Industrial Development Report 2004

Industrialization, Environment and the Millennium Development Goals in Sub-Saharan Africa

The new frontier in the fight against poverty

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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Foreword

When we launched this series on industrial development last year the idea was to offer, as a permanent feature, a tool to assess the state of world industry: UNIDO's Industrial Development Scoreboard. We also chose to focus the report on the roles of innovation and learning as engines of industrial development and the part played in this by global value chains.

As we traveled around the world presenting the first Report, we detected great appreciation for our effort to develop an indicator to benchmark industrial performance, since benchmarking is undoubtedly a vital aid to competing in a global economy. We also found great receptivity to our call to prioritise innovation and learning for wealth creation and growth promotion.

But in addition to that we came across an appetite that the first report did not satisfy; a demand to know what recommendations UNIDO, drawing on its experience, could make both to the poorer countries and to the international community to further their effort to eradicate poverty.

This is why this issue of the *Industrial Development Report* focuses on the countries of Sub-Saharan Africa, a priority region for UNIDO as mandated by our Member States, in keeping with the stipulations of the 1997 Business Plan. Sub-Saharan Africa is the last frontier in the fight against abject poverty. While between 1981 and 2001 the number of people living in absolute poverty fell worldwide from 40 per cent to 21 per cent of the total population, in Sub-Saharan Africa it *increased* from 42 per cent to 47 per cent.

Achieving the non-income poverty Millennium Development Goals – that is, meeting the very basic health, education and infrastructure needs – depends greatly on the availability of additional Official Development Assistance. But achieving the income poverty goal depends more on trade and development. In Sub-Saharan Africa, GDP per person would have to grow on average more than 4 percent per annum until 2015 in order to achieve the income poverty goal.

Where is this growth going to come from? Achieving the non-income poverty MDGs is vital. We reckon that in Sub-Saharan Africa they would deliver an effective GDP growth impulse of about 1.5 percent per year. Clearly, even after allowing for possible cross-effects, this falls far short of what is needed to achieve the income poverty MDG.

How then can this growth gap be bridged? To start with, an exogenous shock will be required in the form of further steps towards market access. The creation of new export opportunities can be expected to provide a significant additional impulse to growth.

However, in their present state the SSA economies are not ready to take full advantage of such opportunities. As international experience teaches, they must embark upon demographic, productivity and technological transitions. This demands – in addition to sound macroeconomic management, good governance and dramatic improvements in agricultural productivity – two vital processes: first, the buildup of institutional and social capabilities, with focus on private sector development; second, economic transformation by means of diversification, structural change and export development.

Only along this path will SSA be able, not just to break out of the vicious circle of poverty, but also to move on to achieving economy-wide productivity growth, attracting FDI, fostering the diffusion of technology, narrowing the gap between potential and actual growth and, ultimately, improving social conditions in a sustainable fashion.

This Report updates and expands the Industrial Development Scoreboard and advances towards specifying policy initiatives – regarding investment, trade, technology and entrepreneurship – that can be adopted at country level to achieve effective and profitable integration into the world trading system, taking full advantage of the opportunities offered to the least developed countries by the multilateral rules.

We still need to define the policy recommendations more precisely and are working on them. This is not a simple task. Drawing prescriptive lessons is not exactly the greatest strength of economics. Much improvement is needed. One of the main difficulties is that an endeavour of this kind must necessarily be highly detailed and context-specific. It also requires developing appropriate means of measuring capacity-building, that can assist in the definition of policies and help bridge the gap between highly quantifiable macroeconomic targets and the still highly notional and qualitative microeconomic ones. We are already working on upgrading the state of the art in this respect. We intend to devote the next *Industrial Development Report* to fine-tuning the specification of policy options.

This Report is also intended to meet another key demand, that of spelling out, for the benefit of the rest of the multi-

lateral system, the recommendations stemming from our work on how to adapt policies so that they can provide better opportunities to the poor countries. This endeavour we find particularly rewarding.

It is part of our broader effort to design a concrete proposal to improve the working of the multilateral system. We have already submitted an outline of this to the United Nations Secretary General and the Chief Executives Board for Coordination. At its core is the adoption of a common Business Plan articulating the efforts of the whole system around the provision of the public goods necessary to defeat poverty, relying on the specialized competencies of the Agencies, Funds and Programmes. The Report reflects the progress we have made in UNIDO along these lines.

Important steps are being taken that should help advance in this direction, such as the UN General Secretary's moves toward reforming of the UN system to strengthen its contribution to world development, the UK initiative to set up an international financial facility to borrow against future aid flows, the U.S. Millennium Challenge Account, and Japan's TICAD scheme. These steps will culminate next year with the UN Summit to review progress since the 2000 Millennium Declaration. UNIDO is fully committed to the effective achievement of the goals and targets of this Declaration.

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Explanatory notes

References to Africa and SSA are to Sub-Saharan Africa and those to LDCs are to Sub-Saharan LDCs, unless otherwise specified.

Designation of least developed countries (LDCs) follows the United Nations definitions, which is based on three criteria: low income (less than $900 estimated GDP per capita, three year average), weak human resources (a composite index based on health, nutrition and education indicators) and high economic vulnerability (a composite index based on indicators of instability of agricultural production and exports, inadequate diversification and economic smallness). There are 49 LDCs in total with 34 of them in Sub-Saharan Africa. The latter account for approximately 60 percent of the total population of LDCs in 2001.

References to dollar ($) are to U.S. dollars, unless otherwise specified.

Billion means 1,000 million.

References to tonnes are to metric tonnes, unless otherwise specified.

The description and classifications of countries and territories used, and the arrangements of the material, do not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country, territory, city or area, or of its authorities, concerning the delimitation of its frontiers or boundaries, or regarding its economic system or degree of development.

Designations such as 'developed', 'industrialized' and 'developing' are intended for statistical convenience, and do not necessarily express a judgment about the state reached by a particular country or area in the development process.

The following symbols are used in tables:

A dash (–) indicates that the value is negligible or nil.

Two dots (..) indicate that the data are not available or not separately reported.

na is not applicable.

Totals may not add precisely because of rounding.

The UNIDO Scoreboard database on selected indicators of industrial performance and 'drivers' draws on numerous databases, as detailed in the part 2 technical notes.

Abbreviations

ACP	African, Caribbean and Pacific
AGOA	African Growth and Opportunity Act
APCI	Africa Productive Capacity Initiative
APRM	African Peer Review Mechanism
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASCM	Agreement on Subsidies and Counterveiling Measures
ASEAN	Association of Southeast Asian Nations
BIPM	Bureau International des Poids et Mesures
BIS	Bureau of Indian Standards
BOD	biological oxygen demand
CAMI	Conference of African Ministers of Industry
CDF	Comprehensive Development Framework
CIDA	Canadian Agency for International Development
CIP	Competitive Industrial Performance
CIS	Commonwealth of Independent States
CO_2	carbon dioxide
COD	chemical oxygen demand
COMTRADE	United Nations Statistics Division's Commodity Trade database
COTEX	Consortium of Textile Exporters
CPC	China Productivity Centre
CPMFI	Cleaner Production Metal Finishing Industry
CSTD	UN Commission on Science and Technology for Development
CT	Clean technologies
DFID	UK Department for International Development
EA2	East Asia excluding China
EAC	East African Community
EACM	East African Common Market
EBA	Everything But Arms
EC	European Commission
EDF	Enterprise Development Fund
EKC	Environmental Kuznets Curve
EOP	end-of-pipe technologies
EPA	Economic Partnership Agreements
EPZs	export processing zones
EST	environmentally sustainable technologies
EU	European Union
FDI	foreign direct investment
FYR	former Yugoslav Republic
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDI	gross domestic investment
GDP	gross domestic product
GEMS	Global Environment Monitoring System
GIS	Geographical Information System
GM	genetically modified
GNI	gross national income
GNP	gross national product
GR ATIS	Ghana Regional Appropriate Technology Industrial Service
GSP	Generalized Systems of Preferences
GTAP	Trade Analysis Project
HDGASA	Hot Dip Galvanisers Association
HIV/AIDS	human immunodeficiency virus/acquired immune deficiency syndrome
HKPC	Hong Kong Productivity Council
HPE	High Performing Economy
HT	high-technology
ICICI	Industrial Credit and Investment Corporation of India
ICT	information and communications technology
IEA	International Energy Agency
IFC	International Finance Corporation
IIRT	International Investors Round Table
ILRI	International Livestock Research Institute
IMF	International Monetary Fund
IPA	investment promotion agency
IRT	International Investors Round Table
ISCED	International Standard Classification of Education
ISIC	International Standard Industrial Classification
ISO	International Organization for Standardization
ITMIN	Industrial Technology and Market Information Network
ITRI	Industrial Technology Research Institute
ITTU	Intermediate Technology Transfer Units
ITU	International Telecommunication Union
IVA	industrial value added
JPC-SED	Japan Productivity Centre for Socio-Economic Development
LAC	Latin American and the Caribbean countries
LAC2	Latin America and the Caribbean without Mexico
LDC	least developed country

LIPC	Lesotho Investment Promotion Center
LLDC	land-locked developing country
LT	low-technology
M&A	merger and acquisition
MAC	Manufacturing Advisory Centres
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
MEP	Manufacturing Extension Partnership
MERCOSUR	Mercado Común del Sur
MFA	Multi-Fibre Arrangement
MHT	medium- and high-technology
MIDA	Malaysian Investment Development Agency
MIGA	Multilateral Investment Guarantee Agency
MP	Millennium Project
MNC	multinational company
MSB	Mauritius Standards Bureau
MSE	micro- and small-scale enterprise
MSME	micro, small and medium enterprise
MSTQ	Metrology, Standards, Testing And Quality
MVA	manufacturing value added
NAFTA	North American Free Trade Agreement
NAMAC	National Manufacturing Advisory Centre
NARI	National Agricultural Research Institutes
NBER	National Bureau of Economic Research
NCPC	National Cleaner Production Centres
NCS	Network Computer Systems
NEEDS	Nigerian Economic Empowerment and Development Strategy
NEPAD	New Partnership for Africa's Development
NGOs	non-governmental organizations
NIST	National Institute for Standards and Technology
NRSA	National Remote Sensing Agency
NTBs	non-tariff barriers
OAU	Organization of African Unity
OBM	own brand manufacturing
ODM	own design manufacturing
OECD	Organisation for Economic Co-operation and Development
OEM	original equipment manufacturing
OPEC	Organization of the Petroleum Exporting Countries
PC	personal computer
PPP	purchasing power parity
PRS	Poverty Reduction Strategies
PRGF	Poverty Reduction and Growth Facility
PRSP	Poverty Reduction Strategy Papers
PSB	Productivity and Standards Board
PSD	private sector development
R&D	research and development
RB	resource-based
RUF	Revolutionary United Front
S&T	science and technology
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAR	Special Administrative Region of China (Hong Kong)
SDF	Skills Development Fund
SERCOTEC	Servicio de Cooperación Técnica
SID	Small Island developing states
SIF	Social Investment Funds
SIDO	Small Industries Development Organization
SISIR	Singapore Institute of Standards and Industrial Research
SITC	Standard International Trade Classification
SME	small and medium-sized enterprises
SMIG	salaire minimum interprofessionel garanti
SOE	State-owned enterprises
SPREAD	Sponsored Research and Development
SSA	Sub-Saharan Africa
STI	science, technology and innovation
TDS	Technology Diffusion Scheme
TICAD	Tokyo International Conference on African Development
TIRDO	Tanzania Industrial Research and Development Organisation
TJ	terajoules
TNC	transnational corporations
TRIMS	Trade-Related Investment Measures
TRIPS	Trade-Related Intellectual Property Rights
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission on Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNITA	União Nacional para la Independência Total de Angola
UNITeS	United Nations Information Technology Services
USHEPiA	University of Science, Humanities and Engineering Partnerships in Africa
USIMINAS	Usinas Siderúrgicos de Minas Gerais SA
WDI	World Development Indicators
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

Overview

The Industrial Development Report 2004 comprises two parts. The first one is devoted to the special focus of this issue: Industrialization, Environment and the Millennium Development Goals (MDGs) in Sub-Saharan Africa (SSA)[1]. The second part reviews global industrial trends.

Part 1: Special focus

Rationale for the geographic and thematic focus of this report: the key issues

The MDGs are meant to be achieved globally by 2015 – or before. But this will not happen for most of the poorest countries, particularly those in SSA, which are seriously off-track, unless the international community and the countries themselves engage in significant additional efforts.[2] What it will take to achieve the MDGs in a sustainable manner through domestic transformation is the main concern of this report.

The MDGs represent a welcome exogenous shock designed to break the most stubborn structural impediments and low-level equilibrium traps that afflict the less developed countries (LDCs). Such a breakthrough cannot be expected to happen as a byproduct of development, since development is what is blocked to start with. Reaching basic human development thresholds, such as those relating to universal enrolment in primary education, reproductive health, infant mortality and gender balance is a pre-requisite for development. But this, important as it is, would of itself not suffice to prompt broad-based development. It will allow increasing the *potential* rate of growth, but much more than that is involved in the transition from the vicious circle of poverty to the virtuous circle of development.

Additional shocks are required: another exogenous one, arising from further steps towards the opening of markets; and domestic ones, such as those aimed at speeding up the demographic, productivity and technological transitions by means of structural change, productivity growth and the building up of social and institutional capabilities. Steps in this direction cannot wait until 2015. Attending to these enabling factors from the very start is necessary not only to ensure rates of growth consistent with achieving the income poverty MDG but also to sustain the goals over time. Ensuring the emergence of a vibrant private sector is also indispensable.

The first questions the report addresses are why SSA countries have been falling behind and what needs to be done so they do not risk falling even farther behind. For this the report examines SSA development fundamentals and strategic options (Chapter 1).

The report then proceeds to gauge the kind of growth performance that would be consistent with achieving and sustaining the income poverty MDG, as well as the sources of that growth and its implications for economic transformation (Chapter 2).

Next, the report addresses the contribution of the private sector to the poverty reduction strategies, and ways to strengthen that contribution (Chapter 3).

Creating the conditions for the dissemination of technology, including environmentally sound and advanced technologies, is critical for the SSA economies to begin to catch up with the rest of the developing world. This is examined in Chapters 4 (environment) and 5 (advanced technologies), with special attention to the pre-requisites for effective technology absorption and dissemination.

In the light of these considerations, the first part of the report concludes with a forward-looking analysis of the policies which could propel SSA towards meeting the MDGs (Chapter 6).

Fundamentals

Seen from the point of view of development, SSA is not just failing to converge with other regions: its decline is absolute. Arresting and reversing economic decline in SSA is the most vital global development challenge today.

The Millennium Declaration puts social objectives first. Meeting the imperious social needs in SSA is actually a precondition of economic development. The inability to cross thresholds such as basic standards of healthcare and education, agricultural productivity and core infrastructure block the region's transition to sustained growth. In SSA, poor non-economic initial conditions translate into a loss of 0.6 to 1.6 percentage points in potential annual growth. But just overcoming these initial conditions is not enough: at issue is the ability to connect the pursuit of social and economic objectives so that they interact positively.

SSA's economic opportunities cannot be properly gauged by treating this heterogeneous region as a single unit. Three

groups of countries can be distinguished: natural-resource economies (accounting for 28.2 percent of the population); economies lacking significant natural resources but with good coastal access (33.2 percent); and countries that not only lack significant endowments of natural resources but are also landlocked (38.6 percent).

Developing natural-resource economies find it hard to transform rents into sustainable growth. This applies to all SSA countries except Botswana, a remarkable case. If Botswana is at one extreme, Sierra Leone is at the other: its income, similar to Botswana's in 1970, is now only a tenth of Botswana's. Most countries in-between did attempt to divert rents into productive development but failed, often for having pursued unsustainable shortcuts, without focusing appropriately on gradual capability- and institution-building.

Worldwide there are plenty of examples of coastal economies that lack substantial resource endowments but have succeeded in breaking into the global market for manufactures. In SSA, Mauritius did, but the rest have not been as successful. Coastal SSA is in some respects located as well as, or better than, the rapid-growth Asian economies. But the market is highly competitive, with narrow margins and tight quality and delivery requirements. So far coastal SSA countries have been unable to provide an environment in which cost, quality and reliability are all satisfied. Hence, apparently advantageous income differentials with other regions, particularly Asia, have not translated in unit labor cost advantages. The EPZs may open a window of opportunity but, as Mauritius shows, what made the difference was not just trade policy.

SSA's landlocked economies without significant high-rent natural resources have not had the option of emulating their West European counterparts by integrating into the surrounding region, because SSA's coastal economies do not offer them sufficient market opportunities. The realization that Africa's landlocked economies would profit greatly from growth-oriented reform in the neighboring coastal economies gives a distinctive rationale for the New Partnership for Africa's Development. Apart from that, the landlocked countries could find opportunities in new developments in global trade, such as the growth of airfreight and the use of electronic transmission and telecommunications in the service economy of the developed countries.

In order to deepen their industrialization, the oil-producing countries of SSA must overcome some of the 'Dutch disease' negative effects of their relatively new-found riches. This means adopting policies to change the relative prices that now tend to discourage investment in manufacturing, and to encourage investment in the basic infrastructure required by industrial development (power, transport, communications).

Other countries, with relatively large populations, can embark on promotion programs to favor depressed regions, expand exports of manufactures, or induce R&D projects in industry. Finally, small landlocked countries may get together with neighboring countries to promote a wider market for manufacturing via free-trade areas or common-market arrangements. In this, full advantage should be taken of WTO regulations that allow for longer grace period for promotional policy measures in low-income developing countries.

Growth, structural change and industrialization

Achieving the MDGs is critical to overcome structural impediments and to prime the SSA economies for growth. But the MDGs alone are not enough to propel growth to the rates that are required for effective poverty reduction. In order to achieve sustainable growth, SSA countries have to undergo a period of structural change promoted by a demographic transition and supported by policies to ease the absorption into manufacturing and service jobs of the surplus labour released by agriculture following significant gains in agricultural productivity.

Halving income poverty by 2015 implies a dramatic turnaround in the economy of SSA, reversing the negative per capita income growth rates of –1.2 percent in the 1980s and –0.4 percent in the 1990s. UNIDO's estimates show that the per capita growth rate required in much of SSA to achieve the income poverty reduction goal is close to 5 percent.

Thirty SSA countries require annual GDP per capita growth rates of 2 to 6 percent to achieve the income poverty MDG by 2015. The weighted mean growth rate required for all the SSA countries is 3.8 percent and the unweighted mean is 4.2 percent. The required growth rate is lower for countries with oil or mining resources and coastal access. The landlocked economies are farthest from the goal, as they need to grow by 4.9 percent annually. Six landlocked countries need to grow by more than 5 percent (5.8 percent on average if Uganda and Malawi are excluded).

Only a few countries are on track to reaching the MDGs: Benin, Cape Verde, Equatorial Guinea, Malawi and Uganda have reduced poverty to the point that their MDG-required per capita GDP growth is less than 2 percent. Mozambique, Mauritania, South Africa and Botswana also face attainable growth-rate requirements.

The poorest SSA countries are also those that pose the greatest challenges in terms of required growth rates in order to achieve the MDGs. They have been making the slowest progress towards the income poverty goal – when they have not actually been slipping away from it. In many SSA countries the MDG growth requirements greatly exceed the best they have achieved in the recent past. If their growth rates do not improve, MDG fulfillment dates would have to be reset as follows: 2066 for the landlocked countries, 2055 for the resource-abundant coastal nations, and 2057 for the coastal ones.

In other words, on the assumption of unchanged policies, an unaltered global trade environment and current levels of foreign assistance and foreign direct investment inflows, few SSA countries will achieve the MDGs. However, because our growth projections assume unchanged patterns of income distribution, it is possible, though unlikely, that even if SSA countries fail to reach required growth rates, at least some of them may still manage to reduce poverty by reducing income inequality.

Decisive progress towards the non-income poverty MDGs would spill over into growth while also helping reduce income inequality and alleviate poverty. Improvements in education, gender quality, health and the environment would have a positive effect on growth through better qualification of the labor force, longer life expectancy, higher productivity and reduced fertility rates. UNIDO's calculations suggest that the achievement of non-income poverty MDGs would help to raise growth by 1.4 to 1.6 percentage points.

The required higher growth rates are not unattainable. They have been achieved elsewhere by countries such as China, India, Republic of Korea, and Thailand, which started at levels of income similar to those of SSA countries today. Their experiences suggest that:

- Significant structural change in output is preceded by protracted 'warm-up' periods.
- Industry's share in employment, value added and exports rises, often substantially, in the first 12 years following the start of sustained growth.
- Faster growth rates are associated with the acceleration of productivity growth in industry.
- Reallocation of manpower across sectors contributes more significantly to aggregate productivity growth where productivity differences across sectors are initially large and where labour shifts more massively to industry.
- In countries with characteristics similar to those of many SSA countries, such as the lack of natural resources, absence of a large industrial base and initial concentration in labour-intensive manufacturing, there is a strong positive correlation between the level of investment and the rise in the share of MVA in GDP.
- Capital accumulation favours export-oriented manufacturing activities relatively to those seeking to serve domestic markets.
- There is no short-run competition for resources between industry and agriculture, be it because of the availability of unemployed resources, productivity gains, or positive input-output linkages. The long-run equilibrium relation between industry and agriculture is positive in most cases.

An important lesson for SSA from the export experience of the high-performing developing economies (HPEs) is that to diversify their export portfolios and reduce reliance on primary commodity exports, it is also essential to move upmarket into faster-growing export markets for medium- and higher-technology products. This is all the more important given the competitive strength of Asian exporters – Bangladesh, China, India, Sri Lanka, Vietnam – in labour-intensive manufactured exports.

The HPE experience also shows that rapid agricultural productivity growth is a key condition for sustained poverty reduction. The contribution of agricultural and rural development to poverty reduction in SSA would have to come from both raising rural incomes and facilitating the movement of the rural poor towards more productive, higher-paid industrial activities. This development would obviously have to include improvements in the health, sanitation, education and property rights of the rural poor.

Unfavorable initial conditions in SSA (which are largely addressed by the MDGs) are estimated to reduce potential growth in the landlocked economies by 2.7 percentage points annually. Significantly, more than half of this forgone growth can be attributed to policy-sensitive conditions. Indicators of income distribution, social capability and institutional quality show SSA at a disadvantage when compared with the HPEs at their point of take-off. But SSA countries can transform unfavorable initial conditions into a platform for industrialization by building, with the support of the international community, functional institutions to aid sound policies.

Private sector development for poverty reduction

Achieving the MDGs by 2015 demands a major financial effort by the international community and the countries involved. Since much of the effort consists of investment in basic social overheads (health, education, infrastructure), undoubtedly much of it needs to be channelled through the government. These investments will help reducing SSA's growth handicap. However, significant reductions in income and non-income poverty cannot be achieved, and even less sustained, without growth.

But where is this growth going to come from? Chapter 2 addresses this question as it relates to diversification, structural change and capability building, Chapter 3 tackles it from the perspective of the role that private sector development (PSD) can be expected to play in achieving the productivity improvements that are needed to fuel poverty reduction. It also considers how to foster such a role.

The accelerated economic growth that is necessary to achieve the MDGs and, just as importantly, to sustain them over time, can only be driven by the private sector, which needs to be ensured the right institutional and policy environment and to acquire the ability to engage in dynamic export development.

The incipient private sector of an LDC can hardly be expected to be able to engage in productivity catching-up and international competition in a policy environment that does not go beyond good macroeconomic management, improved governance and a healthy investment climate. Functional capability-building policies are also required; that is, those relating to the technological infrastructure; extension services for the SMEs; enabling mechanisms for firms to master tacit knowledge, skills and experience; and training and assistance to speed up managerial, organizational and technical learning and to build up the ability to conform to standards and technical regulations in foreign markets. The provision of this kind of public goods is taken for granted in advanced industrial countries, but it still needs to become part of PSD policies in the LDCs.

Poverty Reduction Strategies (PRS) are the principal national policy tool in the effort to achieve the MDGs. So far 28 countries in SSA have submitted either full or interim PRS papers (PRSPs). Another eight countries are in the process of

preparing one. By 2001 only about a third of countries with PRSPs had included private-sector participation. This is a first hurdle, related in good measure to the weakness of the formal private sector in the LDCs.

Other hurdles are the multiplicity of strategies and demands on the countries by different donors and international agencies, as well as domestic political actors, in the process of producing the PRSPs, and the frequent conflict of timeframes – between those of the MDGs set for 2015, the typical PRSP which covers a span of three to five years, and those of other agencies.

Furthermore, material constraints are often invoked as the reason for not matching macroeconomic imperatives with the establishment of a sound incentive framework for microeconomic decision-making and the corresponding supply of public goods. This often translates into a conflict between macroeconomic targets and social development objectives. An increasing number of PRSPs have been trying, rather timidly, to bridge this gap by presenting alternative scenarios side-by-side: the resource requirements for costed actions in their full version and the requirements for actions scaled down to the existing budget. However, this is not just about resources. It also has to do with building bridges between the macroeconomic and the microeconomic incentive systems and the supply of public goods.

There is no reason why mobilizing the private sector should wait until the MDGs are achieved. Indeed, doing so may well jeopardize the success of current efforts in that direction. There is consensus that low-income African economies will not break free from the shackles of poverty unless and until they diversify their economies, especially through industrialization. Productive development is crucial to promoting economic growth and poverty reduction. Hence, development policy must combine PSD policies, especially those related to SMEs, with macroeconomic policies, if it is to enhance growth and reduce poverty. This is highlighted by a number of PRSPs. The limited private sector response in most SSA economies, with a few shining exceptions (Botswana, Mauritius, Mozambique and South Africa), and de-industrialization in a majority of them, imply that PRSP strategies are failing to deliver in this crucial aspect. Slow progress in poverty reduction correlates with shortcomings in PSD, industrialization and structural reform, including institution-building. Where PSD is concerned, this is partly because the skills, expertise and culture of the governments and donor agencies involved do not necessarily match the needs of the private sector.

Problems arising from the scale, scope and nature of private activity in SSA as well as the scarcity of reliable data on the size, structure and potential of the private sector are clearly also important. Even where the organized private sector does exist, it is unrealistic to expect profit-motivated entrepreneurs to engage in a PRSP designing process lasting more than 26 months from which they see very little gain. At the implementation stage, the relative sparseness of private-sector goals and targets means that there are few gauges of the degree of participation and effectiveness of private sector efforts in achieving the aims of the PRSPs.

Policies to ensure sustainable growth led by the private sector need to be brought to the core of the PRSPs. This includes integrating capacity-building for PSD in the PRSP agenda, financing industrial growth, improving public-private consultation and partnership, and incorporating mechanisms for the private sector to cope with external shocks and volatility.

More specifically, action needs to be taken to foster the supply of non-financial services, especially those aimed at developing entrepreneurial, technological and trade capacities, including export promotion and the encouragement of local industry outsourcing, particularly by SMEs; the capacity of technological institutions to deliver support services to industry; and the formation of business consortia to improve access to markets, finance and input factors. The establishment of productivity councils might be an important step in this direction.

Industry and the dissemination of environmentally sound technologies

In SSA's predominantly rural economies, solving environmental problems means ensuring better living conditions for millions. At present, due to factors such as the age of the technologies in use, shop-floor practices and other characteristics of industrial establishments, industrial pollution in the region is becoming highly concentrated, with rising intensity, especially around growing urban centers.

Achieving the income poverty MDG implies a pattern of structural change consistent with high rates of economic growth. Consequently, policy interventions in SSA countries need to address the problems of environmental degradation associated with rapid increases in industrial activity. A rising income per capita will not, on its own, ensure improvements in environmental performance over time.

Most indicators show environmental degradation first increasing with growing income, and only starting to decline after reaching a critical turning point. For biological oxygen demand (BOD) – a measure of water pollution – this turning point comes only at a very advanced level of development (per capita income of $20 000). For global pollutants such as CO_2, the turning point occurs beyond the observable income range of industrialized countries. All this suggests that without intervention, environmental degradation will get much worse before, and if, it gets any better – a delay SSA countries cannot afford.

This means that environmental policy interventions have a role in the earlier stages of development. The structural change implicit in attaining the growth rates demanded by the income poverty MDG means that ways must be found to achieve the kind of industrial development that will allow SSA countries to prevent, early, the consolidation of a harmful linkage between industry and pollution.

An environmentally sound industrial development strategy requires special attention to two areas: the integration and cohesion of industrial and environmental policies and the dissemination, with international assistance, of environmentally sound technologies (ESTs).

First of all, there is a need for a more strategic approach to influencing how changes in scale, composition and technology configuration can reduce pressures on the environment. Countries tend to pursue separate policies in each of these three domains. They have yet to take advantage of their potential synergies for reducing environmental impact.

Second, sectorally and regionally focused technology upgrading programs need to be designed and adequately supported. These programs would align all the factors, both internal and external to a firm, to address the more serious environmental pollution problems and enhance productivity in the utilization of energy, water and material resources. To be successful, however, these must dovetail with the broader effort of enhancing the technological capabilities of firms to compete in domestic and international markets.

In addition to these, steps need to be taken to eliminate waste in production, as envisioned by the Cradle-to-Cradle strategy for industrial design and technology. Indeed, much remains to be done towards designing appropriate policy measures and incentive structures that will gradually help overcome 'degenerative' patterns of industrialization.

Advanced technologies: from elusive promise to reality in Sub-Saharan Africa

While the revolution in life sciences and ICTs has brought about new opportunities for wealth creation and hopes for novel development solutions, for the LDCs the benefits from these technologies have so far been very limited. Looking forward, one thing is sure: the SSA countries cannot afford to focus on upgrading their industrial capabilities along purely conventional lines. They also need to tap into the advanced technologies.

New technologies (information and communications technologies, biotechnology, spatial information technologies) provide an array of diverse new applications in agriculture, health, and environmental management that can be of significant value for SSA – provided that the basic infrastructure, human-capacity and institutional constraints are overcome with international technical and financial help. Vital among institutional constraints that need to be eased are those relating to the lack of appropriate incentive systems and the undersupply of public goods.

Undoubtedly, many of these technologies can help provide solutions to basic needs, such as cheaper diagnostic kits and drought-resistant seeds. They can also create aids to better governance via the effective use of data and transparency of public information, and help to improve productivity dramatically both in agriculture and in industry.

The fixed start-up costs of biotechnology laboratories, Spatial Data Infrastructures used for geographical information systems, or computer networks, are often inhibitory in Sub-Saharan African LDCs in the absence of external financial and technical help. While most financial resources are initially needed to upgrade physical facilities, recurring costs for such projects generally require more than 10 percent of the initial capital outlays per annum. One further limiting factor is that the adoption, adaptation and eventual innovation related to technological upgrading require the ready availability of threshold skill pools. Apart from the technical skills, managerial capabilities can limit the effectiveness of advanced technologies in developing-country settings. In SSA countries, where average gross secondary and tertiary school enrolment are 27 percent and 4 percent respectively, it is clear that the achievement of MDGs will provide an important impetus to raising the potential pool of skilled labor and improving the infrastructure. However, in order for advanced technologies to fulfill their potential in SSA, further investments have to be made specifically to set up and improve the capabilities of the public and private scientific and technological research and extension infrastructures.

Clearly, investing in new technologies entails key important policy choices and trade-offs, from the kind of infrastructure needed to support new technologies to ethical considerations relating to bio-safety. SSA country governments, civil society and private sector all need to be informed of the benefits and costs of adopting and adapting new technologies to their circumstances.

Private investment is crucial to the uptake of advanced technologies in SSA. Given the low level of development of advanced-technology markets in SSA so far, this will require creative policy interventions to ensure that the constraints binding PSD in this field are gradually eliminated. While public initiatives have 'illustration value', more work needs to be done on PSD. In this vein, the extension approach creating explicit links between the public and private institutions such as universities, state R&D laboratories and firms that have been successfully employed in other developing countries should also be encouraged in SSA countries.

Finally, as illustrated by community telecommunication centers and pre-paid mobile telephones, it is possible to bring advanced technologies profitably to poor regions using the right mix of services and a basic level of infrastructure. Needless to say, in order to scale up such initiatives to ensure that there are pronounced social and economic benefits, fundamental structural impediments such as lack of human capital must be overcome and the supportive institutional framework must be put in place.

Promoting industrial development in Africa: policy needs

Current policies do not deal adequately with the structural problems that hobble manufacturing in Africa. They do not appropriately factor in the need to endow African countries with the capacity to respond to the challenges of technical change, liberalization and shrinking economic distances. There is, however, no universal 'quick fix' to develop productive capacity: the process is slow and highly differentiated by activity and by country. To succeed, any strategy must be highly context-specific; sensitive to local needs, environments and resources, and integrated across the factor markets and institutions.

At its heart must be the building of industrial capabilities, which calls for much more than the essential triad of better macro management, improved governance and a healthy

investment climate. The first step in fostering productive capacity in Africa is to include a focus on supply-side policies within broader policies, as the New Partnership for African Development has chosen to do.

The targets for productive development can be derived from the MDGs, and be made fully consistent with them. In order to cut income poverty by half in SSA, UNIDO estimates that the growth rates required for industrial value-added are between 6 percent and 9 percent. This needs additions to physical capacity; new factories, equipment and so on. But just building capacity is not the answer to African industrial problems. More important is to build *capabilities* – to operate plants at competitive levels, raise quality, introduce new products, upgrade practices and diversify into higher-value-added activities. This also requires investment, but it needs a set of resources more precious than money: skills, organization, knowledge, information, technology and institutions.

There is clear need to develop gauges for capacity building and PSD. The lack of a production function relating inputs of factors to the output of capabilities makes quantifying capability development a difficult task. One way to go about it is to undertake needs assessments akin to those the United Nations Secretariat's Millennium Project applies to such diverse, and equally challenging, fields as health, education and the environment. Scenarios for institutional and capability development ought to be drawn up as a necessary supplement to the MDGs and in line with the MDG-consistent growth rates. There is no reason why institutional and capability development could not be expressed in terms of specific indicative measurements, in the same manner as with the MDGs, since what underpins such development is the availability of skills and services that are essentially quantifiable. The report suggests a few of these 'metrics' for investment promotion, R&D, scientific and technical cadres in enterprises and exports. No doubt, taking such metrics as mandatory quantitative targets would be futile in the absence of genuine improvements in the capacity to create wealth. In and of themselves, the metrics are devoid of any meaning and may turn into a straight-jacket. What matters is their implications on the input side since none of the respective targets could be achieved without allocating resources to developing the skills and capabilities necessary to enable countries to attain their objectives. Incorporating variegated economic and social objectives to a common operational platform, to which all bodies of the multilateral system contribute, is probably the only way to respond to the urgent need to integrate them in development practice.

In this context, there are a number of policy needs that are relevant to virtually all countries across SSA in terms of improving technological capabilities, infrastructure, business environment, investment opportunities and institutional quality.

Before embarking on a strategy that will enable a privately driven endogenous growth process to materialize, SSA governments need to upgrade their policymaking capabilities. Another basic need, widely agreed, is to build human capital. Part of the challenge is to raise the quantity and improve the quality of formal education at all levels, increasing the focus on technical, entrepreneurial and managerial skills. In order to make the formal education more relevant to the needs of the productive sectors it is advisable to involve the private sector and empower the local communities in the design and content of the curriculum and in monitoring quality and delivery of skills.

A comprehensive audit of skill needs for productive capacity development is necessary to design strategies and set priorities not just at present but also in the future. Improving the functioning of skill levy systems and making their operations credible and relevant to industry as well as launching training institutions directly linked with, and in some cases managed by, industry, are also necessary. In many cases, industry associations can be encouraged to set up such training centers. SMEs especially require further support to recruit better-trained labour and to invest in formal training through information dissemination and incentive programs.

A complementary strategy to promote a 'technology culture' in private enterprises is also important, so that the demand for capabilities also induces supply. This is not so much a matter of formal R&D (though this *is* relevant to large firms) as of technological effort to improve productivity and quality and develop more competitive products. The effort involves a range of measures like fiscal incentives, subsidized credit and venture capital provisions – but this is not sufficient. It also involves an effort to persuade enterprises of the need for greater technological effort, and for changes in management outlook, work practices and resource allocation.

Building technological capabilities is particularly important as SSA countries will need to tap into emerging and advanced technologies as well as more traditional ones in order to compete in world markets. For example, if employed more effectively in SSA, an extension approach to creating explicit links between public and private sectors could help promote private investment in new technologies. Also, governments can help the dissemination of these technologies by simply using them more widely (as in e-government services) and promoting private supply. The private sector can be encouraged through outsourcing agreements, credit schemes, licensing regulations and public-private partnerships. Regional networks to build scientific and technological capabilities, as those envisioned by NEPAD, represent an important opportunity to tap into regional complementarities and economies of scale. The technical and managerial capacity of the African diaspora, particularly in establishing links with foreign universities and businesses, is undoubtedly an important resource for these purposes.

Another pressing policy need is to improve the infrastructure for metrology, standards, testing and quality (MSTQ), ensuring that industries have access to accredited facilities for testing, certification and calibration. A useful target would be for national MSTQ agencies to meet at least 60-75 percent of industry's needs in these areas. Similarly, encouraging the R&D institutions and universities to associate more closely with industry helps to increase their relevancy for productive sectors. This can be achieved by using catalytic programs to fund enterprise research contracts and inducing institutions

to earn more by selling services to industry – for example a 'hard budget' constraint can be established requiring R&D institutes to earn 40 percent of their revenues by the sale of services within five years.

In addition to capacity-building efforts in technological skills and infrastructure, the physical infrastructure requirements of the SSA economies are often among the most pressing needs. In order to prioritize and develop a comprehensive strategy to overcome the bottlenecks, an analysis of the situation should be undertaken involving the private sector. In some instances, pooling resources with other countries in the region can lead to the development of an efficient infrastructure serving common needs within SSA.

While this kind of recommendations are been increasingly featured in SSA countries' PRSPs, they need to be fleshed out according to specific country conditions and productive capacity-building needs. It is necessary to undertake more research on and benchmarking of African manufacturing to strengthen existing activities and to understand impediments both by the public and private sector stakeholders. This requires greater involvement of the private sector in the preparation and implementation of PRSPs, including specific time-bound targets to promote productive capacity development, especially in the SME sector. By integrating the trade capacity building agenda into the PRSP strategy, it is possible to ensure that the different aspects of development strategy are better aligned.

Most SSA economies have much to gain from across-the-board measures to improve business environment conditions. Such reforms can be expected to provide the critical mass necessary to attract investment without which few countries can hope to meet their MDGs. Important among these are raising corporate and intellectual property law to current best-practice levels, ensuring that the legal system has the right skills and capacities to implement them effectively. Removing unnecessary barriers to entry, such as ownership stipulations and cumbersome registration and permit procedures as well as the impediments that arise in import and export procedures, is necessary if SSA countries are to participate in global production networks.

Investment promotion agencies (IPAs) have an important role in actively pursuing FDI and assisting entrepreneurs, foreign or local, who are interested in investing in the country. The funding and staffing of IPAs need to be significantly strengthened and cost-effective reforms introduced to improve their performance. It is critical to involve more directly the private sector, including the MNC affiliates, in promotion activities, as existing investors are the best ambassadors for investment promotion. IPAs should be proactive, reaching out to enterprises and providing a complete package of services with the minimum of bureaucratic procedures. For many SSA countries, coordinating investment promotion activities with counterparts in the region makes good sense, as much of investment promotion in SSA is about getting rid of the bad perceptions about the business environment in the continent. IPAs should be enticed and monitored by setting performance targets for attracting FDI. If the current share of IPA-generated FDI is only 10 percent of total inflows, a target of at least 25 percent would seem to be reasonable over ten years. Efficient EPZs run on private sector lines (perhaps even by foreign investors) and productivity centers that provide incentives tied to results achieved in productivity and exports, are also among the potential policy tools to leverage investment and private sector growth.

SSA's development efforts require the active support of the international community to succeed. This is why it is so important to correctly understand its development needs and provide the necessary support, not just through financial means, but also with advice, information, skills and assistance.

This Report has emphasized that attaining and then sustaining the MDGs in Africa entails renewed industrialization – and vice-versa. A healthy and competitive real sector of the economy is necessary to drive income, export and employment growth. It is also necessary to move African economies out of their reliance on a squalid economic structure that doesn't deliver sustained development. Only this way Africa can integrate productively into the international economy.

The SSA countries need to articulate coherent packages of policies which meet two standards: first, to effectively tap available sources of growth; and, second, to take maximum advantage of trade opportunities through domestic capacity building and structural change. These efforts have to be guided by assessments of institutional and capability development needs akin to those undertaken for the MDGs. This approach should render what would amount to today's equivalent of the policy interventions that led to the recent successful industrialization experience in Southeast and East Asia. *Mutatis mutandis* and with the necessary equity considerations, this would appear to be the road forward.

Part 2 – Review of industrial trends

Global industrial performance

The most notable trend in global industrial performance between 1980 and 2000 is the increase in the developing world's share of global manufactured value added (MVA), from 14 percent to 24 percent. Within this broad trend, though, the performance of regions and countries has varied significantly. Transition economies suffered a large decline in industrial activity in the early 1990s, a result of the shock of rapid liberalization. On the other hand, the 45 LDCs covered by the database improved their industrial growth rates marginally since the mid-1980s, albeit from a low starting point.

The distribution of manufacturing production in the developing world is becoming less unequal overall, but this has been happening mainly through the success of a few large successful economies, with China in the lead. The bottom half of the developing world's population continues to account for a tiny share of global MVA. The gap between the industrially richest and poorest countries has been widening; for the world as a whole in the second half of the 1990s, and for developing countries over the last two decades.

East Asia, excluding China, is now the most industrialized region in the developing world. It has been the engine of recent overall industrial growth, doubling its share of the

developing world's MVA from 29 percent in 1980 to 54 percent in 2000. Latin America and the Caribbean (LAC) has been the largest loser: from being the leading region in 1980, with a 47 percent share, it ended the period a poor second with a 22 percent share. SSA also lost share, from 1 percent to 0.8 percent. South Asia and the Middle East and North Africa (MENA) increased their shares slightly.

Over the last 20 years, there has been a shift in the technology composition of manufacturing from resource-based (RB) and low-technology (LT) activities to medium- and high-technology (MHT) ones in both industrialized and developing economies. Transition economies exhibit (in the midst of their industrial decline) a growing share of resource-based activities. LT activities grew slowest in both industrial and developing countries.

Developing country exports have grown faster than those of industrial ones in all technological categories and periods except for RB products in the early 1980s. The developing countries' lead is greatest in HT products, followed by MT ones. Export performance is highly uneven in the developing world, more so than MVA. East Asia, including China, accounts for nearly 70 percent of the developing world's manufactured exports in 2000, up from 52 percent in 1981.

Benchmarking industrial performance

The mapping of industrial activity in this report covers 155 countries over 1980-2000. It also extends and updates the Competitive Industrial Performance (CIP) index by broadening its definition to include four components: MVA, manufactured exports, industrialization intensity and export quality. Productivity has not been included in the set of industry-specific indicators underlying the CIP index for reasons of data availability. However, the CIP index score is positively and systematically correlated with average labor productivity for the whole manufacturing sector between 1980 and 2000 across a relatively small set of developing countries.

Singapore was the best global performer in 1990 and 2000. Next comes Ireland, which leaped to second place in 2000 from ninth in 1990 and 19th in 1980. Interestingly, Singapore and Ireland followed similar strategies, entering high-technology global value chains and developing strong human capital and infrastructure. The next six places in 2000 are held by mature industrial countries, led by Switzerland. Finland follows, having moved up three places in the 1990s, displacing Japan, which has moved down to the sixth position.

On a regional level, there has been a small, steady decline in the CIP index for the industrialized world and a steady, rapid rise in East Asia's. The index for LAC starts at the same level as East Asia in 1980, declines in the 1980s and rises in the 1990s, ending the period slightly higher than at the start. The MENA starts with the lowest index value in 1980, improves significantly in the first decade and slows down in the second. South Asia has a consistent but small rise in both decades. SSA ends the period more or less where it started, but this time behind the MENA region. That said, regional aggregates do not show the role of 'outliers' in each region, like China in East Asia, Mexico in LAC, South Africa in SSA or India in South Asia.

Among the newcomers to the CIP index database, the transition economies and the SSA countries are of particular interest. Transition economies span a large range in the CIP index, from Hungary at 21 to Kyrgyz Republic at 121. The best performers among the transition countries, such as Hungary, Poland and Czech Republic, have relatively high indices for industrialization intensity and export quality performance.

The economies of SSA tend to cluster near the bottom of the CIP index, occupying 19 of the last 30 ranks. There is a clear break in the ranks after the leader, South Africa: the next in line, Mauritius, is 21 ranks lower. The Seychelles has also improved its ranking from 90th in 1980 to 77th in 2000 since its MVA per capita has nearly trebled. Cape Verde has also improved its position.

One of the many factors accounting for sustained success seems to be the ability to develop exports by tapping into global value chains. There are two routes to doing this: building strong local capabilities (in domestic enterprises) or attracting export-oriented FDI. The Republic of Korea and Taiwan Province of China chose to build domestic capabilities first, while Malaysia chose to rely on FDI – but over time there has been growing convergence between them.

If embedded in a broader set of indicators, the CIP can also shed light on the role of industry in overall development and poverty reduction. Although no conclusive evidence is reached about the direct contribution of enhanced competitive performance to poverty-reducing employment and income generation, there is fairly strong evidence about industry's indirect contributions to poverty reduction. A sample of over 50 developing countries examined on the basis of data for 1990 and 2000, shows a strong positive association between the CIP index and GDP per capita, and suggests that an increase of 0.01 of the former would lead to a rise of between $250 and $300 (in 1990 prices) in the latter. This, in turn, implies reduction of poverty – indirectly through improved industrial performance – on the assumption that growth in the aggregate is likely to benefit the lowest incomes too.

The report also benchmarks five leading factors that greatly influence competitive industrial performance: skills, technological effort, inward FDI, technology licensing and modern infrastructure. The idea is not to fully account national industrial performance but to capture key influences on industrial performance and second, to have comparable quantitative data across a wide range of economies.

There seems to be a clear correspondence between industrial performance and the above-mentioned factors at the regional level. Not surprisingly, industrialized countries do better in all of them, with the largest lead in R&D. In the developing world, East Asia without China has the strongest set of factors, with the exception of FDI per capita and telephone mainlines per 1000 people, where LAC does better in the late 1990s. LAC follows in most variables, but MENA has a higher tertiary technical enrolment rate in 1998. South Asia and SSA without South Africa lag significantly behind. Finally, judging by the results of a regression analysis based on data for 35 countries in 1990 and 51 countries in 2000, the factors accounted for do seem to influence countries' ability to mount competitive industrial performance. In particular, FDI, R&D and royalties achieve significance in both years.

Table 0.1 Millennium Development Goals, targets and indicators for the monitoring of progress

Goals and targets	*Indicators for monitoring Progress*
GOAL 1: Eradicate extreme poverty and hunger	
TARGET 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day.	1. Proportion of population below $1 (PPP) per day. 2. Poverty gap ratio [incidence x depth of poverty]. 3. Share of poorest quintile in national consumption.
TARGET 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	4. Prevalence of underweight children under 5 years of age. 5. Proportion of population below minimum level of dietary energy consumption.
GOAL 2: Achieve universal primary education	
TARGET 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.	6. Net enrolment ratio in primary education. 7. Proportion of pupils starting grade 1 who reach grade 5. 8. Literacy rate of 15–24 year-olds.
GOAL 3: Promote gender equality and empower women	
TARGET 4: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015.	9. Ratio of girls to boys in primary, secondary and tertiary education. 10. Ratio of literate women to men, 15–24 years old. 11. Share of women in wage employment in the non-agricultural sector. 12. Proportion of seats held by women in national parliament.
GOAL 4: Reduce child mortality	
TARGET 5: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate.	13. Under-five mortality rate. 14. Infant mortality rate. 15. Proportion of 1 year-old children immunized against measles.
GOAL 5: Improve maternal health	
TARGET 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio.	16. Maternal mortality ratio. 17. Proportion of births attended by skilled health personnel.
GOAL 6: Combat HIV/AIDS, Malaria and other diseases	
TARGET 7: Halt by 2015 the spread of HIV/AIDS and have begun to reverse it.	18. HIV prevalence among pregnant women aged 15–24 years. 19. Condom use rate of the contraceptive prevalence rate. 19A. Condom use at last high-risk sex. 19B. Percentage of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS. 19C. Contraceptive prevalence rate. 20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10–14years.
TARGET 8: Halt by 2015 the incidence of malaria and other major diseases and have begun to reverse them.	21. Prevalence and death rates associated with malaria. 22. Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures. 23. Prevalence and death rates associated with tuberculosis. 24. Proportion of tuberculosis cases detected and cured under DOTS.
GOAL 7: Ensure environmental sustainability	
TARGET 9: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources.	25. Proportion of land area covered by forest. 26. Ratio of area protected to maintain biological diversity to surface area. 27. Energy use (kg oil equivalent) per $1 GDP (PPP). 28. Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons). 29. Proportion of population using solid fuels.
TARGET 10: Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation.	30. Proportion of population with sustainable access to an improved water source, urban and rural. 31. Proportion of population with access to improved sanitation, urban and rural.
TARGET 11: Achieve by 2020 a significant improvement in the lives of at least 100 million slum dwellers.	32. Proportion of households with access to secure tenure.
GOAL 8: Develop a global partnership for development	
TARGET 12: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system. This includes a commitment to good governance, development and poverty reduction, nationally and internationally.	*Official development assistance* 33. Net ODA, total and to the LDCs, as a percentage of OECD/DAC donors' gross national income. 34. Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation). 35. Proportion of bilateral ODA of OECD/DAC donors that is untied. 36. ODA received in landlocked countries as a proportion of their gross national incomes. 37. ODA received in small island developing States as proportion of their gross national incomes. *Market access* 38. Proportion of total developed country imports (by value and excluding arms) from developing countries and from the LDCs, admitted free of duty.
TARGET 13: Address the special needs of the least developed countries. This includes: tariff- and quota-free access for LDCs' exports; enhanced program of debt relief for heavily indebted poor countries (HIPC) and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction	
TARGET 14: Address the special needs of landlocked countries and small island developing States.	

Table 0.1 Millennium Development Goals, targets and indicators for the monitoring of progress *(continued)*	
Goals and targets	*Indicators for monitoring Progress*
TARGET 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term.	39. Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries. 40. Agricultural support estimate for OECD countries as a percentage of their gross domestic product. 41. Proportion of ODA provided to help build trade capacity. *Debt sustainability* 42. Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative). 43. Debt relief committed under HIPC Initiative. 44. Debt service as a percentage of exports of goods and services.
TARGET 16: In cooperation with developing countries, develop and implement strategies for decent and productive work for youth.	45. Unemployment rate of young people aged 15-24 years, each sex and total.
TARGET 17: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries.	46. Proportion of population with access to affordable essential drugs on a sustainable basis.
TARGET 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.	47. Telephone lines and cellular subscribers per 100 population. 48A. Personal computers in use per 100 population. 48B. Internet users per 100 population.
Source: UN (2003) "Millennium Development Goals". http://unstats.un.org/unsd/mi/pdf/mdglist.pdf. *Note:* Goals, targets and indicators effective 8 September 2003.	

The MDGs and targets were established by the signing of The Millennium Declaration by 189 countries, including 147 heads of State and Government, in September 2000. MDGs consist of 8 goals, 18 targets and 48 indicators for monitoring progress; the goals and targets are interrelated and need to be seen as a whole (Table 0.1). Implementation of the Millennium Declaration is done through the Millennium Project, country-level monitoring, the Millennium Campaign and operational country-level activities by the UN. The Millennium Project focuses on identifying the operational priorities, organizational means of implementation, and financing structures necessary to achieve the MDGs, through research done by ten thematically oriented Task Forces. The first review of progress towards the MDGs is due to take place in 2005, when the Millennium Project will also present its final recommendations to the Secretary-General.

Source: The Millennium Project, 2002.
http://www.unmillenniumproject.org/html/about.shtm

Notes

[1] On the MDGs, please see Table 0.1 at the end of the Overview. On the references to the Sub-Saharan and least developed countries, please see the Explanatory Notes on page xii.

[2] According to the World Bank's World Development Indicators, SSA increased its share in the total number of people living in extreme poverty by a factor of almost three in the last two decades – from 11.3 percent in 1981 to 18.6 percent in 1990 and to 28.5 percent in 2001. If China is excluded, it went from 19.4 percent in 1981 to 27.0 percent in 1990 to 35.4 percent in 2001, respectively. While the number of people living in extreme poverty *decreased* by 24 percent worldwide between 1981 and 2001, largely owing to the outstanding performance of East Asia and China, in SSA it *increased* by 91 percent. No other region suffered an increase in the absolute and relative number of people in extreme poverty, with the exception of Eastern Europe, where the share of people in extreme poverty in total population went from 0.3 per cent in 1981 (41.6 percent in SSA) to 3.7 per cent in 2001 (46,5 percent in SSA).

First Part

Special Focus

Poverty in Africa: the underlying fundamentals

CHAPTER 1

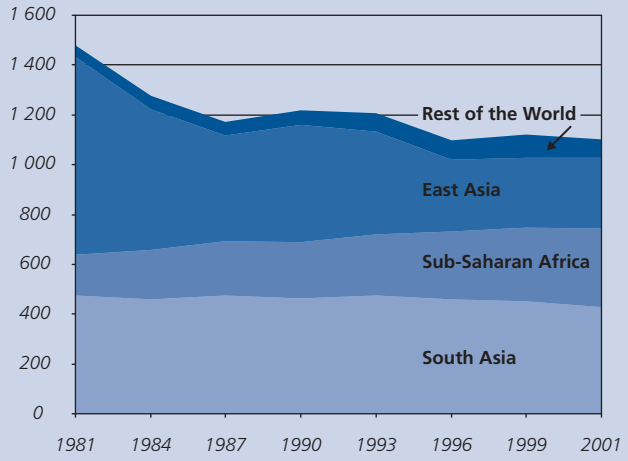
Sub-Saharan Africa: Diagnosis and strategic options

The economies of Sub-Saharan Africa (SSA) have been in decline for a quarter of a century. Unless this disturbing trend is reversed, the Millennium Development Goals (MDGs) are unattainable for Africa. The trend is all the more remarkable because it is exceptional: the other regions that around 1980 were characterized by low per capita income – South and East Asia – have on average grown rapidly. Yet the decline is not merely relative. SSA is not just failing to converge with other regions, its decline is absolute: per capita incomes are significantly lower now than a quarter-century ago. Nor was this decline the result of a sudden, dated catastrophe across the continent, or a disastrous performance in a few countries. Rather, decline has been fairly continuous over the entire period. Brief periods of positive growth have been interspersed with longer periods of decline. While, as discussed below, decline has not been universal, it has been the growth successes that have been exceptional: decline has been the norm.

SSA is not just failing to converge with other regions, its decline is absolute.

Africa has, as a result, become *the* development challenge. It is already the region at the bottom of the ranking of indicators for the MDGs. On present trends most of the developing world will continue to converge with the developed world, but significant parts of Africa will not merely fall behind; they will fall apart.[1] The 'overarching' MDG – the halving of income poverty – is evidently unattainable for the region without the reversal of overall economic decline. Average per capita income is simply too low to achieve the intended scale of poverty reduction solely through redistribution. For example, the next-poorest region, South Asia, has a per capita income, measured on a purchasing power parity (PPP) basis, that is about 50 percent higher than that of SSA. In the richer regions substantial reductions in absolute poverty might hypothetically be achieved purely through redistribution, and even in Africa some of the other MDGs, such as primary education and gender equality, *can* be achieved without growth. But growth is going to be necessary for massive poverty reduction in Africa. The global development challenge will increasingly become the need to arrest and reverse African economic decline, rather than to accelerate development in the bulk of the developing world (figure 1.1).

Figure 1.1 Sub-Saharan Africa's uniqueness



Source: Chen and Ravallion, 2004.

Basic thresholds as first hurdles

The Millennium Declaration poses a major challenge to development thinking and practice in that it places social objectives upfront. This reflects the conviction that, particularly in the worst-off countries, social outcomes cannot be expected to result as an automatic byproduct of protracted economic development processes, assuming that these actually occur. Thresholds such as basic standards of governance, healthcare and education, agricultural productivity and core infrastructure, may become hurdles blocking the dynamics needed to break out of the poverty trap, and thus preventing the transition to sustained growth.

Economic decline is both cause and consequence of adverse social conditions. In SSA, education enrolment rates are low, and the quality of education, measured by proxy indicators such as pupil-teacher ratios, is worse than in any other region. Life expectancy, already lower than any other region, is actually falling. Economic transformation and industrializa-

Box 1.1 Building domestic capabilities

Africa can enjoy sustained growth of incomes, employment and exports provided that its enterprises can raise productivity to competitive levels, and keep it there.[1] While raising productivity is desirable *per se,* this is not enough to ensure growth in a liberalizing world if the *level* of productivity (even after adjusting for lower wages) is below that needed to compete. Some activities may survive at lower productivity levels if they do not face direct foreign competition (for instance, they may be protected by high transport costs or access to cheap local raw materials, or they may serve niche markets that imports cannot threaten easily). Such protected or niche activities have largely driven Africa's recent (anemic) industrial growth in countries that have allowed import competition. But such activities will not suffice to deliver the rates of growth required by the MDGs because they are confined to small markets and, most importantly, cannot provide the foreign earnings Africa badly needs. African enterprises must enter the larger arena, both at home and abroad, if they are to provide significant industrial growth.

The key to raising productivity to competitive levels lies in improving industrial capabilities. But what are industrial 'capabilities'? They are not production capacities in the sense of physical plant, equipment and buildings; it is relatively easy to acquire or build capacity, at least if the financial resources are available. Capability – the ability to make capacity operate competitively – requires something more: the tacit knowledge, skills and experience related to specific technologies that is collected by enterprises and cannot be imported or bought in. The process involves creating new skills, partly by formal education but, usually more importantly, by training and the experience of new technologies. It requires obtaining technical information, assimilating it and improving upon it. It entails building institutional rather than individual capital, with new managerial and organizational methods, new ways of storing and disseminating information and of managing internal hierarchies. It also needs intense interaction between enterprises – firms do not learn on their own – and between enterprises and support institutions. Finally, it requires the factor markets that provide skills, technology, finance, export marketing and infrastructure to respond to the new needs of enterprises.

The process of capability building has to be continuous, not once-for-all, because technologies and market conditions change constantly, and responding to these changes requires new skills and knowledge. Building competitive capabilities needs policies to overcome these market failures.[2] The story of industrial success in the developing world is in fact the story of how effectively governments have helped their enterprises to overcome such failures in capability building.

Source: Lall, 2001.

Notes: [1] Productivity here is interpreted broadly to include not just production but also quality, design, delivery and marketing.

[2] Policies have to address market failures at three levels. The first is within the firm, in terms of promoting investment in complex new technologies when faced with costly and risky learning costs (infant industry promotion). The second is between firms and industries (coordination of investments in activities linked by externalities, needing the promotion of value chains or geographical clusters). The third is between firms and factor markets and institutions (coordination at the higher level).

tion are largely based on the accumulation of human and technological capital. This requires building capabilities and learning, which in turn leads to higher earnings for a wide spectrum of the population in increasingly open economies. Hence, reaching minimum thresholds – and indeed, the MDGs themselves – can best be seen, not as points of arrival but of departure towards sustainable development; economically, socially and environmentally.[2] At issue is the ability to connect the pursuit of social and economic objectives in such a way as to bridge the observable gap between them in most of the developing world.[3]

Poorer non-economic initial conditions in SSA induce a loss of between 0.6 and 1.6 percentage points in growth.

In trying to explain the failure of SSA to achieve economic and social development vis-à-vis the strong performance of East Asia, answers have often been sought either in policy, institutional and geographical shortcomings or in proxies such as physical capital deepening, human capital accumulation and productivity growth, or in microeconomic, technological and entrepreneurial behaviour. A more comprehensive perspective can be found in what may be called the 'capability explanation of development' (box 1.1) inspired in earlier work by Adelman and Morris (1967) and Abramovitz (1986).

This explanation relates development potential to a broad range of social capabilities that translate into 'initial conditions'. According to our empirical estimations, poorer non-economic initial conditions in SSA induce a loss of between 0.6 and 1.6 percentage points in growth rates relative to the average high-performing economies, such as Republic of Korea, Chile, Indonesia, Malaysia, and Thailand, while controlling for other factors (see Chapter 1 Annex).

The economic roots of decline in Sub-Saharan Africa

Africa's overall economic decline is linked with its economic structure and its trade patterns. Africa has not significantly industrialized, it has not reduced its initial dependence upon primary commodities for exports, and it has not 'formalized'. Again, this is in contrast to the rest of the developing world. In only two decades the structure of developing countries' exports has changed to an astonishing degree. In 1980 manufactures accounted for only around 25 percent of their exports; now they account for 80 percent. The breakthrough by important developing countries into the global market for manufactures has probably been the main structural economic event of the past quarter-century – and Africa is the main low-income region not to have shared in this transformation.

It is tempting to conclude that Africa's failure to industrialize results from its shortage of capital. However, important evidence suggests that this is not the problem (Devarajan, Easterly and Pack, 2002). Over the past 30 years Africa has in fact exported considerable amounts of its own private savings. This has taken the form of capital flight.

By 1990 Africa had a higher proportion of its private wealth

held outside the region than any other region, including the Middle East with its vast oil wealth and relatively few domestic investment opportunities. In some major African countries this trend has continued[4] (Collier, Hoeffler and Pattillo, 2001).

By 1999 Nigeria had an estimated $107 billion of its private wealth held abroad. This was a far larger amount than the value of private wealth invested in the country. Indeed, about 70 percent of Nigeria's private wealth was held outside Nigeria. This is both a symptom that something was radically wrong, and a major opportunity. It is a symptom in that if Nigerians were placing their own wealth abroad, it was evident that foreign private investment was also unlikely to enter the country in large quantities other than for highly specialized opportunities such as oil extraction. Evidently, the investment climate was unsatisfactory, for whatever reason. It is an opportunity, because if Nigeria's own wealth could be attracted back to the country there would be scope for a massive increase in the private capital stock: it could roughly be tripled.

By 1990 Africa had a higher proportion of its private wealth held outside the region than any other region.

During the 1990s some African countries that also had very severe capital flight managed to do just this. Uganda in 1990 had about the same proportion of its private wealth held abroad as did Nigeria in 1999. But over the 1990s it managed to get a significant proportion of this flight capital shifted back into Uganda. In some years the capital repatriation flow was larger than export earnings.

There is a message in such movements in private wealth out of and back into the continent: that Africa's shortage of private investment is unlikely to be due to a shortage of finance. Of course some individual firms, and especially many micro-enterprises, will have been constrained by shortage of finance, but at the aggregate level the region was choosing not to use much of the financial assets directly owned by Africans. More African wealth was directed to finance expansion in the rich countries than expansion in Africa!

Another symptom that something has been amiss is the trend towards informalization. The formal economy of SSA was never very large, but it has been getting even smaller. It is very difficult for informal enterprises to grow. Many activities, such as exporting, virtually require a threshold scale of operation and good value-chain linkages. Two reasons for this trend are that, first, firms have chosen to stay small and thus 'hidden' from taxation and other official interference; and second, firms are small because the opportunities for industrial production are so meager that they preclude them from tapping their potential for flexibility, specialization and job creation.

To understand why this has happened it is necessary to examine both opportunities and strategies. Some countries had better investment opportunities than others. This will be examined in the next section of this chapter. Then the focus turns on actual and possible industrialization strategies.

Africa's opportunities

Africa is a geographic entity rather than an economic one, and it is not sensible to discuss Africa's economic opportunities at such a high level of aggregation. Nor, however, is it necessary to go to the other extreme and treat each country as being unique. Broadly, economic opportunities can be aggregated into three groups: natural-resource economies; economies that though lacking significant natural resources

Table 1.1 Classifying African countries by opportunities

	Population (million people)		
Country	*Natural resource-rich*	*Coastal*	*Land-locked*
Angola	13.5		
Benin		6.4	
Botswana	1.7		
Burkina Faso			11.6
Burundi			6.9
Cameroon	15.2		
Cape Verde		0.4	
Central African Rep.			3.8
Chad			7.9
Comoros		0.6	
Congo Dem. Rep.			52.4
Congo, Rep. of	3.1		
Côte d'Ivoire		16.0	
Djibouti		0.6	
Equatorial Guinea	0.5		
Eritrea		4.2	
Ethiopia			65.8
Gabon	1.3		
Gambia		1.3	
Ghana		19.7	
Guinea	7.6		
Guinea-Bissau		1.2	
Kenya		30.7	
Lesotho			2.1
Liberia		3.2	
Madagascar		16.0	
Malawi			10.5
Mali			11.1
Mauritania	2.7		
Mauritius		1.2	
Mozambique		18.1	
Namibia	1.8		
Niger			11.2
Nigeria	129.9		
Rwanda			8.7
Sao Tome and Principe	0.2		
Senegal		9.8	
Seychelles		0.1	
Sierra Leone	5.1		
Somalia		9.1	
South Africa		43.2	
Sudan			31.7
Swaziland			1.1
Tanzania		34.4	
Togo		4.7	
Uganda			22.8
Zambia	10.3		
Zimbabwe			12.8
Total	192.9	221.3	260.4

Source: UNIDO based on Collier, 2004.

have good coastal access; and a remnant of countries that not only lack significant endowments of natural resources but are also land-locked.

There are inevitably some judgment calls in classifying countries according to these categories (table 1.1). For example, all countries have some natural resources; the issue is at what magnitude they become critically significant for the economy.[5]

The Democratic Republic of the Congo can be primarily defined by its virtually land-locked status, rather than by its potential natural-resource wealth, the justification for this being that that wealth has never been realized. In contrast, Sierra Leone, which is equally poor, is classified as natural resource-rich because diamonds have in the past been a massive source of income to the economy, and probably remain its defining feature.

38.6% of the total population are in economies that have neither natural resources nor a coastal location.

Both Sudan and the Democratic Republic of Congo are classified as land-locked despite having short coastlines. The justification is that the bulk of the country, and indeed of the population, is far from the sea.[6] There is good reason, though, to focus not on where the population currently lives but on where it could live. For example, in Kenya currently much of the population lives far from the sea. However, were Kenya to develop a large coastal manufacturing export industry, there is no legal impediment to massive internal migration. Relocation would of course generate some problems, but migrants would remain residents and taxpayers. In contrast, a genuinely land-locked country simply does not have this option (nor, realistically, do the Democratic Republic of Congo and Sudan): if people emigrate the government loses taxpayers. The most difficult country to classify is South Africa. It obviously has abundant natural resources, but it is also a substantially industrialized coastal economy with real potential to export industrial and other non-natural-resource products, and so it is classified here as coastal.

These debatable classifications determine precise numbers, but do not determine the broad message that each category is important for Africa. In this classification of countries, 28.5 percent of the population lives in natural-resource economies, 32.8 percent in the coastal economies, and 38.6 percent – the largest group – in those economies that have neither natural resources nor a coastal location.

Natural-resource economies

Africa as a region has low population density. A consequence of this is that the per capita natural-resource endowment appears rather favourable – since natural resources tend to be distributed randomly beneath the surface of the earth. Of course, such resources are not evenly distributed across Africa; some countries are much better endowed than others. At one extreme are tiny populations such as those of Sâo Tome and Principe and Equatorial Guinea, which find themselves richly endowed with important oil resources, while at the other are societies such as Ethiopia, where 66 million people occupy an area that seems to be largely un-endowed with valuable resources. Some countries, such as Sudan and Madagascar, have to date not benefited significantly from natural resources, but are likely to do so in the future as political conditions permit exploration and extraction.[7]

The challenge: transforming rents into growth

The big challenge facing any economy that is well endowed with natural resources is to transform the rents from these resources into sustainable forms of income (box 1.2, p. 9). In most circumstances this will involve both the government and the private sector. The government has the necessary role of acquiring the rents through taxation. Without such a role the rents are likely to be acquired by foreign interests and sent out of the country. The government also has a role in using some of these rents to accumulate infrastructure. In most countries, most, though not all, infrastructure is predominantly supplied by the state or by state-owned enterprises.

However, investment in infrastructure is only one aspect of transforming rents into sustainable incomes. Infrastructure is complementary to the other major form of fixed investment: equipment. Overwhelmingly, investment in equipment is undertaken by the private sector. For it to be undertaken directly by the state involves a degree of public involvement in the economy that is inefficient. Hence, for natural-resource rents to be transformed into investment, and for that investment to be productive and so sustain income, the rents must not only be used effectively by the government, but in some way be transferred to the private sector, which in turn must use them for investment.

Both of these steps involving the private sector are difficult.

Management of natural resource rents is governance intensive.

The transfer of the rents to the private sector can easily occur in such a way that there is little incentive to save them in any form. For example, if rents are used to finance an expanded public-sector payroll, then public employees will see little reason not to spend their incomes on consumption as opposed to saving them. One route to transfer the rents to the private sector in a form that might encourage investment is via the financial system: the government puts money into the financial system for on-lending to private enterprises. In some societies this has been reasonably successful, but in others it has been highly wasteful. The effectiveness of the strategy depends upon the integrity and efficiency of the financial system; in effect, on whether it can identify good investment opportunities and enforce loan repayment.

In some circumstances the radical solution of directly trans-

ferring some of the natural-resource rents to households makes a lot of sense.[8] It really depends upon the scale of the rents relative to the other income of the society. Where rents are very large relative to other incomes, and the population is small – as in, say, Equatorial Guinea – direct distribution in some form is likely to be an important part of a successful strategy. The transfer might go to all registered households, or be linked to some social aim, for example by providing bursaries for children who attend school. In some oil-rich small states, such as Brunei, transfers to households have in effect been made through inflating the public payroll, but this risks gradually denuding the population of productive, private-sector work experience. In more populous societies in which natural-resource rents per capita are modest, direct transfers to households are unlikely to be administratively feasible. Some transfer back to households can be achieved through offsetting reductions in taxation, but such a method, though administratively efficient, is liable to be regressive. The challenge, then, is for the government to make good use of a relatively high level of public resources.

Getting it right: Botswana

For whatever reason, most of the world's natural-resource economies have not been very successful in transforming rents into sustainable growth (Sachs and Warner, 1995). African countries have usually been unsuccessful, but Botswana constitutes a remarkable exception. The government of Botswana succeeded in transforming rents into savings and in getting a reasonable return on these savings. The key strategy was to insist upon rigorous project appraisal, so that public savings were only used to finance public investment if the rate of return exceeded a critical threshold.

Since there were relatively few such opportunities – Botswana being land-locked and arid – very large surplus funds were accumulated. Some of these were transferred through the banking system to private entrepreneurs, but the strategy here was cautious. Most of the surplus money was invested abroad, so that Botswana became a *rentier* economy, with a large income from its overseas investment portfolio.

The same techniques of project appraisal were, of course, widely available across the region. The distinctive thing about Botswana was not so much the technical expertise involved in undertaking these appraisals, but the political decision to treat such appraisals seriously. Quite why Botswana politicians were able to arrive at and maintain this sophisticated behaviour when others were not is still a matter of debate, although a common explanation is that it reflected a deeper commitment to a 'legal-rational' state, which in turn was rooted in the perceived need for 'defensive modernization' in the face of external threats – first from colonization and then from South Africa (Parsons and Robinson, 2003). Such deep influences were clearly reinforced by the good fortune to have economically sophisticated leaders who, in a small society, were in a position to make a major difference to policy and set a pattern that could then become a routine.

Botswana's success lied in the political decision to treat project appraisals seriously.

Why it usually goes wrong

In contrast to Botswana, Sierra Leone is testimony to the potential for natural-resource rents not merely to be wasted but to destroy a society. In 1970 Botswana and Sierra Leone had approximately the same level of income and the same

Box 1.2 The role of natural resources: an optimistic view

Based on the Heckscher-Ohlin model, Wood and Mayer (2001) and Wood (2002) envisage a rather optimistic scenario about the role of natural resources in Africa's future development and in reducing mass poverty. Three common conditions are suggested for the elimination of mass poverty: creating incentives for investment, fostering international business linkages and providing broad access to assets and markets among people. Based on comparative analyses of how land-abundant resource endowments impact upon the sectoral structure of output and exports, two main trajectories for Africa's development are outlined:

- **Africa's comparative advantage lies in primary sectors.** The share of primary products in Africa's exports is currently large and will remain so for the next decades, although the share will gradually decline as development advances. Nevertheless, even at a high level of development, Africa would remain dependent on resource-based exports. This said, due to the presently low level of manufacturing output, there is scope for a dramatic increase in a variety of different manufacturing industries over the next few decades. Manufacturing is likely to be concentrated in a small number of countries and areas with better links to world markets, possibly with three coastal conurbations in East Africa, West Africa and Southern Africa respectively.
- **Most of the increase in Africa's exports over the next few decades would come from natural-resource-based products.** This is because they still account for an overwhelming share of total output. This would comprise non-traditional resource-based products; processed and well as unprocessed products, such as fish and horticultural products; as well as mining, especially because of limitations to agricultural expansion, partly due to environmental considerations. Primary processing, including small-scale agriculture, will spread the benefits of development and be just as demanding in terms of skills and technology as core manufacturing activities.

A land-abundant development trajectory focusing on natural resources may lead to prosperity, and Africa may tap great opportunities in this regard. Both the US and Australia have achieved high levels of output from their abundant land resources because they have invested heavily in specialized research and education in agriculture and mining during the last century (For an extensive review of relevant bibliography on natural-resource-based, export-led growth also see OECD, 2003).

Does a focus on resource-based development offer any hope for getting away from past unsuccessful development patterns of commodity-based growth? Wood (2003) answers this affirmatively. Resource-based development is not all low-technology, out-of-date or unsuccessful; some resource-based activities are hi-tech and technologically dynamic. More importantly, the scope for developing a broad variety of economic activities, including high-skill manufacturing, are enormous in SSA due to the low base of current output. This development path could be pursued by a policy focus on incentives for investment, business linkages and broad access to assets and markets among people.

Source: Wood and Mayer, 2001 and Wood, 2002.

resource – diamonds. Thereafter, Botswana has experienced one of the most rapid growth rates in the world and is now a middle-income country, whereas Sierra Leone experienced one of the most rapid economic declines in the world and is now at the bottom of the Human Development Index. The income differential between them is now approximately ten-to-one.

What happened in Sierra Leone (the same as in several other African countries) was that natural-resource rents became instrumental in destroying the state. There are several routes by which this occurred. One is that governments in receipt of such rents tend to become more distant from their populations. In particular, they have less need to raise tax revenue and this tends to reduce the extent to which governments are held accountable to their populations. Another route by which natural-resource rents undermine the state is through the rise in corruption. Foreign resource-extraction companies can negotiate more favourable contracts by bribing public officials than if they have to compete in a transparent fashion. Conversely, public officials can become enormously wealthy by committing their countries to contracts that are highly disadvantageous to the national interest.

The combination of detachment and corruption can foster another force that weakens the state: natural-resource-based secessionist movements. Usually, natural resources are located in peripheral regions where some political entrepreneurs can be tempted to urge secession. By being able to point to detachment and corruption at the national level such politicians can readily claim that rents that should belong by rights to the region are being stolen. The secessionist wars in Biafra, Katanga, Cabinda and Southern Sudan are examples of this process (keeping in mind that civil wars are always multi-dimensional).

Natural-resource rents can also become instrumental in destroying the state.

A final way in which natural resources have weakened governance is that they provide an easy source of finance for rebel groups. The most spectacular examples of this in Africa were the Revolutionary United Front (RUF) in Sierra Leone and the *Unio Nacional para a Independência Total de Angola* (UNITA) in Angola. In both cases very large rebel organizations were financed predominantly through plundering diamond deposits. Timber has been used in a similar fashion from time to time in Liberia.

The illusion of success: unsustainable growth

Between the extremes of successful harnessing of natural-resource rents for growth (as in Botswana) and of the collapse of the state (as in Sierra Leone) several African countries have simply wasted the opportunity for sustainable growth. Nigeria, Republic of the Congo, Cameroon, Benin, all followed a pattern of 'unsustainable growth' in which during the oil booms rents were used at least in part to boost economic activity in a manner that was then reversed during the subsequent oil slumps. Industrial 'strategies' were an integral part of these unsustainable growth plans.

Oil rents were directed to import-substituting industry, which was given heavy protection. Continuing post-boom industrial subsidies proved too expensive, and even with high protection the industries proved to be non-viable as domestic demand declined. The most spectacular example of such an unsustainable growth strategy is Nigeria, where the non-oil economy is now smaller on a per capita basis than it was before oil was discovered. Something in excess of $200 billion in oil rents has accrued to the non-oil economy with no lasting results.

The extent of opportunity lost

The extraordinarily wide divergence between Botswana and Sierra Leone demonstrates that in the presence of large natural-resource rents government can make a huge difference for good or ill. The paradox is that while the successful use of natural-resource rents is intrinsically governance-intensive, the presence of such rents tends to undermine governance.

High rents, as we have noted, encourage corruption. Resource rents also tend to follow boom-bust cycles, both because physical quantities vary with discoveries and depletion, and because prices are subject to wide swings. Such cycles are difficult for governments to manage. The boom phase presents politicians with a tempting opportunity to make the most of the short term and ignore the future. This can be disguised because even the most extravagant populism can be presented as investing in the future through grandiose schemes of public investment.

Even some of the economies which are not well-endowed with natural resources, and only get large rents during the rare episodes when the prices of their agricultural exports boom, have succumbed to such unsustainable strategies. For example, both Côte d'Ivoire and Kenya were well-managed economies until the late 1970s, when booms in their coffee exports induced public expenditure programmes that were irreversible, unproductive and costly.

Possibly one reason why Africa was more prone to the mismanagement of natural-resource rents was that it lacked well-trained influential elites. During the 1970s and 1980s its universities were left to fall apart through lack of funding and there were virtually no thinktanks. It was not until the 1990s that a serious effort was made, through the African Economic

High quasi-rents may encourage corruption; they also tend to follow boom-bust cycles, difficult for governments to manage.

Research Consortium and the African Capacity Building Foundation, to build indigenous capacity for economic analysis.

Botswana demonstrates that natural resources could have been used to good effect more widely in Africa. Moreover, successful as Botswana has been, it probably understates the potential for the transformation of natural resource rents into sustainable growth. After all, because of its peculiar geographic disadvantages, Botswana lacked investment opportunities that would have been available in most other African economies. To see what might have been possible had a country with better geography, such as Nigeria, used its resources well, we need to turn to Asia. Countries such as Indonesia and Malaysia succeeded in using natural-resource rents for export-oriented industrialization. The rents were used in such a way as to drive down the costs of doing business, for example by provision of effective infrastructure and investment in education.

Coastal economies without natural resources

Although Africa is well endowed with natural resources, there are several coastal economies that lack substantial resource endowments. The growth strategy for such economies would be expected to look radically different from an economy with valuable natural resources.

The challenge: harnessing labour-abundance

Elsewhere in the world, low-income coastal economies have transformed themselves through breaking into the global market in manufactured exports. The early phase of this phenomenon was the 'East Asian Tigers', but during the 1990s a new generation of countries – notably China, Viet Nam, India and Bangladesh – have followed the same route, again with spectacular success. The only African coastal economy to have followed this path has been Mauritius.

Coastal Africa is in some respects located as well as or better than the Asian economies that have succeeded in penetrating the global market in manufactures. However, the market is highly competitive, working on both narrow margins and tight quality and delivery schedules. Mainland coastal African countries have so far, for various reasons, not been able to provide an environment in which cost, quality and reliability are all satisfied. If they had, they would have had to confront major competitive challenges.

Several of the coastal African economies have foundered on unit costs.

Several of the coastal African economies have foundered on cost. For example, during the 1970s Côte d'Ivoire indeed succeeded in entering the European market for garments, but its firms went bankrupt by the end of the decade due to exchange-rate overvaluation. This applied across the Franc Zone and so shut out most of coastal West Africa from global markets. In other coastal countries the impediment was not price but reliability. This came partly from unreliable infrastructure. In most countries the power supply was subject to frequent interruption. In many countries telecommunications were both costly and highly limited.

In most countries customs services were subject to long and variable delays. For example, in Madagascar even firms in the export-processing zone (EPZ) typically had to wait several weeks for customs clearance. Such firms were competing with others based in Asian countries in which the government guaranteed customs clearance in a matter of hours. Unreliability arose also as a knock-on effect from domestic suppliers of inputs to exporting firms. Companies producing for the home market often survived because they were quasi-monopolies, but they inflicted uncertainty and unreliability upon exporting firms that depended on them.

Getting it right: Mauritius

Mauritius is the exception to this pattern, analogous to Botswana among the resource-rich. Mauritius has succeeded in transforming itself from a very poor and badly located sugar economy into a well-diversified economy with manufactured exports and tourism sustaining a per capita income of about $10 000. Mauritius succeeded due to a combination of circumstances. A key strategy was the use of an EPZ. This enabled protection to be maintained for existing domestic import-substituting industry without allowing it to become a handicap to new export firms, since they were able to import duty-free. This made the politics of trade liberalization radically easier. It is worth noting that EPZs had been tried elsewhere in SSA without much success until the introduction of the African Growth and Opportunity Act (AGOA) (see Chapter 2 Case Study).

The use of an EPZ in Mauritius has enabled protection to be maintained without allowing it to become a handicap.

Mauritius also had other advantages – in particular, its trade policy initiative coincided with a recognition by Hong Kong-based firms that they would need to shift their production sites. Another possible advantage was that, because the economy was small, the EPZ could rapidly become politically significant, prompting the society to lock into the policies for sustaining manufactured exports.

Other than Mauritius, the main examples of successful African EPZs are Lesotho and Madagascar. Lesotho is a rare case of a land-locked economy that is succeeding, to an extent, in export markets (box 1.3). However, it is not an economy from which it is sensible to generalize since in effect it benefits from South Africa's infrastructure while

remaining outside its regulatory and institutional framework.[9]

Madagascar, however, is a particularly interesting case. Its EPZ became extremely successful due to AGOA, a scheme that gave SSA countries privileged access to the US market, albeit for a limited period. This margin of advantage has in most cases proved insufficient to achieve significant export volumes, but for Madagascar it proved decisive. The EPZ workforce rapidly expanded to 300 000 before a political crisis closed the port for eight months. Unsurprisingly, during this period employment in the zone collapsed. In the year since the crisis the Zone has started to recover and is currently back to about 80 000 employees with prospects of full recovery.

Madagascar's EPZ became extremely successful due to AGOA. The question is how long that will last.

Unfortunately, AGOA's provisions include a phase-out from 2005, though the US Congress is already considering measures for its extension. Uncertainty over the future of AGOA and the impact of the dismantling of the Multi-Fibre Agreement (MFA) and of China's accession to the WTO, is likely to affect investment and relocation decisions in Madagascar (Chapter 2 Case Study). Since Madagascar currently provides one of the best prospects for a low-income African economy to break into global export markets for manufactures, the extension of AGOA is of considerable importance for SSA. That said, it seems possible that once a politically significant group of exporting firms has been built up, they will be able to lobby to create an environment in which they are genuinely competitive abroad.

For example, the politically costly reform of the customs service would become worth doing. In the past, as in many SSA economies, working in the customs service has been so lucrative that the service has been an effective lobby against tariff reductions and the simplification of import procedures. Such entrenched interests are often effective obstacles to the emergence of a competitive export sector. A relatively small group of well-established people has large and very evident incentives to lobby against policy change, whereas prior to reform, the potential beneficiaries – such as the thousands of young people who would get jobs – are a large and diffuse group who do not even realize that they could benefit.

Only a tiny handful of SSA countries have managed to break into global manufacturing – Mauritius, and to a much lesser extent, Lesotho and Swaziland in clothing and South Africa in clothing and motor vehicles and components. Mauritius succeeded initially thanks to a phase of privileged access to clothing markets.

When the MFA ends, Mauritius is likely to remain a successful economy because it has diversified into products such as top-of-the-market knitwear in which quality, reliability and market responsiveness, rather than low cost, provide competitive advantage. The privileged access was thus a useful pump-priming phase for exporters somewhat analogous to the original infant-industry argument. Perhaps the mistake in the infant-industry argument for protection as often applied is that it is used to support only firms that focus on the domestic market, neglecting the opportunity to prime the exporting pump. Possibly, AGOA will now provide some African countries with the temporary phase of export support that the MFA gave Mauritius (see Chapter 2 Case Study).

What usually goes wrong

The fact that relatively few African countries have been able to take advantage of AGOA on a significant scale suggests that many of them currently have costs that are way too high. Many African countries now have per capita incomes that are much lower than China's. Indeed, China is now a middle-income country with an average per capita income, at PPP prices, of over $4 000. Much of Africa has per capita incomes at or below $1 000 at PPP prices. And since China is growing at around 10 percent per year, this gap in incomes is widening rapidly. This difference in incomes should give rise to much lower labour costs in Africa which, as long as Africa can approximately match the labour productivity levels of its competitors – no doubt a tall order – can provide the basis for competitiveness in labour-intensive manufactured exports. However, there are several important ways in which such an advantage in income might not be turned into a competitive advantage.

The first is if the exchange rate is so appreciated that labour costs per employee are higher than China's. This could arise because of Dutch disease – other sources of foreign exchange such as natural resources or aid raising the price of non-tradable goods, so that wages are higher when measured in manufactures than in China. In some countries this is the case. The Chinese government has paid considerable attention to keeping its exchange rate competitive, whereas typically in Africa governments have tried to keep their exchange rates as appreciated as possible to make imports cheap for the middle classes.

A labour cost advantage might not turn into a competitive advantage.

The second way in which labour costs per employee could be high despite low incomes is if formal-sector wage earners are paid far above the national average income. This is the case in much of the Franc Zone, where the SMIG is typically set at levels well above average incomes.[10]

Moreover, even if wages are fully competitive with those in China, this may not be enough to give a competitive advantage. One obvious way in which this may occur is if employees are less productive. If, for example, it literally took two African workers to perform the task performed by one Chi-

nese worker (due perhaps to lower skills or motivation), then wages per worker would need to be half those in China before unit labour costs would be the same (box 1.3).

It is often suggested that the low level of education in Africa raises labour costs in manufacturing. Yet opportunities for manufacturing employment are so slim that workers with some education may find it hard to get a job. It seems unlikely that firms currently find it more difficult to recruit workers with some education in Africa than in other regions. But there is another, much more important way in which competitive wages do not translate into competitive advantage.

Even were African labour to work for free, if non-labour costs are higher than those of competitors, then the activity may be uncompetitive. Often non-labour production costs are radically higher in Africa. Because transport and customs are slow and unreliable, firms respond by holding large inventories. But in SSA interest rates are usually quite high, so the extra cost burden of carrying large inventories is considerable. Similarly, power and water supplies are often unreliable. As a result of such problems labour productivity may be much lower than in China, but the cause has nothing to do with labour: a Chinese workforce in the same conditions would have the same low productivity. This distinction is important: to the extent that labour performance is the problem, then solutions in terms of training and incentives are appropriate. But in much of Africa low labour productivity is predominantly the consequence of failures completely unrelated to employee performance.

One possible niche for African manufactured exports is agro-processing.

In either case, worldwide even in labour-intensive industries labour costs are only a small share of total costs – typically about 16 percent. The reality is that Africa's much lower per capita real income than China at best gives only a few percentage points of competitive advantage, even if it can fully match the labour performance of competing countries. To date, this modest cost advantage has evidently been more than fully eroded by other cost disadvantages. Fortunately, all these other cost disadvantages are capable of being rectified by appropriate government policies.

A particularly useful strategy is to coordinate policy improvements for export industry spatially, by targeting improvements on designated EPZs. Such zones can combine good infrastruc-

Box 1.3 Lessons from a budding 'African Tiger': Lesotho

Lesotho, a small, resource-poor and land-locked country, is behaving rather like an East Asian 'Tiger'. It is currently the largest and fastest growing exporter of clothing from SSA to the US. Some 70 percent of its exports are manufactures (well above the average of 25 percent for Africa as a whole), and they have grown at 30 percent per annum during 1999–2002. Lesotho has relied on investors from East Asia to drive its industrial and export growth. The 38 clothing factories in the country now employ around 40 000 people and exported $318 million worth of apparel to the US in 2002. These exports took place under AGOA (see Chapter 2 case study). In 2002, Lesotho's apparel exports were 2.6 times larger than Kenya's, the next-largest beneficiary of AGOA; they were also much greater than AGOA exports by better-established clothing exporters in Africa like Mauritius ($107 million) and South Africa ($88 million).

Foreign-owned apparel exporters are not new to Lesotho. The first Asian plants moved there from South Africa in the late 1980s, when sanctions were imposed on the apartheid regime. They took advantage of the Lomé Convention (giving quota- and duty-free access to the EU) to export to Europe. However, the Convention stipulated that after some time two stages of apparel processing (yarn and textile manufacture) had to be undertaken locally. This was economically unfeasible. Lesotho managed to get this requirement postponed for 8 years; after that, in the late 1990s, exports to Europe fell sharply. The launch of AGOA gave the industry a new lease of life, which will last until 2008. The long experience of Asian investors in the country, and the associated development of production capabilities, provided an edge over other countries with AGOA privileges, including those with larger, longer-established industrial sectors and better location. The first lesson of Lesotho is, then, that the gradual accumulation of capabilities, even of the simplest kind in clothing assembly, is vital to competitiveness.

In addition, MFA drove Asian apparel exporters to Africa (and to several other countries, from Bangladesh and Sri Lanka to Latin America and the Caribbean), and its abolition by the end of 2004 will be an important change. The MFA also explains why AGOA has not attracted any other labour-intensive assembly to Africa, even though trade concessions also apply to them. No footwear, toy, sports goods or similar assembly activities are relocating to Africa despite the tariff advantages they enjoy over competing producers. This suggests that tariff advantages do not offset Africa's productivity disadvantage.

Apparel assembly in Lesotho, simple as it is, still suffers from low productivity. Scattered evidence suggests that the productivity of Lesotho workers is between 30 and 70 percent lower than in China. As wages are not very different from China, such a large productivity gap will be unsustainable once AGOA ends: the activity cannot compete in open markets, even if it reverts to importing cheap fabrics from Asia. The lack of local linkages exacerbates the cost disadvantages imposed by low productivity. Even after 15 years of operations, the industry has not catalysed the growth of local subcontractors or suppliers. This is very different from countries like Bangladesh where within a few years of East Asian investment, hundreds of local garment exporters had started up.

The reasons for lower productivity within apparel manufacturing appear to lie in the wage system (time rather than piece wages), low levels of formal skills, the lack of training (apart from basic on-the-job instruction) and poor employer-worker relationships. Asian firms do not invest much in employee training, preferring to use Chinese supervisors and technicians. The government has done nothing to encourage skill formation by firms (say, through fiscal incentives), nor has it set up any training facilities for the industry. Its main efforts have been directed to getting AGOA extended rather than to using the remaining 'grace period' to raise capabilities to competitive levels. There is thus a real risk that the industry will evaporate once AGOA ends, unless the government launches targeted capability-building measures and provides the basic public goods that the industry needs.

Lesotho has a good investment climate, with well-managed macro policy, a liberal trade regime, welcoming FDI policies, low business costs, reasonable infrastructure and low taxes (15 percent). This is not, however, the reason for its industrial and export success: the real reason (apart from sanctions on South Africa) lies in the trade 'distortions' (the MFA, the Lomé Convention and AGOA) that gave it a form of infant-industry protection. While such protection has stimulated growth, it will yield lasting benefit only if the infant 'grows up' and is able to compete on open markets.

Source: UNCTAD, Chapter 3, 2003.

ture with new, higher standards of performance by public officials such as tax collectors, health inspectors, and customs officials (see Chapter 3). Old informal exaction practices have proved severe disincentives to SSA firms. One African study (Svensson, 2000) found that corrupt practices were three times more damaging to investment than taxation itself. Also, although bribes were directly linked to a firm's profitability, firms that paid more in bribes did not get a better service than other firms; they were simply the more profitable firms and hence the ones otherwise best placed to expand.

Mauritius, which has been more successful than any other African country in breaking into global markets for manufactures, is distinctive in having much less corruption and more effective institutions than the African average. It was not simply trade policy in the form of the EPZ, nor privileged access to the European Union (EU) market, that made the difference in Mauritius, but all the other 'behind the border' policies, such as good infrastructure and a restraint on bad practices by public officials. Making a success of export manufacturing is perhaps less demanding of governance than making a success of natural resources, but it nevertheless requires that the state deliver some basic functions and, more particularly, that it restrains practices that can easily prove fatal to manufacturing.

One possible niche for African manufactured exports is agro-processing, but even here the scope may be very limited until the problem of high production costs is addressed. Agricultural processing is not on average very labour-intensive, but it is very intensive in purchased inputs (Collier, 2003). Cheap labour does not, therefore, go far to offset high transaction costs. The extent of cost-saving inherent in the use of locally-produced agricultural inputs (or other natural resources) depends upon their international transport costs. This can be illustrated through two extreme examples.

Diamonds are so cheap to transport relative to their value that the country in which they are mined has no cost advantage in diamond cutting over any other country. At the other end of the scale, bauxite is very costly to transport relative to its value. Hence, as long as there is a supply of cheap power it makes sense to process bauxite close to where it is mined. Most agro-processing activities lie within this range, but are closer to diamonds than to bauxite. Some local processing has to occur near the point of agricultural supply because of timing, but much of it is fairly footloose. There will be some opportunities within agro-processing, but overall the sector does not provide an escape from the need to address the problems of high costs.

Land-locked economies without natural resources

The final group of African countries has neither significant high-rent natural resources nor is coastal. So far there has been only one successful development model for countries with such characteristics: that of Western European countries: Austria, Switzerland, Luxembourg. The success of these countries rests on integration into the region, *combined with the economic success of the region.* As a result of the region's success, being land-locked does not cut these countries off from their market. Rather, they are at the centre of their market – trading with the coastal economies of the region. Such an option has not been open to Africa's land-locked economies because the coastal economies have not been successful enough to constitute important markets. Hence, the best hope for Africa's land-locked economies rests in growth-oriented reform in its coastal economies, though the recent AGOA-driven successes of Lesotho and Swaziland give raise to hopes that such global stimuli could become a platform for sustained industrialization.

The best hope for Africa's land-locked economies rests in growth-oriented reform in their coastal neighbours.

The limits of economic growth when a land-locked country is surrounded by poverty and stagnation are illustrated by Malawi. For 40 years the country has avoided both internal conflict and major policy blunders, yet it has little to show for its efforts. It has grown only very slowly. Recently, some land-locked countries have grown quite rapidly, but these have been cases of recovery. Notably, Uganda, Rwanda and Burkina Faso have all grown rapidly following periods of decline. What remains to be seen is how far and how fast incomes can rise beyond their previous peaks.

In the absence of prosperous neighbours there has been no easy option. Development has required the intensification of agriculture and this has not offered opportunities for rapid growth. To make matters worse, in many of SSA's land-locked countries agricultural development is problematic because of semi-arid conditions. Indeed, to some extent circumstances have become yet more difficult. Twenty or 30 years ago some of these land-locked countries were industrial centres for their subregions, benefiting from the natural protection of high transport costs. Burkina Faso served markets in the Sahel, and Zimbabwe served markets in southern central Africa. However, as international transport costs have fallen, these industries have found themselves in a cul-de-sac, losing their natural protection and so declining.

Rays of hope

Potentially, new developments in global trade could be of major advantage to these land-locked countries. The key opportunities are airfreight and the use of electronic transmission and telecommunications in the new service economy. These technologies for the first time place land-locked and coastal countries on a level playing field.

Some export activities can be thought of as airport-intensive. Horticulture and flowers in particular can only be airfreighted. This gives a potential advantage to Africa since it is much closer to major markets than the other developing regions. Even better: within Africa the closest countries happen to be the land-locked ones, from the Sahel across to the

Great Lakes region. The key inputs for airport-intensive activities are not just the air transport itself, but also a range of other facilities, such as cold storage, reliable transport links to the airport, and very well-organized producing firms that can maintain agricultural production with a high degree of reliability to a very demanding time schedule and to high quality standards. Such activities also increasingly involve pre-packaging. While this enhances value added, it places additional demands on local producers. The African country that has been most successful in this area is Kenya (which, of course, is not land-locked). Airfreight has benefited from the large tourism industry since freight can be transported in the holds of the same planes that carry the visitors.

The electronic service activities dependent upon electronic data transmission and voice answering services offer rapidly growing opportunities. Ideally, the coastal economies would specialize in exports that required sea transport, leaving the land-locked economies to specialize in these new service activities. The key inputs for the new service economy are good telecommunications and an education that equips students for numeracy and literacy. These are clearly dependent upon government policy.

Africa has a potential advantage in certain export activities, since it is closer to major markets than the other developing regions.

Telecommunications are now predominantly a privately provided service. How good they are depends on whether the government chooses to make the sector competitive, or whether it tries to snatch monopoly rents by licensing only one or two operators who then collude. Multiple operators, in an environment that prohibits restrictions on connections by competitors, are likely to deliver a cheaper and better service. Providing adequate education at the tertiary level may simply be too expensive for the governments of land-locked low-income countries – though Uganda provides an interesting model. Private universities have been allowed to set up, and so far there are thirteen of them. Meanwhile, the public university has been allowed to charge substantial fees, which has released public money for pro-poor uses, such as expanding primary education. Now that they are paying, students have become more assertive in demanding good teaching and properly stocked libraries.

A preliminary assessment

Three distinct groups of opportunity in SSA have been identified. Of these, the largest – the land-locked without natural resources – is best thought of as having rather limited *autonomous* opportunities. Such countries are not 'doomed', but to a significant and disturbing extent their success does not lie in their own hands, but rather in the hands of their better-favoured natural-resource-abundant and coastal neighbours.

The overall reform agenda for the natural-resource-abundant countries is primarily a matter of governance; of establishing the sort of state that has made such a success of diamonds in Botswana. The reform agenda in the coastal economies without natural resources is primarily a matter of gaining global competitiveness. This is sometimes a matter of the exchange rate, sometimes of trade policy, and most generally of better delivery of the physical and technological infrastructures and a curtailment of predatory corruption.

In addition, common pre-conditions for firms to improve their competitive standing are consistent industrial and market development policies, with due attention to market institutions and private-sector-driven resource mobilization, well-devised incentive systems and adequate supplies of public goods that affect capacity building in the areas of skill formation, entrepreneurship and technology (see below).

The dependence of the land-locked countries – the most populous group – on reform in the other two groups gives a distinctive rationale for the New Partnership for Africa's Development (NEPAD) that to date has not been fully exploited. None of the three 'drivers' of NEPAD – South

Box 1.4 Protection in SSA and impact of tariff escalation in developed countries

SSA countries have generally pitched their tariffs at relatively high levels in the successive trade liberalization efforts that culminated in the Uruguay Round of the mid-1990s. SSA's degree of economic openness has been estimated at 0.10, way below the OECD's 0.65 and East Asia's 0.83 (Sachs and Warner, 1997). Since it is widely believed that open economies tend to benefit more from foreign trade, investment and technology flows through FDI, SSA countries are likely to have forfeited some development opportunities due to their tariff policies. By one reckoning, if Africa had been as open as the OECD over the past 40 years, its annual growth rate would have been 0.67 percentage points higher (Artadi and Sala-i-Martin, 2003).

SSA tariffs are generally lower for non-agricultural, mainly industrial products, than for agricultural ones – but SSA countries do impose very high industrial tariffs, of 20.6 percent, on imports from within the SSA region, a serious obstacle to intra-regional trade. Indeed only South Asia has intra-regional tariffs as high as SSA's. For imports from other regions, SSA tariffs range from around 12 percent for imports from industrial countries, the Middle East, and Latin American and the Caribbean, to 14.5 percent for those from East Asia and 17.4 percent for those from South Asia. SSA levels of tariff protection are among the highest among all regional groupings, exceeded only by those of South Asia (Bachetta and Bora, 2003).

The high levels of protection in SSA are confirmed by analyses of bound tariff lines (the 'binding' of a tariff is a commitment not to raise tariffs above a certain level). While the developed countries, most transition economies and most of the Latin American ones have bound all or nearly all of their industrial tariff lines, African and Asian countries have tended to bind only a limited number. In Africa, more than half of the countries have bound fewer than half of their tariff lines.

This said, SSA countries have been moving towards greater openness. Trade regimes of the LDCs, including many SSA countries, at the end of the 1990s were much more open than a decade earlier, as LDCs have generally gone further than other developing countries in dismantling trade barriers (UNCTAD, 2002). And although SSA countries remain on the margins of the world economy, accounting for only 1.4 percent of world trade in 1995, they do exhibit normal trade ratios, relative to their size, income level and geographical location (Rodrik, 1997).

Africa, Nigeria, and Senegal – are in the category of land-locked without natural resources. Yet it is such countries that have the strongest interest in the reform of policies and governance among their neighbours. The situation is not necessarily reciprocal: the coastal and the natural-resource-abundant countries are less dependent upon reform in their land-locked neighbours. NEPAD offers a chance for the region to internalise the negative externalities to the land-locked – and hence to the poorest countries – that have arisen from poor governance and policies elsewhere in the region.

The dependence of the land-locked on reform in the other two groups gives a distinctive rationale for the NEPAD.

Efficiency and investment in industry

Africa's manufacturing industry has been in decline for two decades. Compounding this, productivity has been stagnant. Thus, the productivity gap between African firms and those in the rest of the world has steadily widened. Bluntly put, if African manufacturing is to become internationally competitive, either its existing firms will have to experience a prolonged period of rapid productivity growth, or new firms will have to replace them.[11] If possible it is obviously desirable to raise the productivity of existing firms, rather than write them off. Empirically there seem to be three ways of raising productivity growth: intensifying domestic competition, providing the necessary incentives and public goods, and exposing firms to export markets.

Productivity growth requires change, which is often resisted except where required by competitive pressure.

To date, SSA manufacturing has been heavily protected and, because of the very small market size of SSA economies, this has tended to produce monopolies and oligopolies. The extreme case has been Zimbabwe, where the trade embargoes during the period of the illegal Smith regime produced as a byproduct extreme protection, which was continued as a policy by the Mugabe government for more than a decade. By 1990, after a quarter-century of extreme protectionism, Zimbabwean industry was a series of small monopolies. Industrial surveys showed that in setting their prices firms took no account of competition. As always, monopolies are profitable. Output is restricted, enabling prices to be raised, and there is little attention to reducing costs.

Productivity growth requires change, and change is generally resisted except where it is required by competitive pressure. The same relationship has been found to hold in Africa: the higher are the quasi-rents, the slower the growth of productivity (Harding, Soderbom and Teal, 2004). In SSA productivity growth is unusually slow and, in many countries, it appears to have stopped altogether. Hence, in order to accelerate productivity growth, an effective strategy would be to intensify competition. But this is not enough.

Trade capacity building as an enabler

Reductions in trade protection and export-enabling capacity-building are one way to increase contestability and responsiveness to market pressures. Overall, the degree of protection in African manufacturing has been reduced in recent years, but it is still on average higher than in any other region (box 1.4), with large differences between countries. And not much progress has taken place in capacity-building either, largely due to the sparseness of technical assistance in this area.

Trade liberalization *per se* carries dangers. Recent studies have found that trade liberalization has different effects on firms depending upon their initial level of efficiency. Firms that are relatively efficient respond to trade liberalization by raising their productivity, just as might be hoped. But firms that are far from efficient respond to the same trade liberalization by falling even further behind, and presumably in due course going bankrupt (Aghion e.a., 2003). This suggests that to be effective as a force for productivity growth, trade liberalization should be gradual rather than 'big-bang'.

A big-bang liberalization risks pushing too many firms into bankruptcy, thereby wasting all the organizational capital invested in the firm. By liberalizing gradually, all firms can be put into the position whereby they can avoid missing the chance to gain in efficiency, provided that an adequate supply of public goods matches firm specific efforts. This incentive appears to force productivity growth. By gradually reducing the degree of protection and, at the same time, helping firms conform to the necessary cost, quality, technical, health and environmental standards, the government can in effect place firms on a treadmill where through continuous feasible increases in productivity they manage to pull ahead.

To date, African liberalizations have often followed the big-bang pattern and therefore have probably been excessively wasteful of organizational capital. To this must be added the fact that the level of productivity is not entirely in the hands of the firm itself. If the environment is sufficiently adverse – erratic power supply, bad transport, slow customs procedures, predatory officials – then even the best-managed firm cannot survive. In the absence of complementary reforms, trade liberalization can simply lead to de-industrialization. This has too often been the record in Africa to date. Conversely, without trade liberalization, other reforms can be stymied by the conservatism of firms that do not face the stimulus of competition.

To enhance their productivity performance, firms require, in addition to a competitive environment, ready accessibil-

Box 1.5 North-South Regional Trade Agreements: A Win-Win Formula

While growth in South-South trade – notably in manufactured goods – has contributed to diversification and development, Regional Trade Agreements (RTAs) do not appear to have had a significant impact on trade expansion. Indeed, developing Asia with only one significant RTA, has the largest share of intra-regional trade, whereas Africa with the largest number of RTAs has the smallest share of intra-regional trade (WTO, 2003).

MERCOSUR in Latin America appears to have been an exception with what appears to have been a substantial one-off increase in intra regional trade. After MERCOSUR's launch in 1991, the share of intra-regional exports in total exports more than doubled from 8.9 percent in 1990 to 20.3 percent in 1995, since remaining at that level.

South-South trade in manufactures has grown faster in Asia than in any other region of the developing world and while four-fifths of this trade is with other developing Asian economies – the highest share among the four developing regions – there is only one significant RTA in the Asian region.

By contrast, there are 12 RTAs in Africa, yet intra-regional exports account for only eight percent of total exports. Even when fuel – the continent's largest export – is excluded intra-regional trade accounts for less than 15 percent of total non-fuel exports.

There are several explanations for this state of affairs including multiple and overlapping membership of RTAs, complex structures and conflicting commitments. Moreover, RTAs cannot generate trade in the face of extensive supply side constraints, weak infrastructure, and a lack of complementarity in production patterns and restrictive rules of origin.

Going forward, SSA needs to transform inward-focused and protectionist RTAs into 'open regionalism' agreements. The Cotonou Agreement between the EU and African, Caribbean and Pacific (ACP) countries provides for ACP member states to enter into Economic Partnership Agreements (EPAs) with the EU either individually or collectively.

Such EPAs would be asymmetric North-South agreements between developing and developed regions whereby the EU will dismantle its trade barriers first with SSA countries following from 2008 (at the earliest) leaving – over a lengthy period – to full reciprocity. From an SSA viewpoint, such South-North agreements are attractive because they would give African exporters preferential entry to the world's largest single market, possibly fostering outsourcing arrangements between EU manufacturers and SSA suppliers. Over time, EPAs would give SSA firms access to lower-cost – and better quality – inputs while also encouraging FDI in Africa.

Between 2000 and 2002, there were twice as many new North-South RTAs (eleven) notified to the WTO than South-South agreements (five). Indeed 21 of the 31 such agreements were signed since 1990 compared with 14 South-South RTAs.

History suggests that developing countries that want to participate in regional integration agreements should seek partnerships with large, rich countries or trading blocs (Schiff and Winters, 2003). From an SSA standpoint, the South Africa-EU Free Trade Agreement, already in place, marked a break with the past in terms of its North-South dimension. Negotiations are underway for a similar free trade agreement between the US and the Southern African Customs Union (South Africa, Botswana, Lesotho, Namibia and Swaziland). Open regionalism along these lines has the potential to accelerate industrialization and poverty reduction in SSA while fostering offshoring arrangements between African and OECD firms, thereby enhancing efficiency and productivity.

Sources: WTO, 2003; de la Rocha, 2003; Schiff and Winters, 2003.

ity to a host of competitive products and services that are normally taken for granted in more advanced countries. These include, but are by no means limited to, all kind of intermediate inputs and engineering, technical, financial, information, software, environment, infrastructure and manpower-related services, which are normally outsourced. In the absence of competitive sources of supply of these products and services, firms will be unable to respond to competitive pressures by enhancing their competitive standing.

A big-bang liberalization risks losing too much potentially competitive productive capacity.

Just as importantly, domestic firms also require an appropriate macro- and micro-economic framework, an incentives regime that rewards innovation and the supply of public goods needed to offset private under-investment in human capital, technology and the environment. Without these, trade liberalization and increased competition by themselves will just not do.

Regional trade integration as a means

A variant on the strategy for enhanced productivity at the national level is to integrate markets on a regional basis. For example, the East African Common Market (EACM) has the potential to pool three similarly-sized economies into a market of about 80 million people. On average, this would initially triple the number of firms in each industry and thereby reduce monopoly power. The intensification of competition should tend to squeeze profits and so accelerate productivity growth. As an industry consolidates following such market integration, the number of firms in specific subsectors will decline and the average size of remaining firms will increase, enabling remaining firms to achieve greater economies of scale and so further productivity growth. In addition, a regional approach to the provision of technological services such as those related to testing, metrology, certification and accreditation, is often the only way to go in order to set up viable and internationally competitive quality systems.

However, this process of consolidation is likely to be politically difficult. It necessarily implies that some firms will disappear while others expand, and this is very likely to be uneven across countries, with one country gaining at the expense of another. If one country gained some industries while another country gained others, this process might be politically manageable. This, indeed, is roughly the pattern of industrial integration in the EU and the one sought in Mercado Común del Sur (MERCOSUR) and Association of Southeast Asian Nations (ASEAN) (Sercovich e. a., 1999). Whether this is likely to be the pattern in SSA remains to be seen (box 1.5, p. 17).

Unfortunately, regional integration has radically different effects in developed and developing countries because of the asymmetries at work. In developed countries, such as the EU, regional integration tends to be equalizing: the poorest coun-

tries within the region tend to benefit most from integration. This happened in Europe where industrial growth was most rapid in the initially poor countries of Portugal and Ireland. The reason for this is that regional integration among developed countries helps the most labour-abundant member countries at the expense of the even more labour-abundant developing countries. By joining the EU, Portugal was able to sell to Germany labour-intensive products such as garments, that Germany had previously found it uneconomic to produce and had therefore imported from labour-abundant developing countries. In effect, a regional trade bloc among developed countries protects the most labour-abundant of the members – and therefore the poorest – from competition from even poorer countries.

Trade blocs in Africa may protect the most capital-abundant, and therefore richest of the member countries, from competition.

In contrast, trade blocs in Africa work in precisely in the opposite direction. They protect the most capital-abundant, and therefore richest of the member countries, from competition from the even more capital-intensive developed countries. Hence, a relatively advanced economy such as Côte d'Ivoire may be expected to gain at the expense of poorer economies such as Burkina Faso. The general principle at work here is that, in the absence of trade restrictions, the countries that can benefit most from trade are those with the most extreme endowments; very labour-abundant or very capital-abundant. Regional trade blocs inhibit this, thereby benefiting countries closer to the middle of the endowments range – such as Portugal and Côte d'Ivoire – at the expense of countries at the extremes, such as Germany and Burkina Faso. One implication is that regional integration will work best where countries are at similar stages of development, have similarly-sized markets, and adopt low external tariffs.

The EACM, currently being formed between Kenya, Tanzania and Uganda, is a good example of such an integration process. Because each country is at a similar stage of development and similarly sized, as competition intensifies it will not necessarily imply that all the industry is concentrated in Kenya. For example, the government of Tanzania has already reformed the functioning of its main port, Dar-es-Salaam, achieving high levels of efficiency, whereas the government of Kenya has yet to reform the operation of the port of Mombasa. This may give a substantial advantage to Tanzania, and also encourage the government of Kenya to overcome the political impediments to port reform.

However, the major benefits of the EACM may flow not from market integration in industry, but from market integration in agriculture and the benefits that this brings to industry. Currently, although per capita income in Kenya at PPP prices is only a third that of China, wages, when converted at official exchange rates, are much higher than in China. An important reason for the high cost of labour in Kenya is that its staple food is sold at about three times the world price. Kenya is a land-scarce country and its agriculture is not very efficient, so a policy of self-sufficiency has led to very high food costs. In turn, urban workers have passed these high food costs on to employers, so wages are too high to produce manufactured goods competitively.

Yet Kenya's land-locked neighbour Uganda has relatively abundant land with reliable rainfall. Uganda could supply food to Kenya at much lower prices than currently prevail in Kenya. In turn, this would permit urban wages in Kenya to fall in terms of manufactured goods without lowering the living standards of Kenyan workers. Because the costs of transporting food are very high and Kenya is a big country, to get food prices down Kenya actually needs two distinct strategies. Food surpluses in Uganda can help feed important inland markets, such as Kisumu and Nairobi, whereas the coastal market of Mombasa would be most cheaply fed by imports of food from international markets.

Hence, a strategy of integration which fully exploited Kenya's opportunities would involve Uganda selling food to Kenya, partly in return for manufactured goods produced in Kenya, but also the rest of the world selling food to Kenya in return for manufactures exported by Kenya. Without these two strategies for importing food, Kenya will have great difficulty reducing the cost of labour *in terms of manufactures* sufficiently to be competitive abroad, and in turn this would deny the growing Kenyan labour force the opportunity of employment in manufacturing. Without such new job opportunities, more and more Kenyan workers will find that they have no alternative but to work in agriculture, but with Kenya's limited supply of land this risks driving down the returns to labour and further raising the cost of food, making Kenya progressively less competitive.

The major benefits of the EACM may flow from market integration in agriculture.

To summarize, regional trade integration can sometimes complement a strategy for integration into the international market, as in East Africa, but it also risks shifting industry within the integrated market from poorer countries such as Burkina Faso to richer countries such as Côte d'Ivoire, and in the process making the poorest countries even poorer. The strategy of regional integration thus needs to be judged on a case-by-case basis, at least in terms of its potential for poverty-reducing industrialization. The history of regional integration in Africa shows many failures, and this may be because politicians got carried away with the non-economic objectives implicit in regional integration, while paying insufficient attention to detailed analysis of the likely economic implications.

Export promotion as a strategy

So far we have focused on a strategy of raising productivity by intensifying competition, ensuring competitive inputs and providing the necessary incentives and public goods. Helping firms enter the export market is another route to promote productivity enhancement. African firms seem to have faster productivity growth as a result of exporting (Harding, Soderbom and Teal, 2004). The reason is that their domestic markets are so small and uncompetitive. In contrast, there seems to be no reason why an American or Chinese firm would gain more in terms of productivity growth from selling its products abroad than from selling them on the domestic market, beyond the benefits from expanded contestability.

If, indeed, exporting puts African firms on a productivity escalator, then there is a case for an 'infant export industry' approach: initially supporting the entry of firms into foreign markets. Direct subsidies of exports are not allowed under WTO rules. They are also undesirable for other reasons: they would be fiscally far too expensive to conduct on a significant scale and, most importantly, they are very prone to corruption. Some of Africa's most serious documented cases of corruption involve the abuse of export subsidies.

If exporting puts African firms on a productivity escalator, there is a case for an 'infant export industry' approach.

An alternative approach is for the government to cover some of the initial information costs of breaking into export markets – such as helping firms participate in trade fairs and organize export consortiums. Yet another, as mentioned earlier, is for developed countries to provide a temporary period of privileged access to their markets, such as is provided by AGOA for the US market and by the Everything but Arms (EBA) initiative for the European market (Chapter 2 case study). Such approaches to raising the productivity of the existing industrial sector can be run in tandem to policies aimed to attract new entrants. Finally, as also referred to above, potential exporting firms require the services of the domestic or regional technical infrastructure to overcome technical hurdles to entry into overseas markets.

Investment

Investment is by no means the only determinant of growth, but it is evidently important. There is also some evidence that at the margin private investment is more productive than public investment, and that equipment investment is more productive than construction. Africa is atypical in two important respects here. First, it is highly unbalanced in the ratio of public to private investment. Globally, the private capital stock is usually almost double that of public capital. In the fast-growing East Asian economies the ratio is more extreme, about five to one. Yet in Africa the *public* capital stock is almost double the private one. Hence, not only is there too little overall investment in Africa, but also too little private investment relative to public investment.

One reason private investment has been so low is that the price of capital goods has been much higher in Africa.

Why has private investment been so low? One reason is that the price of capital goods has been much higher in Africa than in other regions. Studies consistently find that equipment is relatively expensive in Africa. There are various reasons for this. One is that taxes and tariffs on investment goods are too high. Another is that because the market for such goods is small, suppliers tend to be monopolistic and so able to charge high mark-ups. The two reasons are linked: one reason why the market is small is that prices are high due to taxes and tariffs. Hence, a strategy of reducing taxes and tariffs on equipment investment would induce an increase in the size of the market and hence in the degree of competition, which would reinforce the reduction in prices.

A second reason why private investment has been low is that the region is perceived as risky. Internationally comparable risk measures such as the ratings by *Institutional Investor* find that Africa is perceived by investors to be the riskiest region of all. Some argue that these perceptions are exaggerated, showing that while the risk ratings broadly reflect fundamentals, Africa would be rated worse than is warranted by the fundamentals (Collier and Pattillo, 1999). This suggests that there may be high returns from raising investor awareness about the African fundamentals through promotional efforts. A second approach is to provide better means of insurance for investors. Public agencies such as Multilateral Investment Guarantee Agency (MIGA) can potentially provide insurance facilities that are particularly cost-effective because they are combined with effective claims-recovery mechanisms.

However, in addition to publicity and insurance it is also necessary to improve the risk fundamentals: investor risks need to be reduced. Since some of the perceived risks are political, many African governments are themselves attempting to address investor concerns by introducing codes of government conduct in the form of investment charters, and establishing implementing agencies in the form of 'one-stop' investment authorities. To increase the credibility of these individual national efforts even more, there may be scope for governments to lock themselves in through mechanisms of peer pressure through, for instance, a regional charter promulgated by NEPAD. As in many areas of life, those burdened with adverse reputations are the ones who benefit most from establishing mechanisms of self-restraint.

However, probably the main reason why private investment has been low in Africa is that the returns on investment in productive activities net of risk – with the exception of natural resource extraction – have been low. This takes us back to the problem of low productivity and high costs. Promoting manufacturing investment by artificially raising the profitability of manufacturing activities has been a frequent strategy across most of Africa for 30 years. It has not worked. A new vision is called for.

Summing up the Sub-Saharan African challenge

African economic performance over the past 30 years has been exceptional. As a result of this exceptionalism, whereas 30 years ago the global poverty problem was fundamentally about development in Asia, in the future it will be about development in Africa.

Although Africa's economic performance has been disappointing virtually across the whole region, the problems cannot sensibly be considered at the regional level. Rather, there are at least three groups of countries distinguished by their opportunities. The largest, with nearly 40 percent of the region's population, is land-locked without significant natural resource endowments. That such a high share of the region's population should be in this situation is wholly unique to Africa. These countries are among the poorest in the world, and unfortunately they have limited options. The only model for such countries that has worked in other regions is for them to export regionally tradable goods to their neighbours. However, this in turn depends upon the neighbouring economies being successful. Thus, the poorest 40 percent of the region is dependent upon growth in the rest of the region. This is one important reason why, for Africa, a growth-oriented strategy is also likely to benefit the poor: growth in one country can benefit neighbouring countries with a very high incidence of poverty. Whether growth has such regional spillovers depends upon the extent of regional integration: effective trade integration will often involve the land-locked countries exporting food and services to their neighbours, together with temporary migrants.

The challenge of achieving growth is thus dependent upon changing performance in the two other opportunity groups. Success in the natural-resource economies depends primarily upon improving governance. The contrast between Botswana and Sierra Leone, and the terrible waste of Nigeria's oil wealth, testify to this. The effective use of natural-resource income needs a strong and effective state. In contrast, success in the coastal economies depends upon becoming globally competitive in manufactures. This is not going to be easy because manufacturing is now a highly competitive activity, with China as the dominant low-income competitor. Yet Africa's coastal economies have some advantages: better location than Asia and lower per capita incomes. To date, these advantages have been more than offset by inadequate government-provided services, by the unreliability and high cost of protected domestic manufactured inputs, by poor macroeconomic policies, and by corruption. All of these problems need to be corrected rather than merely offset. However, some temporary offset by way of favoured access to Organization for Cooperation and Development (OECD) markets is likely to be useful. EPZs combined with AGOA and the Everything-but-Arms agreement may be effective, as in Madagascar. However, African EPZs have not, in the past, been successful. They are only likely to be worthwhile if they are used as a coordinating device to target other changes, such as improvements in basic services and the curtailment of predatory behaviour.

For Africa, a growth-oriented strategy is also likely to benefit the poor.

This curious regional structure of opportunities, in which the fate of the poorest 40 percent depends upon reforms in the more favoured 60 percent, is well-suited to a regionally orchestrated response. Peer pressure – which in this case should be 'poor-pressure' – is needed to accelerate the pace of change in the more favoured countries of the region. NEPAD has the potential to achieve this internalisation of the adverse externalities that poor governance and policies in the favoured countries have, to date, inflicted on their disadvantaged neighbours.

Chapter 1 Annex: Initial conditions and economic growth[12]

Non-economic *initial conditions* that define the social capabilities embedded in countries at the beginning of their development take-off, are found to have significant effects in explaining differences in subsequent economic growth, keeping other factors such as initial level of income constant. To an extent today's policy outcomes are tomorrow's initial conditions, and hence a distinction has to be made between truly exogenous factors (geography, ethnic diversity, colonial legacy), on one hand, and policy-induced ones such as investment in education and healthcare on the other. In between are variables that, although influenced by policy, change only very slowly, such as income distribution (Temple, 1998).

In fact, while policies may provide proxy causes of unmet potential, social capabilities are helpful in explaining why those policy choices have been made in the first place. They affect government policies and the incentive structures within an economy, and explain economic outcomes such as poor saving and investment rates, weak private sector development, and dependence on few natural resources (Temple, 1998). Also, some indicators of social capability are useful to explain factor accumulation, while others, such as the quality of infrastructure, have direct effect on productivity growth.

No analysis of LDC development problems that neglects initial conditions and structural barriers can be expected to provide either a relevant assessment of their development problems or realistic policy guidelines. However, there has been very little concerted effort to collect data and establish an analytical model capturing these effects in the case of SSA. This is admittedly a major undertaking that is waiting to be fulfilled. It is revealing to consider some of the different aspects of social capabilities separately, however difficult it may be in practice to observe some of these variables and quantify them. For example, Adelman and Norris (1967) attempted to gauge factors such as the importance of the domestic middle class and sense of national unity by using proxies, given limited and difficult-to-capture statistical data. The following provides a schematic overview of some of the initial conditions and factors that have been found to make an important impact on economic outcomes.

Exogenous factors

Geography. Geographical features that have been deemed to affect long-run growth possibilities include the quality of soils, climatic conditions, spatial distribution of population, access to seacoasts and navigable rivers, and distance from world markets. Bloom and Sachs (1998), for example, find that growth rates decline with lower coast/land-area ratio, higher proportion of land in the tropics, and higher latitudes. However, when comparing SSA countries to recent high performing economies (HPEs), it results that the proportion of land between tropics need not be by itself an impediment to high growth, as six HPEs, including Indonesia and Malaysia, have 100 percent of their territories between tropics. This means that other geographical features, such as quality of soils, access to natural ports, distance to trading centers, and the like, may be more important, with direct effects on productivity. Also, natural-resource endowments and land abundance can both improve and hamper prospects of growth (see box 1.2, p. 9 and Wood, 2002).

Colonial legacy. A complete analysis of the role played by colonial legacy would involve not only identifying the colonizing nations and the year of independence as has been done in number of publications, but also the nature of the colonial institutions that were established. Colonial institutions erected by different colonizers seem to have followed different patterns depending on a variety of factors like climate, resource endowments, geography, the emergence of a cadre of trained indigenous people and institutions, and on whether a large number of settlers and colonial rulers could set up residence locally. The difference is obvious when we consider the different institutions set by Great Britain in India and in Australia, or by Spain in Central America (Acemoglu and Robinson, 1998).

The institutions for governance and resource-extraction that prevailed during the colonial era in developing countries have been found to affect post-independence institutional quality and growth in a variety of ways. For example, whether indirect rule and the absence of colonial settlers facilitated the emergence of a cadre of trained natives, or, conversely, segregated public-service systems limited native participation in government, are likely to have had different effects on post-independence institutional quality. Similarly, colonial institutions that favoured the emergence of competitive political parties, independent judiciaries, and cabinet governments based on a merit-recruited, politically neutral civil service, or a powerful presidential system wielding strong executive authority, are likely to have had different governance implications. While it is often difficult to quantify these factors, their influence on institution-building cannot be ignored (World Bank, 2000).

Ethnic diversity. Socio-linguistic fragmentation and ethnic diversity, as measured by the probability that two randomly selected people from a given country will not belong to the same ethno-linguistic group (Taylor and Hudson, 1972), may undermine social cohesion, the adoption of common standards and the quality of governance, deteriorating the business climate and the ability to implement pro-growth policies. Easterly and Levine (1997) note the role of high ethnic diversity in inducing political instability, uneven and poor delivery of services and public investment, which in turn hinders growth. Wood (2002) examines the role of ethnic diversity and the lack of institutional conflict-resolution mechanisms in inducing a high-risk investment environment and poor infrastructure. However, the effects of ethnic diversity are not always straightforward. Though ethno-linguistic fragmentation appears to affect SSA growth, the comparison with the HPEs suggests that this diversity should not necessarily be an impediment to achieving the high growth rates displayed by this group in their take-off years: ethno-linguistic fragmentation probabilities in the HPEs go from 0 percent (Republic of Korea) to 89 percent

(India), with a median of 58 percent, while in SSA the average is 54 percent. Although ethnic diversity is an exogenous factor that cannot be changed by an intervention, it may be possible to evade some of the related social problems through effective conflict-resolution institutions and measures that reduce inequality during periods of growth.

Policy-induced factors

Educational capital. Most empirical studies support the view that high initial educational endowments are positively related to growth, in line with various economic theories, from neoclassical to endogenous-growth approaches (Lucas, 1988; Grossman and Helpman, 1991). Although, the choice of particular indicators (literacy, school enrolment or average years of schooling) and the direct macro benefits have been put under critical scrutiny (Pritchett, 1996; Bils and Klenow, 2000), the fact that both adult literacy and primary and secondary enrolment rates in SSA are among the world's lowest indicate that achieving the MDGs will provide a crucial boost to SSA's economic prospects. In addition to this, there is clear evidence that education has direct beneficial effects beyond output growth. For example, improved education of mothers helps to lower childhood mortality and malnutrition.

While it is true that some HPEs had similar educational attainment levels to SSA at the beginning of their take-off, not only they were able to overcome this serious initial deficiency with appropriate educational policies by increasing investment, but also supported them with complementary reforms that helped to align incentives so that the returns to education increased in tandem with structural change.

In fact the experience in a number of the HPEs, especially among the low-skill export manufacturers, show that the educational requirement *for take-off* might not be too high. However, subsequent educational upgrading has important implications for moving up the technology ladder and for making growth more pro-poor.

Furthermore, the calculations above do not account for the fact that it is not only the quantity of education that matters, but also its quality. Take the cases of Zambia, Malawi and Uganda: while macro data is largely absent, data from household surveys show that absenteeism in primary schools is a common problem, with 88 percent of pupils missing on average 14 days of school per year. Similarly, micro evidence of teacher absenteeism is coming to light, especially within the context of HIV/AIDS affecting schoolteachers in SSA. There is also evidence that the educational system in many parts of SSA has been functioning to meet a demand for skills that is biased towards largely unproductive civil service activities (Gelb, Knight and Sabot, 1991).

Life expectancy and other health indicators. Low life expectancy and high fertility naturally leads to low investment in physical or human capital and low savings. Poor health conditions (like a high incidence of AIDS or malaria, or lack of access to sanitation or potable water) directly reduce labour productivity, and cause fiscal distress. In SSA, HIV/AIDS threatens to cut life expectancy by 20 years and malaria is estimated to result in a loss of more than one percent of GDP, in the form of costs of medical care, lost productivity, lower FDI and tourism inhibition (Bloom and Sachs, 1998). In addition, most assessments of HIV and malaria implications for growth underestimate the main long-term impacts as intergenerational links are missed. Compare, for instance, the prevalent average life expectancy of 46 years in SSA with an average life expectancy of 59 years in the HPEs during their take-off years. This indicator alone summarizes that very poor health is one of the biggest obstacles to SSA jumping into growth paths similar to those observed in the HPEs. Indeed, the differences in life expectancy with the HPEs appear as the greatest cause of forgone growth when we apply the growth regression coefficients estimated by Sala-i-Martin e.a. (2000). The estimated growth losses for the SSA for this reason range between 0.2 and 0.8 percentage points vis-à-vis the average HPE.

Table 1A.1 Infrastructure SSA vis-à-vis HPEs

	Take-off	*Year for data*	*Telephone mainlines (per 1 000 people)*				*Paved roads (percent of total roads)*
			1960	*1970*	*1980*	*2001*	*1980*
Sub-Saharan African countries							
Coastal		2000	5.05	5.43	10.94	47.72	20.24
Land-locked		2000	2.30	2.22	3.11	7.19	16.80
Natural resources-rich		2000	3.93	6.88	7.56	22.59	10.96
Benchmark countries							
Chile	1977	1971	17.30	24.90	32.50	232.51	13.21
China	1969	1980	..	..	2.10	137.40	50.00
India	1980	1977	0.70	1.70	3.10	37.52	47.31
Indonesia	1967	1964	0.80	1.10	2.40	34.51	61.98
Korea, Rep.	1960	1961	..	15.00	70.90	485.67	61.42
Malaysia	1960	1970	5.80	9.50	28.70	195.76	68.85
Sri Lanka	1977	1973	2.30	2.90	3.60	44.27	33.25
Thailand	1986	1986	1.40	2.60	8.10	98.65	53.15
Viet Nam	1989	1992	0.20	..	..	37.60	11.11
Mauritius	1977	1980	9.10	13.50	24.40	257.38	92.92
Bangladesh	1970	1973	..	..	..	4.30	51.79

Source: World Development Indicators Database, 2003.

Infrastructure. Poor infrastructure (low percentage of paved roads, small number of phone lines per worker, deficiencies in the transportation system and in port facilities, and so on) hurt growth in a variety of ways by lowering productivity, hindering reallocation of labour and increasing transaction costs. This is clearly reflected in the fact that land-locked countries face transport and insurance costs of up to 42 percent of total export costs, compared to 5.8 percent for developing countries as a whole. In 1997 Africa, excluding South Africa, had 171 000 kilometers of paved roads, fewer than Poland. Outside South Africa, the continent has only five million telephones, and most Africans live two hours from the nearest telephone. Weak telecommunications has been estimated to reduce African growth potential by 1 percentage point (Easterly and Levine, 1997, cited in World Bank, 2000). UNECA estimates show that Africa needs to invest $18 billion per year in infrastructure to fulfil its growth potential (UNECA, 2000).

What is important to highlight, moreover, is that the infrastructure requirements for take-off today may be quite different to what they were two decades or more ago. Modern industrialization needs reliable telecommunication infrastructure in order to tap into global commodity chains. SSA has largely missed the telecommunications revolution that took place in the past two decades. While the number of telephone lines per capita in the HPEs were multiplied by a factor of ten on average (excluding China where it was 70), the increases in SSA were much smaller (box 1 A.1). Indeed the 'digital gap' is becoming all the more evident as only one in 113 people use the internet in SSA compared to the world average of one in ten people (WEF, 2003).

Civil conflicts and wars. Armed conflicts impose enormous costs on countries and create uncertainties for all economic agents. Studies have found that political, social, and government instability raised the investment risk in the poor-growth African countries and thus was a disincentive for foreign investors (Collier and Hoeffler, 1998). They also inflict costs on neighbouring countries by generating refugee flows, prompting increases in military spending, interrupting key communication routes, and reducing trade and investment. The resources diverted from development uses by conflict are estimated at $ 1 billion a year in Central Africa and more than $ 800 million in West Africa. This calculation does not include the cost of environmental degradation occasioned by the disruptive movements of large number of people (World Bank, 2000).

In the early post-independence era, peace and stability descended upon several African countries. But the peace soon gave way to military coups, civil strife, and armed conflicts. The structure and performance of African economies – low per capita income, slow GDP growth, fast population growth, and high dependence on primary commodities – has been found to increase the risk of conflict (Collier and Hoeffler, 2002). Africa's ethnic and religious diversity is found to have complex effects on civil strife. Collier and Hoeffler (1998) find a U-shaped relationship between ethnic diversity and likelihood of civil conflicts. Temple (1998) goes further and points out that there might be a turning-point in the diversity index where the intermediate range of ethnic diversity is most damaging for the likelihood of civil conflict and poor policy choices. Political factors, such as weak democratic institutions and a lack of political and civil rights, also increase the risk (Collier and Hoeffler, 2002).

The most frequent form of conflict is civil war. Thirty years ago Africa had a lower incidence of civil war compared with other developing regions. However, while the incidence of civil wars have gone down in other regions, it has actually increased in Sub-Saharan Africa. (Collier and Hoeffler, 2002) According to the records of the Organization of African Unity, 26 conflicts erupted in Africa between 1963 and 1994, affecting 61 percent of the population (OAU, 1998). Inside Africa, Southern Africa recorded the lowest percentage of

Table 1A.2 Initial conditions and forgone growth vis-à-vis average HPE

					Forgone annual growth (percent)		
	Coastal average	*Land-locked average*	*Natural resources-rich average*	*All benchmark (without Viet Nam) average*	*Coastal*	*Land-locked*	*Natural resources-rich*
Non-economic initial conditions							
Geography	na	na	na	na	–0.3	–0.5	–0.4
Index of coast/land area	0.33	0.01	0.12	2.00	–0.1	–0.1	–0.1
Proportion of land between tropics (percent)	80	99	90	62	–0.2	–0.5	–0.4
Life expectancy (years)	52.98	45.62	46.57	54.70	–0.2	–0.8	–0.7
Primary school enrolment (percent)	0.68	0.63	0.67	0.74	–0.1	–0.2	–0.1
Total non-economic initial conditions (without inequality, ethnic diversity, quality of infrastructure, etc.)	na	na	na	na	–0.6	–1.6	–1.3
Economic initial conditions							
Real exchange rate distortions	157.56	149.60	191.75	90.22	–0.5	–0.4	–0.7
Number of years of openness	0.13	0.08	0.08	0.50	–0.7	–0.8	–0.8
Share of mining in GDP (percent)	11	8	37	8	0.2	0.0	1.0
Share of primary exports in total exports (percent)	65	58	60	67	0.0	0.1	0.1
Total economic initial conditions					–1.0	–1.1	–0.4

Source: UNIDO calculations based on Doppenholfer, Miller and Sala-i-Martin, 2000; proportion of land between tropics and index of land/coast area from Bloom and Sachs, 1998; all other data from Penn World Tables and United Nations.

affected people (29 percent, 33 million). During 2002, 14 SSA countries (out of 47) were still involved in some form of armed conflict.

Slow-changing endogenous factors

Income and wealth inequality. Unequal distributions of income and wealth can generate growth-hampering conditions and result in poverty traps in a number of ways – by prompting political pressures to re-distribute income through distortive taxation that discourages investment (Alesina and Rodrik,1993) or by preventing a large share of the population from investing in physical and human capital, in the presence of lending market imperfections (Galor and Zeira, 1993). Poor income distribution could entail growth losses relative to the median HPE of up to 1.1 percentage points. Nevertheless, the fact that Chile, Malaysia, Thailand and Mauritius managed to grow fast despite relatively unequal initial distributions suggests that there are ways to circumvent the obstacles posed by inequality.

Economic and Market Related Initial Conditions

There are also other economic and market related factors that have been granted attention to in the growth literature. For example, size of markets, agricultural productivity, quality of macroeconomic institutions and trade openness have been studied in the context of African growth. While they largely relate to the success of economic policies, they can also be important sources of growth differential between the SSA countries and high performing economies elsewhere. Using the methodology adopted by Sala-i-Martin e.a. (2000), some of these economic initial conditions are estimated to account for 0.4 to 1.1 percentage points in foregone growth vis-à-vis the average HPEs, while also controlling for other factors (see table 1A.2, p. 23).

In conclusion, while factors effecting social capabilities are diverse and complicated in nature, scattered evidence show that they have important impact on determining the success of economic policies and intended outcomes. Overall, as the table 1A.2 shows, up to 1.6 percentage points difference in growth rates in the land-locked economies vis-à-vis the average HPE can be explained by non-economic initial conditions. Therefore they should be carefully taken into account while alternative policy scenarios for SSA are considered, as the existing incentive structure and constraints on capabilities within each society might have profound effects on the timing and design of reform strategies.

Notes

This chapter is based on a background paper by P. Collier (2004). However, the views expressed here are of UNIDO and do not necessarily reflect those of the author.

1 This expression is accredited to Achebe, 2000.

2 Harvard economist Kenneth Rogoff, the chief economist of IMF between 2001 and 2003, has renamed the MDGs as "Minimum Development Goals" referring to the limited objectives encapsulated in them (Rogoff, 2004).

3 The views in this respect have changed much since Lord Kaldor's times (see Kaldor, 1957). In this transformation the lessons learned from the South-East Asian industrialization experience have been most influential. The understanding that causalities often run in both directions is not new in the UN thinking or elsewhere but such understanding is still awaiting much improved policy development.

4 Collier, Hoeffler and Pattillo, 2001 used the standard 'residuals' method to get annual flows and then accumulated the flows globally based on some additional assumptions, to arrive at the conclusion that Africa has much higher capital flight than all the other regions. They maintain that debt-driven flight (which occurs when capital flees a country in response to economic circumstances attributable to external debt itself) is comparatively small other than in cases of heavy indebtedness. Similarly, UNECA (2003) finds that most of the estimated $187 billion of real capital flight out of Africa between 1970–1996 can be attributed to *debt-fuelled* flight (when funds borrowed abroad are re-exported as private assets).

5 As we are trying to classify countries by their potential opportunities in the medium term, the classification of natural resource rich economies as opposed to coastal and land-locked might merit further explanation. Because the main interest here lies in the current receipt of large rents from natural resources, the analysis is confined to the export of ores, minerals and fuels and ignores agricultural commodities where the rents are usually much lower. We estimate the volume of these exports relative to GDP using 1999 data from the World Development Indicators, Table 4.5. As some data is missing from this database, approximations are taken into consideration. The first cut-off was done by classifying countries with more than 20 percent of GDP in natural resource exports as natural resource rich. Then a second cut-off was introduced with a further condition: the countries with more than 10 percent of GDP in export of ores, mineral and fuels that have a higher than $70 per capita of natural resource exports were also counted. This keeps Central African Republic and Chad from being natural resource economies, as well as classifying Cameroon as a natural resource economy as opposed to a coastal one.

In general, the analysis of coastal economies implies that what matters for a country's prospects is whether it has a viable and significant port where an export industry can get started rather than how many people currently lives within 100km to the sea. If the industry is successful, people will move, but it is not this potential movement that is needed before the strategy of export-led industrialization if the port can be successful. The movement of people is simply something that will follow on from success. By contrast, countries with natural resources under the ground but unexploited do not yet have the characteristics of countries with large natural resource rents. Something must be impeding the exploitation – e.g. civil war or extreme political uncertainty, but these are not the same problems as generated by high natural resource rents.

6 The logical extension of such considerations would be to rely, for instance, on the proportion of the population of a country that lives within one hundred kilometers of the sea. Jeffrey Sachs, who has pioneered work on the problems of land-locked countries, has followed this approach, (see Sachs and Bloom, 1998).

7 In fact, there have been non negligible FDI inflows in the Sudanese oil industry. Average annual GDP growth in Ethiopia has been 6.2 percent a year since 1990, making it the third fastest growing economy in the region with Mozambique, – behind Equatorial Guinea and Uganda.

8 For a proposal along these lines see Sala-i-Martin and Subramanian, 2003.

9 There is actually no formal EPZ in Lesotho, although the Lesotho Development Corporation thus provide a range of incentives tantamount to an export platform.

10 SMIG stands for "salaire minimum interprofessionel garanti".

11 In fact, choices are often not that stark, bearing in mind the reality of take-over, mergers, amalgamations and the like. Classic examples are South African sugar firms take over state sugar estates in Malawi and

Mozambique and South African breweries taking over state-owned breweries across the continent.

[12] The statistical analysis in this Note draws on Sanchez, 2004.

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Breaking with backwardness

CHAPTER 2

Industrial development in Sub-Saharan Africa

Introduction

Structural transformation – specifically the growth of manufacturing and of services – is a pre-requisite for rapid and sustainable poverty reduction in Sub-Saharan Africa (SSA). To achieve their income poverty Millennium Development Goal (MDG), SSA countries must more than double the rate of per capita income growth achieved in the last few years. Conversely, economic growth and structural transformation depend on reaching the MDG thresholds themselves.

Other than for a handful of countries, such growth rates would be exceptional in SSA. Moreover, given the relatively low level of economic development attained by a vast majority of SSA countries, such growth performance implies major structural change since neither present levels of factor accumulation (of both physical and human capital), nor the existing physical and institutional infrastructure, are yet commensurate with the requirements of such a performance.

In order to help grasp the significance of the changes in the productive sectors involved, what follows first examines the evolution and recent performance of manufacturing industry in SSA to explain the region's slow and halting progress towards structural change. Then the pattern of industrial development in SSA is described and analyzed in the context of global pattern of industrial growth, considering diversification and deepening effects.

Next the focus turns on the growth rates required to achieve the income poverty MDG in SSA countries and their implications of structural change.[1] Attention is also paid to whether the prevailing conditions in SSA today provide a viable platform from which SSA economies can 'take-off' into sustained industrial growth and structural transformation.

Manufacturing industry in Sub-Saharan Africa: The record

SSA lags behind other developing regions in terms of almost all measures of economic development: income per head, industrialization and agricultural productivity. The distribution of manufacturing activity in SSA, measured by the dollar value of manufacturing value added (MVA), is highly skewed (table 2.1 and 2.2). Only ten out of 45 countries have an MVA of one billion dollars or more, while just one country, South Africa, accounts for 27.3 percent of the subcontinent's total MVA.

The top ten producers of manufactures (equivalent to 21 percent of the total number of countries) account for 45 percent of total MVA and the top 15 (equivalent to one-third of the total number of countries) are responsible for almost half (49 percent) of the total.

Table 2.1 Top 15 countries in Sub-Saharan Africa by MVA, 2001

Rank	*Country*	*MVA (Million dollars)*	*MVA per capita (dollars)*
1	South Africa	26 418	597
2	Sudan	3 606	112
3	Côte d'Ivoire	2 930	185
4	Cameroon	2 248	146
5	Nigeria	2 120	18
6	Zimbabwe	1 779	139
7	Senegal	1 133	118
8	Kenya	1 057	34
9	Ethiopia	1 009	15
10	Mauritius	1 004	842
11	Burkina Faso	898	72
12	Ghana	880	44
13	Uganda	692	26
14	Zambia	625	59
15	Angola	525	41

Source: UNIDO Industrial Statistics database, 2003.

Table 2.2 Top 15 countries in Sub-Saharan Africa by MVA per capita and by share of MVA in GDP, 2001

Rank	*Country*	*MVA per capita (dollars)*	*Country*	*Share of MVA in GDP (percent)*
1	Mauritius	842	Swaziland	28.8
2	Seychelles	669	Mauritius	20.7
3	South Africa	597	Côte d'Ivoire	21.6
4	Swaziland	362	South Africa	19.3
5	Gabon	307	Zimbabwe	19.1
6	Namibia	216	Burkina Faso	18.2
7	Botswana	192	Chad	16.1
8	Côte d'Ivoire	185	Rwanda	15.7
9	Cameroon	146	Zambia	15.0
10	Zimbabwe	139	Cameroon	14.9
11	Senegal	118	Senegal	13.6
12	Sudan	112	Lesotho	12.4
13	Cape Verde	109	Seychelles	12.4
14	Congo, Rep. of	78	Madagascar	10.8
15	Burkina Faso	72	Kenya	10.4

Source: UNIDO Industrial Statistics database, 2003.

With the exceptions of South Africa and Mauritius, MVA per head in the 15 most industrialized countries (table 2.1) is very low. South Africa is the only country in which manufacturing plays a major role in both domestic output and exports, while Mauritius, an island with a population of only 1.2 million inhabitants, is best described as an export platform.

Only ten out of 45 countries in SSA have an MVA of one billion dollars or more.

Low levels of MVA per head reflect the underdevelopment of African manufacturing. Beyond the factors discussed in Chapter 1, this is attributable primarily to small markets, and the failure, with a few exceptions like Mauritius, South Africa and Lesotho, to break into export markets (table 2.2 shows the top SSA countries ranked by share of manufacturing gross domestic product (GDP), as well as by MVA per capita).

Forty of the 48 countries (83 percent of SSA countries for which data are available) have an MVA per capita below $250. The rankings and dollar value data for MVA per capita suggest that rich natural resource endowments and high levels of primary product export concentration are not necessarily important deterrents to industrialization in SSA.

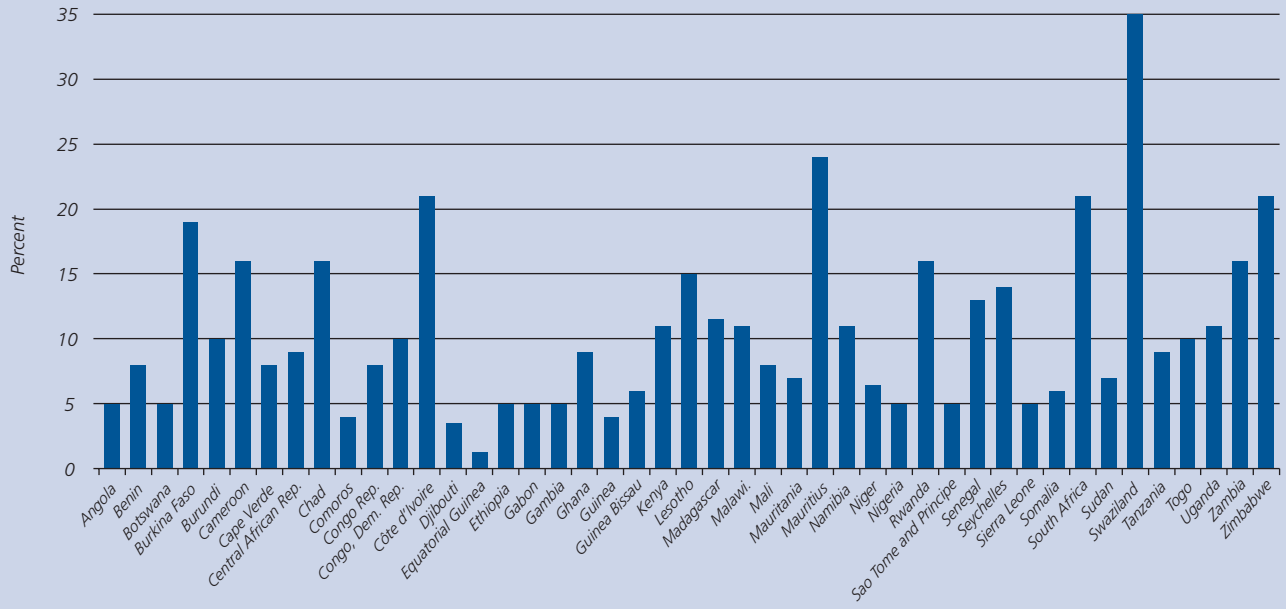
The data also suggests that neither the high concentration of natural resources nor sea-access seem to have played an overriding role in determining the location of manufacturing activity in SSA (table 2.1). Seven of the top 15 countries are on the west coast, four on the east coast, three in the south, and one is an island. Four are land-locked (Burkina Faso,

Table 2.3 MVA performance in Sub-Saharan Africa, 1981–2001

Country	*MVA (million dollars)*	*MVA per capita (dollars)*			*Share of MVA in GDP (percent)*			*MVA annual growth rates (percent)*	
		1981	*1991*	*2001*	*1981*	*1991*	*2001*	*1981–1991*	*1991–2001*
Angola	525	89	52	41	8.5	4.9	4.8	–3.4	1.9
Benin	250	38	31	39	9.2	7.6	8.1	2.2	5.3
Botswana	335	103	154	192	6.2	4.9	4.8	8.7	4.5
Burkina Faso	898	48	46	72	16.9	14.2	18.2	2.0	7.7
Burundi	90	19	24	13	9.9	11.7	8.9	5.6	–5.8
Cameroon	2 248	138	147	146	11.9	14.8	14.9	2.2	2.8
Cape Verde	43	38	84	109	5.4	8.5	7.7	9.6	6.2
Central African Rep.	152	38	49	40	3.9	10.1	8.6	3.1	0.05
Chad	267	29	36	33	18.6	16.2	16.1	4.8	3.6
Comoros	10	12	16	15	3.5	3.8	4.1	4.1	–1.3
Congo, Rep. of	269	76	102	78	6.6	8.2	8.2	5.2	–1.2
Congo, Democratic Rep.	349	38	21	7	11.9	9.4	8.6	–0.5	–5.4
Côte d'Ivoire	2 930	231	174	185	19.6	20.9	21.6	3.2	3.8
Djibouti	14	51	37	20	4.9	4.4	3.2	1.7	–7.6
Equatorial Guinea	5	8	6	11	1.4	1.3	1.3	1.9	8.3
Ethiopia	1 009	13	7	15	6.8	4.2	6.0	–0.7	9.1
Gabon	399	393	413	307	5.4	6.3	5.1	1.6	0.7
Gambia	21	14	19	15	3.9	5.5	4.4	7.2	1.2
Ghana	880	37	37	44	9.2	9.4	9.2	6.2	4.0
Guinea	164	17	21	20	3.4	4.5	3.7	5.5	2.1
Guinea Bissau	18	32	17	12	14.9	6.8	6.0	–5.3	–3.5
Kenya	1 057	33	37	34	9.6	10.3	10.4	5.1	1.9
Lesotho	104	15	41	58	5.0	10.6	12.4	13.1	5.5
Madagascar	426	32	26	25	11.4	11.3	10.8	2.2	2.7
Malawi	267	34	33	23	15.7	16.5	11.1	4.0	–2.1
Mali	283	17	23	23	6.1	8.6	7.5	7.1	2.6
Mauritania	97	52	50	36	9.2	9.7	6.2	2.4	–1.1
Mauritius	1 004	225	513	842	14.2	19.9	20.7	11.0	5.9
Namibia	412	207	190	216	9.2	9.9	9.7	2.7	2.9
Niger	200	19	20	18	4.2	6.1	6.4	4.3	3.9
Nigeria	2 120	25	22	18	6.7	5.7	4.9	1.6	1.1
Rwanda	445	74	60	55	17.7	15.5	15.7	1.2	5.4
Senegal	1 133	90	97	118	12.3	12.9	13.6	3.9	4.8
Seychelles	80	276	618	669	7.3	11.6	12.4	8.9	5.4
Sierra Leone	32	7	6	7	2.6	3	4.9	2.8	1.5
Somalia	55	..	..	..	..	..	..	..	..
South Africa	26 418	777	618	597	20.7	20.7	19.3	0.8	1.6
St. Tome and Principe	5	26	24	24	6.2	5.5	5.3	0.3	1.7
Sudan	3 606	98	89	112	8.9	8.7	6.6	1.3	4.5
Swaziland	397	110	329	362	13.6	29.6	28.8	17.9	2.9
Tanzania	463	18	14	13	10.9	8.5	8.0	0.7	3.3
Togo	193	48	48	41	8.9	10.5	10.1	3.1	3.4
Uganda	629	8	10	26	4.3	5.4	9.9	5.0	13.5
Zambia	625	56	56	59	9.5	12.4	15.0	4.5	2.3
Zimbabwe	1 779	192	146	139	22.1	20.0	19.1	3.1	0.3

Source: UNIDO Industrial Statistics database, 2003.

Figure 2.1 **Share of MVA in GDP in Sub-Saharan African countries, 2001**



Source: UNIDO Industrial Statistics database, 2003.

Uganda, Zambia and Zimbabwe), while the rest enjoy sea-access. This highlights the interdependence and interaction of history, geography and policy in steps towards structural transformation and economic development.

High levels of income per head tend to be associated with higher levels of industrialization as measured by MVA per capita. Strikingly too, MVA per capita is highest in countries with small populations. Seven of the top eight – the exception is South Africa – have populations of less than two million.

Neither the concentration of natural resources nor sea-access seem to have played a major role in the location of manufacturing activity.

The country distribution by MVA share in GDP (figure 2.1) indicates that 33 countries have manufacturing shares in GDP of less than 12.5 percent. The remarkably high value for Swaziland is a result of its recent inclusion in the small group of SSA exports platforms. The share of manufacturing in GDP is also high in Mauritius due to the strength of its successful export-processing zone (EPZ) specializing in clothing exports.

Other countries with high MVA shares in GDP – South Africa, Côte d'Ivoire, and Zimbabwe – reflect the presence, during their periods of rapid industrialization, of European settler communities that led to an expansion of industry, often supplemented by government protection, to satisfy local settler needs.

Factors influencing industrialization in Sub-Saharan Africa

Building on the work of Chenery (1960) a model was used to assess the degree of industrialization attained by each SSA country relative to its predicted level (tables 2.4 and 2.5, and figure 2.2).[2] The results suggest that income per capita has been less important in determining the degree of African industrialization than the UN estimated in 1963 on the basis of global data – while population growth was found to be significantly more important. A ten percent increase in per capita income leads to only a 10.6 percent rise in MVA, while population growth of ten percent is associated with an 18.4 percent increase in MVA.[3]

Actual and predicted MVA are compared for 12 top 'over-performers' and 'underperformers' (tables 2.4 and 2.5).[4] Figure 2.2 shows the percentage difference between actual and estimated MVA.

The divergence between actual and expected MVA values is commonly attributed to openness (trade and geography) or to government economic policy. Trade influences, especially a strong comparative advantage in natural resources, may lead to under-industrialization while government interventions, in the form of protection and other measures to promote manufacturing, may have the opposite effect.

Undoubtedly government promotion played an especially important role in the case of South Africa and Zimbabwe (formerly Southern Rhodesia) when these countries were subjected to international sanctions, including trade blockades, which governments at the time counteracted with strong import-substitution programmes. The experience of the two countries also illustrates the central role of history in influencing the pattern of industrial development, as well as the striking contrast in post-sanctions development strategies.

Table 2.4 Over performers: Sub-Saharan African countries above the predicted MVA

Country	MVA observed in 2001 (million dollars)	MVA predicted (million dollars)	Residual (million dollars)	Residual (percent)
Seychelles	80	3	77	96.2
St. Tome and Principe	5	1	4	83.3
Swaziland	397	103	294	74.0
Ethiopia	1 009	307	702	69.6
Sudan	3 606	1 210	2 396	66.4
Cape Verde	43	15	28	65.1
South Africa	26 418	9 830	16 588	62.8
Mauritius	1 004	410	594	59.2
Burkina Faso	898	373	525	58.5
Côte d'Ivoire	2 930	1 417	1 513	51.6
Nigeria	2 120	1 059	1 061	50.0
Rwanda	445	237	208	46.7

Source: UNIDO calculations, see (b) in Chapter 2 Technical Annex.

Table 2.5 Under performers: Sub-Saharan African countries below the predicted MVA

Country	MVA observed in 2001 (million dollars)	MVA predicted (million dollars)	Residual (million dollars)	Residual (percent)
Equatorial Guinea	6	78	–73	1 460.0
Guinea	164	502	–338	206.0
Sierra Leone	32	95	–63	197.0
Angola	525	1 344	–819	156.0
Djibouti	14	33	–19	136.0
Tanzania	463	838	–375	81.0
Botswana	335	596	–261	78.0
Gambia	21	36	15	71.4
Congo, Rep. of	269	457	–188	70.0
Mali	283	417	–134	47.3
Benin	250	365	–115	46.0
Madagascar	426	621	–195	45.8

Source: UNIDO calculations, see (b) in Chapter 2 Technical Annex.

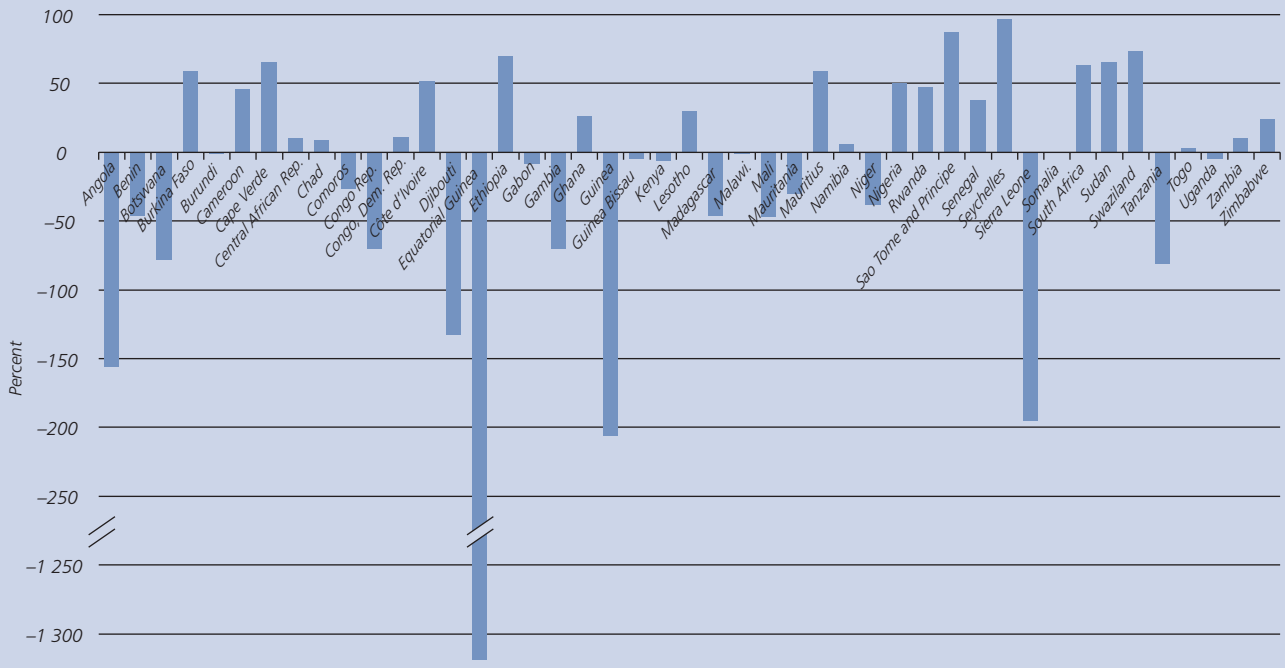
Sanctions against South Africa influenced regional industrial development to the extent that some firms relocated to neighbouring territories, specifically Swaziland and Lesotho, which helps explain the rapid MVA growth in these countries during the 1980s (table 2.2). It is to be noted that MVA growth slowed markedly in both Lesotho and Swaziland in the 1990s following the removal of sanctions against South Africa. This illustrates the dynamic dependence between African countries with very different geographies and factor endowments (Chapter 1).

In the post sanctions period, the South African government has achieved considerable success in switching from an inward-focused industrialization strategy to one that prioritizes exports. By contrast, after some initial export success, especially in clothing and textiles, Zimbabwe has deindustrialized, though this partly reflects the protracted socio-political crisis in the country.

A different path was taken by the small land-locked countries (Lesotho and Swaziland) and small islands (Mauritius and Seychelles), which promoted export-led industrialization. This gave them much higher MVA/GDP ratios than those in countries with larger domestic markets.

The results suggest that a rich natural-resource base does constrain industrialization to some extent. Half of the countries that have under-performed as industrializers have high proportions of primary exports in total exports – Angola (100

Figure 2.2 Percentage difference between actual and estimated MVA in Sub-Saharan countries, 2001



Source: UNIDO calculations, see (b) in the technical annex to Chapter 2.

percent primary exports), Tanzania (84 percent), Gambia (82 percent), Kenya (79 percent), Guinea (72 percent) and Madagascar (48 percent).

Government promotion played a crucial role in South Africa and Zimbabwe when these countries were subjected to international sanctions.

Structural change

On their way to attaining the required higher level of economic growth, SSA countries must undergo three major phases of structural change:

(a) **Demographic transition:** a substantial reduction in the fertility rate which will reduce the denominator in the income per capita indicator while releasing resources for investing in human capital, with the net effect of raising human capital per capita. At present, demographic growth containment in SSA has mostly worked via HIV/AIDS and other diseases and not as a result of purposeful decisions to limit household size.[5]

(b) **Structural change in agriculture** via the introduction of better cultivation practices including irrigation, use of fertilizer and chemicals, improved seeds, mechanization, agricultural extension services and enhanced rural infrastructure. Over time this should lead to increased agricultural output driven by higher labour productivity in the farming sector and a reduction in the sector's share of total employment (box 2.1). At present, output per worker in SSA agriculture is about one sixth of that in Latin America, a region with similar resource base and far greater geographical affinity with SSA than East Asia.[6]

(c) **Compositional change within manufacturing** so that employers can absorb surplus labour from the agricultural sector while shifting upmarket from a preponderance of low-income elasticity subsectors such as food, textiles, apparel, footwear and furniture to more capital- and skills-intensive activities: the production of machinery and other metal products, industrial chemicals, and electric/electronic products. To counter increased domestic and international competition this industrial transformation demands improved skills and capacity to exploit advanced technologies, which in turn requires access to improved infrastructure of services for the sector, as well as an environment conducive to entrepreneurial risk-taking and innovation (Chapter 5).

The changing structure of manufacturing

The 1990s were a decade of rapid globalization, during which developing countries as a whole increased their share of global MVA from 16.9 percent to 24 percent, while SSA countries actually lost share. These shifts reflect the lowering of international trade barriers as well as underlying changes in comparative advantage that enhanced the competitiveness of manufacturers in the developing world, most notably in East and South Asia (Chapter 7). As a result, in all but two of 15 branches analyzed, (non-electrical and electrical machinery) there has been a shift of production between 1990 and 2001 from industrialized countries to developing country locations (table 2.6). During this period, however SSA lost share in all branches except textiles, apparel, leather and footwear and basic metals.

These figures show that SSA manufacturing industry is still, on average, at a low level of development, reflected in its neg-

Box 2.1 Why did Sub-Saharan Africa miss the Green Revolution and what it needs to catch-up?

Green Revolution refers to the big increases in wheat and rice yields brought about by the introduction of new high-yielding crop strains in developing countries, starting in Southeast Asia in 1960. It involved a complete technology package consisting of improved high-yielding varieties of rice; irrigation or controlled water supply; fertilizers and pesticides, as well as the transfer of associated managerial skills to farmers. At the same time, local governments also played a key role by improving rural infrastructure such as transportation and communication to assist with the diffusion of these technological innovations. As rural incomes increased, partially due to the growth in non-farm income, absolute poverty and food insecurity declined significantly.

However, the Green Revolution was not completely benign in terms of its environmental and social impacts, which came under much heated debate since then. Monoculture, excessive dependence of large amounts of chemical pesticides and mineral fertilizers and the unsustainable exploitation of soil and groundwater caused important social and ecological setbacks (Swaminathan in UNDP, 2001).

SSA's failure to participate in the Green Revolution has gone *pari passu* with a serious deterioration in the regional food security situation. There are numerous reasons for this failure – climate and soil conditions in SSA are more complex; water is scarcer and transport and communication infrastructure is much weaker. Significantly, basic scientific and technological research capacity in SSA has been very weak, with few exceptions. While public investment in agricultural research has almost doubled worldwide during the past two decades, it has remained stagnant in SSA. Furthermore, it has largely focused on export crops and ignored the needs of production for domestic consumption, (maize, cassava, yams and other root crops).

Today, the introduction of new biotechnologies, as well as the use of information and communication technologies and geographic information systems, hold great promise for increasing agricultural output in SSA. There is, however, comparatively little research being targeted on the production problems facing LDC farmers (Jefferson, 2001). This is significant, as the future 'double green revolution' in SSA should learn from the problems of the previous green revolution and ensure social and gender inclusiveness as well as ecological sustainability while designing appropriate tools to deal with the particular climatic and soil conditions of SSA countries. This in turn, rests on raising the scientific and technological capabilities in SSA (Chapter 5).

Sources: Runge e. a., 2003; Hoekman and Anderson, 1999; Jefferson, 2001; UNDP, 2001.

Table 2.6 Changes in the international distribution of MVA for selected branches, 1990 and 2001

Branch	Year	World share (percent)		Gain/Loss for developing countries (percent)	Regional shares (percent) in 1990 and 2001		
		Developed countries	Developing countries		Sub-Saharan Africa	Latin America	Southeast Asia
Food and beverages	1990	82.6	17.4		6.5	45.7	31.7
	2001	79.2	20.8	3.4	6.5	43.5	37.0
Textile	1990	74.9	25.1		3.8	23.1	54.2
	2001	67.0	33.0	7.9	3.9	19.5	60.6
Apparel, leather, fur, footwear	1990	75.3	24.7		2.4	34.3	43.4
	2001	72.2	27.8	3.1	3.4	33.3	44.9
Wood and cork products	1990	88.1	11.9		6.2	20.9	55.2
	2001	87.9	12.1	0.2	6.0	24.0	55.3
Paper and paper products	1990	89.6	10.4		2.0	46.3	37.9
	2001	87.2	12.8	2.4	1.4	43.5	45.4
Printing and publishing	1990	93.8	6.2		3.0	41.3	42.6
	2001	92.8	7.2	1.0	2.7	42.4	47.0
Industrial chemicals	1990	84.7	15.3		1.7	47.1	36.3
	2001	81.3	18.7	3.4	1.3	39.9	48.9
Petroleum and coal products	1990	64.4	35.6		1.8	33.8	33.8
	2001	56.8	43.2	7.6	1.4	27.1	44.2
Rubber and plastics products	1990	85.9	14.1		2.0	33.4	54.4
	2001	84.0	16.0	1.9	1.8	31.9	55.5
Non-metal mineral products	1990	83.3	16.7		2.4	33.0	40.2
	2001	77.4	22.6	5.9	2.1	27.9	49.8
Basic metals	1990	83.4	16.6		1.0	39.0	45.0
	2001	76.6	23.4	6.8	1.3	27.9	54.9
Metal products	1990	90.7	9.3		2.5	34.3	45.7
	2001	89.5	10.5	1.2	2.1	35.5	50.2
Non-electrical machinery	1990	93.3	6.7		2.5	34.3	45.7
	2001	95.3	4.7	–2.0	2.1	35.5	50.2
Electrical machinery	1990	88.7	11.3		0.6	29.0	60.1
	2001	89.2	10.8	–0.5	0.3	18.4	75.5
Transport equipment	1990	89.6	10.4		1.3	40.9	47.2
	2001	82.2	17.8	7.4	0.5	30.6	64.7

Source: UNIDO Industrial Statistics Yearbook, 2003.

ligible participation in whole subsectors of major importance in other regions. The conclusions drawn from the study of income elasticity of manufacturing subsectors in SSA point in the same direction[7]. Because of SSA's relatively low level of development, income elasticities are not as high in more developed regions, so the main demand stimulus to industrial growth emanates from population growth rather than from rising incomes. Accordingly, industries producing basic necessities – textiles, apparel, leather and food/beverages are the ones in which SSA countries seem to show signs of dynamism. Among these, textiles and apparel have the potential to expand rapidly if international initiatives such as the African Growth and Opportunity Act (AGOA) and Everything But Arms (EBA) can be fully exploited (Chapter 2 case study).

Growth, diversification and deepening in manufacturing

Growth performance

During the last two decades, growth of total African MVA exceeded the world average but fell well short of the phenomenal growth rates achieved in East and South Asia. However, in MVA per capita terms, growth was well below the global average (table 2.7).

Among the top ten SSA performers in MVA growth, overall and per capita, between 1981 and 2001, five small population countries – Botswana, Cape Verde, Lesotho, Mauritius, and Seychelles – were fast growers in both decades. In both decades, too, the top eight countries in growth of MVA were also the best performers in terms of MVA per capita growth (tables 2.8 and 2.9). Among the newcomers to the top ten in the later period, though, were two states with large populations by SSA standards, Uganda and Ethiopia. High population growth rates account for the exclusion of the bot-

Table 2.7 Annual growth of MVA and MVA per capita in selected regions, 1981–2001

Region	Average growth rates of MVA (percent)		Average growth rates of MVA per capita (percent)	
	1981–1991	1991–2001	1981–1991	1991–2001
Sub-Saharan Africa[1]	2.8	2.8	0.7[2]	1.2[2]
Latin America	1.6	2.8	–0.4	1.1
East and Southeast Asia	9.1	8.4	7.1	6.8
West Asia and Europe	3.0	3.9	0.4	1.7
World	3.1	3.1	1.4	1.7

Source: UNIDO Industrial Statistics Yearbook, 2003.
Notes: [1] Excludes South Africa.
[2] Data refers to Africa as a whole including North Africa.

tom two countries – Ghana and Burundi – from the per capita growth table. In the latter decade, only one country, Rwanda, fails to appear in both columns again due to its relatively high rate of population growth.

Table 2.8 Top performers in annual MVA growth in Sub-Saharan Africa, 1981–2001

	1981–1991		1991–2001	
Rank	Country	Average growth rates of MVA (percent)	Country	Average growth rates of MVA (percent)
1	Swaziland	17.9	Uganda	13.5
2	Lesotho	13.1	Ethiopia	9.1
3	Mauritius	11.0	Equatorial Guinea	8.3
4	Cape Verde	9.6	Burkina Faso	7.7
5	Seychelles	8.9	Cape Verde	6.2
6	Botswana	8.7	Mauritius	5.9
7	Gambia	7.2	Lesotho	5.5
8	Mali	7.1	Seychelles	5.4
9	Ghana	6.2	Rwanda	5.4
10	Burundi	5.6	Benin	5.3

Source: UNIDO Industrial Statistics database, 2003.

Table 2.9 Top performers in annual MVA per capita growth in Sub-Saharan Africa, 1981–2001

	1981–1991		1991–2001	
Rank	Country	Average growth rates of MVA (percent)	Country	Average growth rates of MVA (percent)
1	Swaziland	14.1	Uganda	10.1
2	Lesotho	10.8	Ethiopia	7.1
3	Mauritius	10.1	Equatorial Guinea	5.4
4	Seychelles	7.8	Burkina Faso	5.2
5	Cape Verde	7.6	Mauritius	4.9
6	Botswana	5.4	Seychelles	4.9
7	Mali	4.4	Cape Verde	3.7
8	Gambia	3.1	Lesotho	3.5
9	Guinea	2.7	Botswana	2.6
10	Somalia	2.6	Benin	2.3

Source: UNIDO Industrial Statistics database, 2003.

Table 2.10 Manufactured exports and high-technology exports as a percentage of total merchandise exports and of manufactured exports, respectively. Selected regions and country groupings, 1990 and 2001

	Share of manufactured exports in total exports (percent)		Share of high-technology manufactured exports in total manufactured exports (percent)	
Region or group	1990	2001	1990	2001
Sub-Saharan Africa[1]	20[2]	33[1]	0[2]	4
Latin America and the Caribbean	34	49	4	15
East Asia and Pacific	75	86	14	32
South Asia	71	55[1]	3	4
Developing Countries	60	73	8	27
OECD (high income)	79	81	18	23
World	73	78	16	23

Source: World Bank Development Indicators, 2003.
Notes: [1] Data is for 2000.
[2] Data is for 1991.
[3] Data is for 1999.

A distinctive feature is the prominence of small economies. In 1990 the ten fastest growers in terms of total MVA accounted for ten percent of SSA (excluding South Africa) MVA. By the end of the 1990s, the share of the top ten in

In 1990 the ten fastest growers in SSA accounted for 10 percent of the region's MVA.

MVA growth had grown to 17 percent of the total SSA MVA (excluding South Africa). There is little doubt that policy played a major role in the in the relative success of several smaller economies. Tiny domestic markets and a narrow resource base encouraged policymakers to prioritize industrial exports, notably clothing, in countries like Mauritius and more recently Lesotho.

Changes in export participation

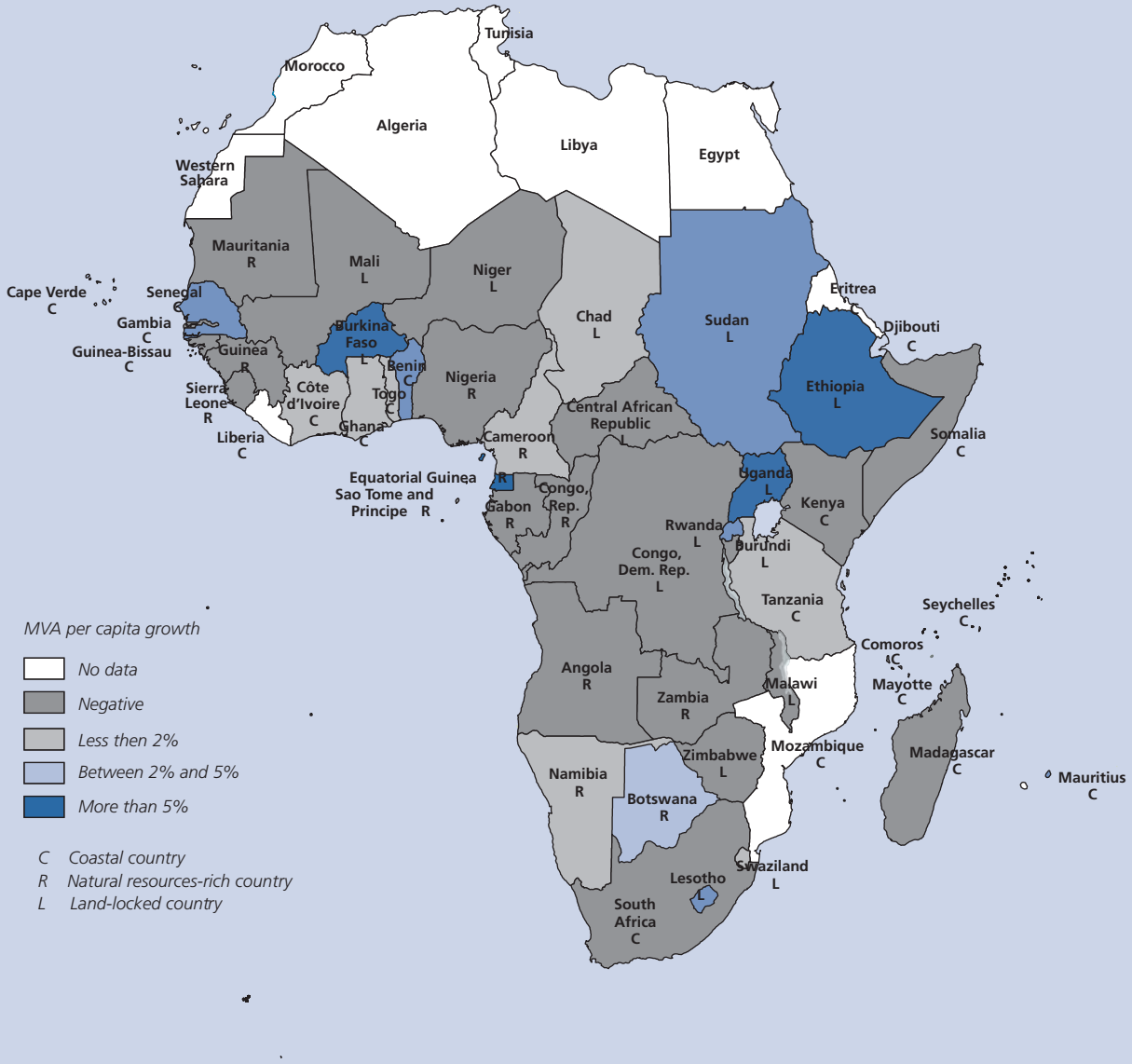
Several top growth performers in manufacturing relied on exports of manufactures to drive industrial expansion. In

Table 2.11 Manufactured exports per capita, share of manufactures in exports and medium- and high-tech manufactured exports per capita in SSA, 2000

Country	Manufactured exports per capita (dollar)	Share of manufactured goods in total exports (percent)	Medium- and high-tech manufactured exports per capita (dollar)
Mauritius	1 251.9	97.6	57.6
Swaziland	718.0	74.6	122.1
South Africa	383.7	63.8	181.1
Gabon	344.0	16.3	11.0
Botswana	277.1	8.4	25.8
Namibia	172.9	23.4	32.9
Côte d'Ivoire	131.7	58.7	10.7
Lesotho	129.8	94.5	15.6
Zimbabwe	58.4	38.4	20.0
Cameroon	39.2	31.9	1.1
Senegal	38.7	59.4	8.2
Ghana	27.7	50.5	1.6
Cape Verde	22.6	98.8	0.1
Zambia	20.4	32.1	2.6
Central African Rep.	19.5	–	4.2
Kenya	19.2	37.7	2.9
Togo	16.0	37.8	2.1
Guinea	9.2	17.7	0.6
Seychelles	7.8	47.2	–
Madagascar	7.2	49.3	0.4
Malawi	6.2	19.1	0.6
Burkina Faso	4.0	25.3	1.1
Benin	3.2	11.1	0.6
Tanzania	3.1	20.4	0.3
Gambia	3.0	23.8	1.3
Uganda	1.8	11.7	0.6
Mali	1.0	3.7	–
Nigeria	0.6	0.2	0.4
Burundi	0.4	5.9	–
Niger	0.4	3.3	0.2
Rwanda	0.2	2.2	–

Source: UNIDO Industrial Scoreboard Database, 2003.

Figure 2.3 **MVA per capita growth rates in Sub-Saharan Africa, 1991–2001**



Source: UNIDO Industrial Statistics Database, 2003.

Mauritius, Lesotho and Swaziland, manufactured exports were dominated by clothing and textile, while in Cape Verde the leaders were clothing and footwear components, and in Seychelles, processed fish products.

Although there has been significant growth in manufactured exports in SSA during the last decade (table 2.10, p. 35), SSA still lags behind other developing regions in terms of participation of manufactures in total merchandise trade and, by a substantial margin, in the proportion of exports of high-technology manufactures in total manufactured exports.

With the exception of South Asia, the share of manufactures in total developing country exports has grown significantly, and manufactured goods now represent close to three-quarters of total merchandise exports. Along with South Asia, SSA fares poorly in high-technology exports, which account for only four percent of exports of manufactures compared with East Asia's 32 percent and a developing country average of 23 percent.[8]

With the exception of South Africa, Swaziland and Mauritius, medium- and high-technology (MHT) manufactured exports per capita are very low in SSA countries. MHT exports exceed $10 per head in only nine of the 31 countries for which data are available (table 2.11, p. 35).

Products classified as high-tech manufactures require high-level skills and are produced by firms that spend heavily on research and development (R&D). With the possible exception of South Africa, it is unrealistic to expect even an average international performance in this field by SSA countries at this stage of their development.

Table 2.12 Scientific- and technical education, R&D, and number of published scientific and technical articles in Sub-Saharan Africa, 2000

Country	*Share of students in science, mathematics and engineering in total tertiary enrollment[1] (percent)*	*Number of scientists and engineers in R&D[2] (per million of population)*	*Number of technicians in R&D[3] (per million of population)*	*Share of R&D expenditures in GDP[4] (percent)*	*Number of published scientific and technical articles[5]*
Angola	..	..	..	..	3
Benin	18	..	..	..	20
Botswana	27	..	..	..	41
Burkina Faso	19	16	15	0.19	23
Burundi	..	21	32	..	3
Cameroon	..	..	..	..	61
Central African Rep.	..	47	27	..	4
Congo, Rep. of	..	33	37	..	13
Congo, Democrat. Rep.	..	..	..	..	6
Côte d'Ivoire	..	..	..	..	40
Chad	14	..	..	..	2
Ethiopia	36	..	..	..	95
Gabon	..	..	..	..	20
Gambia	..	..	..	..	17
Ghana	..	..	..	..	73
Guinea	42	..	..	..	2
Guinea Bissau	..	..	..	..	6
Kenya	..	..	..	..	252
Lesotho	13	..	..	..	1
Liberia	..	..	..	..	1
Madagascar	20	12	37	..	..
Malawi	..	..	..	..	36
Mali	..	..	..	..	11
Mauritania	..	..	..	..	2
Mauritius	17	360	157	0.28	16
Namibia	4	..	..	..	13
Niger	..	..	..	..	21
Nigeria	41	..	..	..	397
Rwanda	..	..	6	..	4
Senegal	..	2	3	0.01	66
Sierra Leone	..	..	..	..	3
South Africa	18	992	303	..	2 018
Sudan	..	..	..	..	43
Swaziland	22	..	..	..	6
Tanzania	39	..	..	..	92
Togo	11	102	65	..	11
Uganda	15	24	14	0.75	59
Zambia	..	..	..	..	26
Zimbabwe	23	..	..	..	85

Source: Data on tertiary education from UNESCO, 1999; qtd in UNDP, 2003; All other data is from World Bank Development Indicators, 2003.
Notes: [1] Data is for last available year within period 1994–1997.
[2] Idem within period 1990–2000. [3] Idem within period 1990–2001. [4] Idem within period 1989–2000. [5] Data is for 1999.

Technology and skill requirements for exporting

SSA's ability to move upmarket into the export of manufactures and specifically of medium-to-high-technology manufactures will depend on the development of the necessary skills and technology accumulating processes (Chapters 5 and 6 and part 2). The paucity of information available for SSA countries in respect of scientific and technical education, R&D personnel and expenditures and scientific and technical publications (table 2.12) underlines just how far behind most SSA countries are in this regard – with a few exceptions, notably South Africa.

While 11 countries provide data for the number of scientists and engineers in R&D, only four have figures on R&D expenditures, although personnel costs generally constitute by far the largest component of R&D spending. Moreover, studies in Ghana, Kenya and Zimbabwe highlight shortages of skilled engineering and technical personnel as a major constraint on technical progress at enterprise level (Lall e. a., 1994 for Ghana, Teitel, 1994a for Kenya, and Teitel, 2000 for Zimbabwe).

Local patenting is singularly low in SSA: most of the registered patents belong to non-residents.

Data on patents, among other measurable outputs of R&D activity, are not taken into account because local patenting is singularly low in SSA: most of the registered patents belong to non-residents (Teitel, 1994b). In the field of technical and scientific publications, SSA's proportion of world totals is very

Table 2.13 World shares of population, GDP and published scientific and technical publications

Region	World share of population, 2001 (percent)	World share of GDP, 2001 (percent)	World share in published articles, 1999 (percent)
Sub-Saharan Africa	10.19	0.98	0.68
Latin America and the Caribbean	8.50	6.20	2.28
East Asia and the Pacific	30.90	7.61	2.47
South Asia	23.67	2.37	1.85

Source: World Bank, 2003.

Table 2.14 Scientific and technical articles and publications: Total number, regional share and per capita, 1999

Country	Number of articles and publications	Regional share (percent)	Number of articles and publications per million of population
South Africa	2 018	55.9	45.4
Nigeria	397	11.0	3.4
Kenya	252	7.0	8.1
Ethiopia	95	2.6	1.4
Tanzania	92	2.5	2.6
Zimbabwe	85	2.3	6.6
Ghana	73	2.0	3.6
Senegal	66	1.8	6.9
Cameroon	61	1.7	4.0
Uganda	59	1.6	2.4
Total Sub-Saharan Africa	3 612	100.0	

Source: World Bank, 2003.

small in relation to its proportion of world population and world GDP (tables 2.13 and 2.14). Such publications are highly concentrated in one country, South Africa, which accounts for over half (56 percent) of the regional total. Nigeria and Kenya account for another 18 percent, so three countries supply almost three-quarters of all technical publications originating in SSA (Zymelman, 1990). South Africa remains at the top with 45.4 publications per million population, followed, at some distance, by Kenya with 8.10, Senegal with 6.9 and Zimbabwe with 6.6.

SSA in the UNIDO Scoreboard

UNIDO's Competitive Industrial Performance (CIP) index ranks 93 core countries that have data for 1980, 1990 and 2000 from a full sample of 155 countries in an effort to benchmark industrial performance (see part 2, Chapter 8). Thirty-four Sub-Saharan countries for which data were available were included in the CIP index in 2000 (table 2.15). Most SSA countries are concentrated in the lower echelons of the rankings, underlying the region's relative industrial backwardness.

Table 2.15 Sub–Saharan Africa: Ranking by CIP Index values, 2000

Rank	Country	CIP Index (x 1 000)
1	South Africa	299
2	Mauritius	240
3	Swaziland	221
4	Zimbabwe	213
5	Senegal	199
6	Lesotho	191
7	Cape Verde	187
8	Côte d'Ivoire	171
9	Nigeria	153
10	Sudan	150
11	Ghana	139
12	Zambia	139
13	Seychelles	137
14	Kenya	134
15	Togo	127
16	Madagascar	123
17	Uganda	123
18	Gambia	120
19	Burkina Faso	118
20	Cameroon	111
21	Namibia	108
22	Tanzania	106
23	Malawi	105
24	Gabon	101
25	Niger	100
26	Benin	93
27	Rwanda	75
28	Guinea	71
29	Botswana	58
30	Ethiopia	50
31	Burundi	47
32	Central African Rep.	43
33	Comoros	41
34	Mali	40

Source: UNIDO Scoreboard Database, 2003.

Industrialization and poverty reduction: Lessons for Sub-Saharan Africa

Economic growth and achievement of Millennium Development Goals in Sub-Saharan Africa

Two key aspects of income poverty are central to the achievement of the MDG goal of halving poverty by 2015: the current level of per capita income and the distribution of income. On average, as per capita incomes increase the poverty headcount declines. Because per capita income has declined in most SSA countries since 1980, poverty has increased on average, rising much more rapidly in those countries whose income inequality was also increasing. Significantly for SSA, it is important to acknowledge that since per capita incomes have actually declined over the last two decades in most of the region, poverty increased on average, as expected, but it rose much more rapidly where inequality was also rising.[9]

While distributional changes are an important factor in explaining differing rates of poverty reduction at country level, per capita income growth tends to be neutral in terms of its effect on income distribution. Beyond doubt, where growth is combined with reductions in income inequality, the rate of

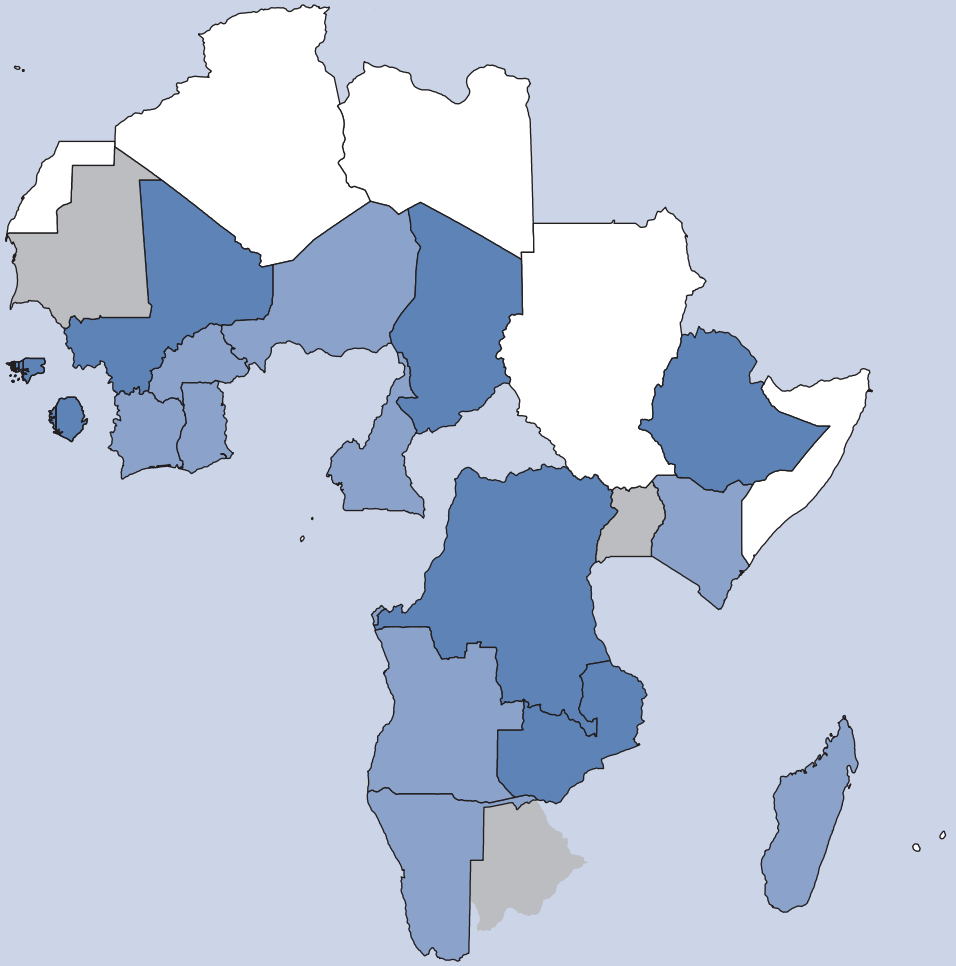
poverty reduction is greater. In growing economies, the median rate of decline in the headcount index is ten percent a year in those countries that manage to achieve simultaneous reductions in inequality, compared to only one percent annually for countries with rising inequality (Ravallion, 2001).

This means not only that growth in income per head is central to reducing poverty, but also that in countries with high levels of per capita income (by SSA standards) such as Botswana or South Africa, where income distribution is highly unequal, there may be scope for reducing poverty by gradually improving the distribution of income, as income grows. However, for the vast majority of SSA countries, where average incomes are very low, poverty reduction strategies should be built into growth policies, preferably while avoiding increases in inequality (Bigsten and Shimeles, 2003).

A paradox in SSA economies is that in many of them the output shares of industry and manufacturing increased initially while agriculture's share declined in line with global historical experience – but sectoral employment shares did not move in the same direction, signalling a decline in agricultural productivity and a widening sectoral productivity gap (O'Connell and Ndulu, 2000). Manufacturing output shares grew between 1960 and 1970 but declined steadily thereafter. On the other hand, manufacturing employment shares rose between 1960 and 1980 and have declined since then.

SSA, as a whole, has *deindustrialized* since 1970, though there are a number of exceptions to this trend. Moreover, average manufacturing labour productivity relative to aggregate labour productivity is lower now than it was in 1970 (UNCTAD, 2003). There is, therefore, both a widening productivity gap

Figure 2.4 Required GDP growth rates for African countries to reach the poverty reduction MDG by 2015



Source: UNIDO calculations, see Table 2.16.

between agriculture and manufacturing and between manufacture and economy-wide productivity, meaning that SSA has been moving backwards in the past three decades.

The sobering assessment of the state of manufacturing industry in the context of recent economic development in SSA dramatizes the challenges involved in reaching the MDGs by 2015. To halve income poverty by then implies a dramatic turnaround in the Sub-Saharan economy, reversing the negative per capita income growth rates of –1.2 percent in the 1980s and –0.4 percent in the 1990s.

The required growth rates (figure 2.4, p. 39) were calculated using the poverty headcount in 1999, the Gini coefficient and a constant poverty line of $1 a day to estimate mean incomes for Sub-Saharan countries in 1999[10]. Then the mean income necessary to halve income poverty headcount by 2015 was calculated, on the assumption that the pattern of income distribution remains unchanged during the period. The difference between the 1999 mean income level and the MDG-required income was then converted into an annual cumulative growth rate.

Table 2.16 Sub-Saharan African countries: Poverty, MDG poverty reduction goal and growth required

Country and grouping	*Share of people living on less than one dollar a day (percent)* 1990	1999	*MDG Poverty Reduction Goal 2015 (percent)*	*Gini coefficient 1999*	*Annual GDP per capita growth required (percent)*	*Note*
Coastal countries						
Benin	25.4	16.4	12.7	43.0	0.8	
Cape Verde	39.5	27.3	19.8	43.0	1.2	4
Comoros	40.6	55.5	20.3	43.0	5.0	1, 5
Côte d'Ivoire	11.1	13.5	5.6	37.0	2.1	1
Eritrea	..	..	..	..	..	
Gambia	45.7	37.8	22.8	43.0	2.2	
Ghana	33.3	44.8	16.7	34.0	3.3	1
Guinea–Bissau	53.4	84.2	26.7	56.0	11.7	
Kenya	22.1	23.9	11.0	58.0	3.7	1
Liberia	25.1	71.8	12.6	43.0	9.0	4, 5
Madagascar	42.8	45.9	21.4	44.0	3.6	
Mauritius	..	..	..	..	..	
Mayotte	..	..	..	..	..	
Mozambique	42.7	32.6	21.4	42.0	1.7	
Senegal	13.3	13.3	6.6	54.0	2.6	
Seychelles	..	..	..	..	..	
Somalia	..	..	..	43.0	..	
South Africa	2.0	2.0	1.0	58.0	2.0	1
Tanzania	78.6	78.3	39.3	36.0	4.4	
Togo	57.5	63.3	28.7	41.0	4.4	
Natural resources–rich countries						
Angola	76.3	72.2	38.1	42.0	4.5	
Botswana	25.0	22.0	12.5	43.0	1.9	1
Cameroon	26.8	40.0	13.4	43.0	4.4	1
Congo, Rep. of	59.1	52.0	29.6	42.0	2.9	4, 5
Equatorial Guinea	43.8	31.7	21.9	43.0	1.5	4, 5
Gabon	..	..	..	..	..	
Guinea	69.6	64.0	34.8	47.0	4.2	
Mauritania	32.6	27.2	16.3	42.5	1.9	3
Namibia	35.9	33.9	18.0	43.0	2.5	1
Nigeria	72.8	67.6	36.4	45.0	4.3	1
Sao Tome and Principe	..	..	..	..	..	
Sierra Leone	29.8	71.8	14.9	42.0	8.2	
Zambia	69.0	79.3	34.5	46.0	6.8	
Land-locked countries						
Burkina Faso	67.3	57.0	33.7	41.0	2.9	
Burundi	58.8	65.4	29.4	42.0	4.7	
Central African Republic	51.7	81.5	25.9	43.0	8.0	1
Chad	80.8	81.8	40.4	40.0	5.5	
Congo Dem. Rep.	79.6	92.4	39.8	42.0	8.6	5
Ethiopia	87.4	85.2	43.7	40.0	5.7	
Lesotho	33.3	40.9	16.6	56.0	5.2	
Malawi	73.8	51.0	36.9	40.0	1.7	
Mali	65.2	71.7	32.6	41.0	5.0	
Niger	70.8	74.5	35.4	36.0	4.4	
Rwanda	49.8	58.9	24.9	28.9	3.0	2
Sudan	..	..	..	..	..	
Swaziland	..	..	..	..	..	
Uganda	55.7	40.8	27.9	41.0	1.7	
Zimbabwe	36.0	52.4	18.0	57.0	7.0	1

Source: UNIDO calculations based on poverty data provided by Charles Gore, UNCTAD, and Gini coefficients from ECA, 1999.

Notes: [1] Poverty data for one year from World Development Indicators Database (2001). Poverty in initial and final years was estimated assuming a constant elasticity of per capita GDP growth of 1. [2] Gini coefficients from World Development Indicators, 2003. Data for 1980–1985. [3] Gini from ECA, 1999. Data for 1993. [4] Poverty data estimated. [5] Gini estimated.

Table 2.17 **Sub-Saharan Countries. Poverty, MDG poverty reduction goal and growth required. Group statistics**

Group	Share of people living on less than one dollar a day (percent) 1990	1999	MDG Poverty Reduction Goal 2015 (percent)	Gini coefficient 1999	Annual GDP per capita growth required (percent)
Coastal					
Average	35.5	40.7	17.8	44.9	3.9
Weighted Average	na	na	na	na	2.4
Median	39.5	37.8	19.8	43.0	3.3
Standard deviation	19.2	24.7	9.6	7.3	2.9
Minimum	2.0	2.0	1.0	34.0	0.8
Maximum	78.6	84.2	39.3	58.0	11.7
Natural resources-rich					
Average	49.2	51.1	24.6	43.5	3.9
Weighted Average	na	na	na	na	4.1
Median	43.8	52.0	21.9	43.0	4.2
Standard deviation	19.4	19.8	9.7	1.6	2.0
Minimum	25.0	22.0	12.5	42.0	1.5
Maximum	76.3	79.3	38.1	47.0	8.2
Land-locked					
Average	62.3	65.7	31.2	42.1	4.9
Weighted Average	na	na	na	na	5.0
Median	65.2	65.4	32.6	41.0	5.0
Standard deviation	16.1	16.3	8.1	7.0	2.1
Minimum	33.3	40.8	16.6	28.9	1.7
Maximum	87.4	92.4	43.7	57.0	8.6

Source: Poverty data was provided by Charles Gore, UNCTAD, and Gini coefficients from ECA, 1999.

For coastal economies the GDP-weighted average required rate is 2.4 percent annually, with a simple average of 3.9 percent. The comparable weighted average growth target for resource rich economies is 4.1 percent a year, while that for land-locked economies is five percent a year. Six land-locked countries would have to grow at more than five percent a year whereas if Uganda and Malawi (both 1.7 percent a year) are excluded the required growth rate rises to 5.8 percent on average.

The most frequent per capita income growth rate required is approximately four percent a year, though there is a wide range of individual outcomes from a worst-case of 11.7 percent in Guinea-Bissau to a best case of 0.8 percent in Benin. The highest required growth rate of 11.7 percent in Guinea-Bissau reflects the fact that the country's headcount actually worsened during the 1990s to 84.2 percent from its base in 1990 of 53.4, in a very unequal society with a high Gini coefficient of 0.56.

The most frequent per capita income growth rate required to achieve the MDGs is approximately four percent a year.

While resource-rich economies should be better placed to achieve the income poverty MDG, the setbacks caused by civil unrest and political instability in countries like the Democratic Republic of Congo (DRC), Liberia and Sierra Leone mean that per capita incomes must now grow at over eight percent a year (table 2.17).

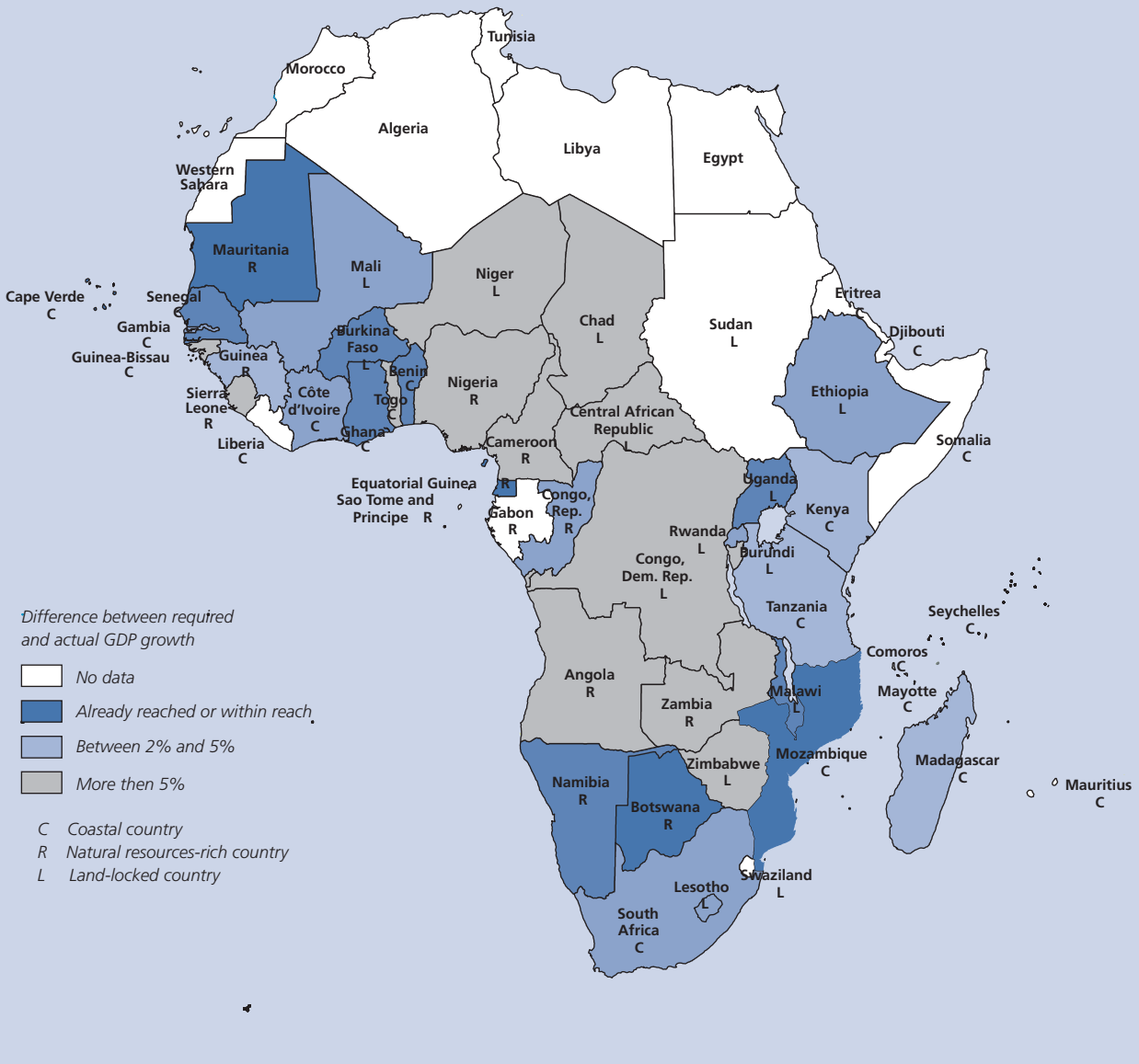
The data show that *on current trends,* only a handful of SSA countries are likely to reach their income poverty MDG. There are eight countries in which the required per capita income growth rates are below two percent annually – Benin, Botswana, Cape Verde, Equatorial Guinea, Malawi, Mauritania, Mozambique and Uganda. In another four countries – South Africa, Côte d'Ivoire, Gambia and Namibia – the required rate is between 2 and 2.5 percent a year. Benin has made impressive progress towards meeting its income poverty MDG and now requires per capita income growth of only 0.8 percent a year; at the other end of the spectrum, Guinea-Bissau has regressed and must grow at 11.7 percent a year over the next decade to halve income poverty.

On current trends, only a handful of SSA countries are likely to reach their income-poverty MDG.

Unless economic performance improves dramatically over the next decade, with greater foreign assistance, increased investment and better policies, most of the remaining 27 countries will miss the poverty reduction target. At the lower end, 12 countries require annual per capita income growth rates of at least five percent (figures 2.5, p. 42 and 2.6).

Countries at the bottom of the list have high levels of poverty and will have to grow very rapidly to meet the income poverty MDG. These countries are classified in the Human Development Report (UNDP, 2003) as 'Top Priority'. Countries with slow or halting progress and medium poverty are classified as 'High Priority', as also are those in extreme poverty with moderate progress.[11]

Figure 2.5 **Difference between the current and required GDP growth rates for African countries to reach the poverty reduction MDG by 2015**



Source: UNIDO calculations, see Table 2.16.

Poverty elasticity of growth

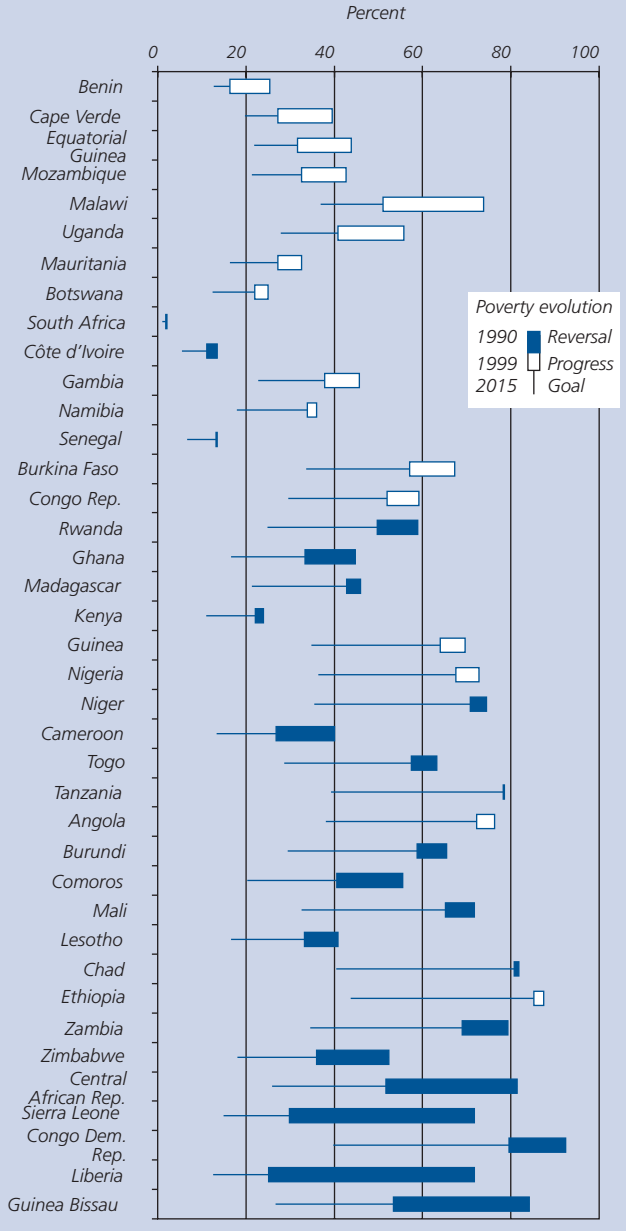
The poverty elasticity of growth – the poverty headcount reduction achieved by one percent increase in per capita income[12] – is lowest in the land-locked countries, which have a weighted average of 0.7, and highest in coastal economies, with 1.2 (tables 2.19a, p. 45 and 2.19b, p. 44). This means that in coastal economies, where the weighted average poverty headcount in 1990 was 35.5 percent of the population, a one percent increase in income per head will reduce poverty by 1.2 percent. In poorer land-locked economies, a one percent increase in per capita income will reduce the poverty headcount by only 0.7 percent, while in resource rich economies the comparable reduction in poverty will be one percent.

In poor land-locked economies, a one percent increase in per capita income will reduce poverty by only 0.7 percent.

Income inequality

Global estimates show that low-income and highly unequal countries have the most inelastic poverty headcounts with respect to income growth, as is the case in most of SSA. For example, Besley and Burgess (2003) find that SSA has much

Figure 2.6 Poverty evolution and the income poverty MDG, 1990–2015



Source: See Table 2.16.

lower growth elasticity of poverty compared with East and Southeast Asia, meaning that to reduce the poverty headcount on a scale comparable with that of Asia, SSA countries must achieve higher rates of income growth. This highlights the true scale of the development challenge with regards to the achievement of MDGs in SSA.

Over the long-run at least two-thirds of cross-country differences in poverty changes can be accounted for by growth in average incomes (Ravallion, 2004a). But while this means that income growth is the most powerful instrument of poverty reduction, it is also true that highly unequal societies have smaller growth elasticity of poverty coefficients.

Thus, the higher the Gini coefficient – the more unequal the pattern of income distribution – the greater the growth effort necessary to reduce poverty. The growth elasticity of poverty is much lower in highly-unequal Zimbabwe than in a more egalitarian society like Rwanda. To reduce the poverty headcount by 34 percentage points between 1999 and 2015 to meet the respective MDG, Rwanda requires a per capita income growth rate of only three percent annually while Zimbabwe needs seven percent (tables 2.16, p. 40 and 2.19). This means that for the poverty MDG to be reached in highly unequal societies growth promoting policies need to be complemented by appropriate 'pro-poor' measures which help more benefits accrue to the poorest members of the community.

To further illustrate the potential impact of improved income distribution on poverty, let us take the hypothetical case of a ten percent reduction in Gini coefficients across the continent. On this assumption, the income poverty MDG required growth rates would be around one percentage point lower than in the benchmark scenario of an unchanged income distribution (table 2.19). The largest change would occur in coastal countries, which are the most unequal, but also the ones with more favourable initial economic conditions (except for few countries such as Liberia). This suggests that in countries with more favourable economic prospects and higher initial income per capita, as well as lower levels of absolute poverty, the income poverty MDG can be more easily achieved through improvements in income distribution. However, for most of SSA, there is little prospect for progress through classical redistributive policies; indeed, these could be growth-retarding. Consequently, as the literature on pro-poor growth policies shows, particular attention has to be paid to raising incomes in the sectors that employ a majority of the poor (rural, informal and low-skilled based manufacturing) in order to achieve widespread poverty-reduction in the low-income highly unequal, societies of SSA (Ravallion and Datt, 1999; Lipton and Ravallion, 1995; Klasen, 2001).

Time frames

Take another assumption: that over the next decade individual SSA countries will be able to match the *highest* growth rates achieved during a five-year period in the 1990s. On this basis coastal countries would, on weighted average, be able to reach the income poverty MDG by 2042; for land-locked states the date moves to 2052 – only eight of the 39 countries listed will halve income poverty by 2015 (table 2.19).

At half the required growth rates levels, poverty goals would only be reached in 2031.

A similar exercise, using *mean* growth rates achieved by individual countries during the 1990s, shows an achievement date of 2057 for coastal economies and 2066 for land-locked states. In this case only six countries – Benin, Cape Verde,

Table 2.18 Sub-Saharan Africa priority classification according to Human Development Report, 2003 and the required GDP growth rates

Group	Gross National Income per capita (dollar)	Share of people living on less than one dollar a day (percent) 1990	Share of people living on less than one dollar a day (percent) 1999	MDG Poverty Reduction Goal 2015 (percent)	Gini coefficient 1999	Annual GDP per capita growth required (percent)
Low priority: 8 countries						
Average	565.0	42.3	42.1	21.2	40.3	2.8
Weighted average	na	na	na	na	na	2.4
Median	335.0	40.1	42.8	20.0	42.0	2.5
Standard deviation	431.9	8.2	10.1	4.1	3.7	1.5
Minimum	280.0	33.3	27.3	16.7	34.0	1.2
Maximum	1 310.0	55.7	55.5	27.9	43.0	5.0
High priority: 14 countries						
Average	1 170.0	43.3	41.0	21.6	45.9	3.5
Weighted average	na	na	na	na	na	2.2
Median	480.0	44.7	35.8	22.4	43.0	2.4
Standard deviation	1 248.7	23.9	25.6	11.9	6.3	3.0
Minimum	160.0	2.0	2.0	1.0	40.0	1.5
Maximum	3 630.0	80.8	84.2	40.4	58.0	11.7
Top priority: 26 countries						
Average	314.5	51.3	57.9	25.6	43.1	4.7
Weighted average	na	na	na	na	na	4.4
Median	270.0	51.7	64.0	25.9	42.3	4.4
Standard deviation	149.3	21.4	21.8	10.7	6.1	2.2
Minimum	100.0	11.1	13.5	5.6	28.9	0.8
Maximum	630.0	87.4	92.4	43.7	58.0	9.0

Source: UNIDO calculations based on poverty data provided by Charles Gore, UNCTAD, and Gini coefficients from ECA, 1999.

Botswana, Equatorial Guinea, Malawi and Uganda – halve income poverty by 2015, while seven countries do not reach the target until the 22nd century.

From table 2.19 it can be estimated that if growth rates were to average 75 percent of required levels, poverty goals would be reached in 2020. If growth averaged half the requirements, this horizon would extend to 2031. If growth rates were only one quarter of required levels, it would take until 2062 to reach the MDGs.

Table 2.19a Elasticities and year of achievement with alternative growth rates in Sub-Saharan Africa, group statistics

Group	Growth elasticity of poverty	Annual GDP per capita growth required with 10% reduction in Gini coefficient (percent)	Maximum annual growth rate of 5 year period (1990's)* (percent)	Year of goal achievement with maximum growth rate**	Mean 1990's annual growth rate* (percent)	Year of goal achievement with mean 1990's growth rate**
Coastal countries						
Average	1.2	2.7	2.6	2042	0.3	2057
Weighted average	na	0.2	1.1	na	–0.2	na
Median	1.2	1.7	1.7	2032	0.2	2040
Standard deviation	0.6	2.9	3.1	2036	1.9	2045
Minimum	0.3	–0.6	–1.1	2003	–3.1	2005
Maximum	2.3	10.2	12.5	2138	4.5	2177
Natural resources-rich						
Average	1.0	3.1	2.4	2041	–0.4	2055
Weighted average	na	3.4	1.1	na	–2.6	na
Median	1.0	3.3	1.5	2029	–1.0	2045
Standard deviation	0.4	2.0	7.3	2033	3.9	2036
Minimum	0.4	0.6	–6.3	2002	–5.8	2002
Maximum	1.7	7.2	25.8	2126	9.8	2126
Land-locked						
Average	0.7	4.1	1.9	2052	–0.8	2066
Weighted average	na	4.2	1.1	na	–1.5	na
Median	0.7	4.0	1.9	2023	0.0	2068
Standard deviation	0.3	2.0	4.6	2046	3.5	2039
Minimum	0.2	1.0	–8.3	2002	–9.7	2008
Maximum	1.3	8.0	9.0	2132	3.2	2132

Source: UNIDO calculations based on poverty data provided by Charles Gore, UNCTAD, and Gini coefficients from ECA, 1999.

Notes: * Annual growth rates were calculated from Penn World Tables, over per capita GDP PPP. Last year available was 2000, with the exceptions of Botswana, Mauritania and Namibia (1999), Central African Republic (1998), Angola, Congo Dem. Rep., Sao Tome and Principe and Sierra Leone (1996).

** Annual growth rate refers to the previous rate with a lower bound of 1% and an upper of 9%. If growth rate was not available, the exercise was done using a 1% rate.

Table 2.19b Elasticities and year of achievement with alternative growth rates in Sub-Saharan Africa

Country or group	Poverty elasticity of growth	Annual GDP per capita growth required with 10% reduction in Gini coefficient (percent)	Maximum annual growth rate of 5 year period (1990's)* (percent)	Year of goal achievement with maximum growth rate**	Mean 1990's annual growth rate* (percent)	Year of goal achievement with mean 1990's growth rate**	Note
Coastal countries							
Benin	1.9	–0.2	2.6	2004	2.0	2006	
Cape Verde	1.5	0.3	4.9	2003	3.3	2005	4
Comoros	0.9	4.0	–1.1	2077	–3.1	2077	1, 5
Côte d'Ivoire	2.3	1.1	0.8	2032	–1.3	2032	1
Eritrea	..	..	..	..	..	..	
Gambia	1.2	1.3	2.7	2012	–0.3	2034	
Ghana	1.4	2.6	1.5	2034	1.4	2038	1
Guinea–Bissau	0.3	10.2	12.5	2020	0.6	2177	
Kenya	1.1	1.7	0.4	2058	–0.7	2058	1
Liberia	0.6		7.9	2138		2138	4, 5
Madagascar	1.0	2.7	0.4	2056	–0.8	2056	
Mauritius	..	..	4.7	..	4.5	..	
Mayotte	..	..	..	..	..	..	
Mozambique	1.4	0.8	5.3	2004	1.1	2023	
Senegal	1.5	0.7	2.2	2018	0.8	2040	
Seychelles	..	..	1.9	..	1.3	..	
Somalia	..	..	..	..	..	..	
South Africa	2.1	–0.6	0.9	2031	–0.3	2031	1
Tanzania	0.6	4.0	0.6	2069	–0.2	2069	
Togo	0.8	3.7	0.5	2068	–3.1	2068	
Natural resources-rich							
Angola	0.6	3.9	–6.3	2069	–5.8	2069	
Botswana	1.7	0.9	5.5	2005	3.7	2007	1
Cameroon	1.2	3.3	1.9	2035	–1.0	2068	1
Congo, Rep. of	1.0	2.2	0.5	2045	–1.5	2045	4, 5
Equatorial Guinea	1.4	0.6	25.8	2002	9.8	2002	4, 5
Gabon	..	..	0.2	..	–0.7	..	
Guinea	0.7	3.4	2.2	2029	1.5	2043	
Mauritania	1.5	0.9	1.2	2025	0.2	2029	3
Namibia	1.3	1.6	1.5	2026	0.9	2039	1
Nigeria	0.6	3.6	2.3	2029	–4.3	2067	1
Sao Tome and Principe	..	..	–0.8	..	–1.2	..	
Sierra Leone	0.6	7.2	–4.4	2126	–5.4	2126	
Zambia	0.4	6.0	1.8	2057	–1.3	2105	
Land-locked							
Burkina Faso	0.9	2.3	1.9	2023	1.2	2036	
Burundi	0.7	4.0	–2.9	2073	–4.5	2073	
Central African Republic	0.4	7.2	–3.5	2123	–4.1	2123	1
Chad	0.4	5.0	0.9	2084	0.0	2084	
Congo Dem. Rep.	0.2	8.0	–8.3	2132	–9.7	2132	5
Ethiopia	0.4	5.3	4.8	2018	1.0	2088	
Lesotho	0.9	3.5	3.4	2023	1.5	2053	
Malawi	1.0	1.2	8.0	2002	2.4	2010	
Mali	0.6	4.4	4.6	2016	2.5	2030	
Níger	0.7	3.9	1.2	2058	–0.8	2068	
Rwanda	1.3	2.6	9.0	2005	–1.7	2047	2
Sudan	..	..	..	..	..	..	
Swaziland	..	..	..	..	..	..	
Uganda	1.2	1.0	4.7	2005	3.2	2008	
Zimbabwe	0.7	5.3	1.0	2108	–1.6	2108	1

Source: UNIDO calculations, see Table 2.19a.

Notes: [1] Poverty data for one year from World Development Indicators Database, 2001. Poverty in initial and final years was estimated assuming a constant elasticity of per capita GDP growth of 1.

[2] Gini coefficients from World Development Indicators, 2003. Data for 1980–1985.

[3] Gini from ECA, 1999. Data for 1993.

[4] Poverty data estimated.

[5] Gini estimated.

* Annual growth rates were calculated from Penn World Tables, over per capita GDP PPP. Last year available was 2000, with the exceptions of Botswana, Mauritania and Namibia (1999), Central African Republic (1998), Angola, Congo Dem. Rep., Sao Tome and Principe and Sierra Leone (1996).

** Annual growth rate refers to the previous rate with a lower bound of 1% and an upper of 9%. If growth rate was not available, the exercise was done using a 1% rate.

Contribution of the non-income poverty Millennium Development Goals to growth in Sub-Saharan Africa

The attainment of non-income poverty MDGs will spur economic growth in SSA by easing existing constraints, especially those in health and education.[13] SSA countries are lagging behind particularly in primary school enrolment, mortality rates, HIV/AIDS and access to safe water. The achievement of the MDGs in these areas would help to increase growth rates by over 1.5 percentage points in landlocked countries (table 2.20).

Such increases are highly significant; they represent approximately one third of the growth rates required for SSA regions to halve poverty. About half of these gains would be attributable to education gains and the balance to health improvements. Attainment of the non-income poverty MDGs would also reduce income inequality. For example, increased life expectancy is estimated to reduce the Gini coefficient by between four and eight percent. If education is taken into account this reduction in the Gini increases to around ten percent.

Insights from High Performing Economies

SSA's disappointing industrialization track record poses the question: is Sub-Saharan Africa different? Is the failure to 'take-off' into self-sustaining industrial development and structural change attributable to the region's unique history,

Table 2.20 **The Millennium Development Goals and induced growth**

Millennium Development Goals and Targets	*Variables*	*Last data*		
		Coastal	*Land locked*	*Natural resource rich*
	Total			
1. Eradicate extreme poverty and hunger				
1. Halve the proportion of people with less than one dollar a day				
2. Halve the proportion of people who suffer from hunger				
2. Achieve universal primary education				
3. Ensure that boys and girls alike complete primary schooling	Primary School enrollment ratio	0.68	0.63	0.67
3. Promote gender equality and empower women				
4. Eliminate gender disparity at all levels of education	Secondary School enrollment ratio	0.36	0.19	0.37
4. Reduce child mortality				
5. Reduce by two thirds the under-five mortality rate	Infant mortality rate (per 1000) In terms of years of life expectancy (years gained)	81.2	102.5	93.2
5. Improve maternal heath				
6. Reduce by three quarters the maternal mortality ratio	Maternal mortality rate (per 100 000, live birth) In terms of years of life expectancy (years gained)	611.3	685.3	844.4
6. Combat HIV/AIDS, malaria and other diseases				
7. Halt and reverse the spread of HIV/AIDS	HIV/AIDS – adult prevalence rate (percent) In terms of years of life expectancy (years gained)	5.2	11.9	12.2
8. Halt and reverse the spread of malaria and tuberculosis	Malaria cases (per 100)	8.2	7.2	11.6
7. Ensure environmental sustainability				
9. Reverse the loss of environmental resources				
10. Halve the proportion of people without access to potable water	No access to safe water (percent of population) In terms of years of life expectancy (years gained)	39.1	42.8	45.1
11. Significantly improve the lives of at least 100 million slum dwellers				
8. Develop a global partnership for development				
12. Develop further an open, rule-based, predictable, non-discriminatory trading and financial system				
13. Address the special needs of the least developed countries (tariff-quota free access, debt relief, etc.)				
14. Address the special needs of land-locked and small island developing states				
15. Deal comprehensively with the debt problem of developing countries				
16. Develop and implement strategies for decent and productive work for youth				
17. Provide access to affordable essential drugs in developing countries				
18. Make available the benefits of new technologies (information and communications)				

Sources: Primary and secondary school enrollment from African Development Bank Statistics. Coefficients are from Doppenholfer, Miller & Sala-i-Martin, 2000. *Secondary* school enrollment is calculated assuming that the least educated gender eliminates the gap. Infant mortality rate: African Development Bank Statistics. Life expectancy gains were calculated assuming that the non–dead child lives to the actual life expectancy in average. Coefficient is from Doppenholfer, Miller & Sala-i-Martin, 2000.
Maternal mortality rate: African Development Bank Statistics. Life expectancy gains were calculated assuming that each mother has 2 births at 25 years of age. Coefficient is from Doppenholfer, Miller & Sala-i-Martin, 2000.
HIV/AIDS: World Factbook 2003, CIA. Counterfactual assumes same quantity of infected in each country. As no direct coefficient was available, life expectancy was used, extrapolating the years gained in life expectancy using the estimates of WHO for countries with high prevalence. Coefficient is from Doppenholfer, Miller & Sala-i-Martin, 2000.

geography, its institutional framework or, more broadly, its initial conditions?

In an attempt to answer these questions, this section draws on the experience of a sample of 11 fast-growing comparator countries – nine of them Asian. Their growth and development paths are examined to:

- Ascertain what lessons they provide for African policymakers.
- Examine the structural changes SSA should expect.
- Compare initial conditions in these countries during their take-off period with those prevalent today in SSA

These high performing economies (HPEs) were selected either because they had broadly comparable initial GDPs per capita, or because, despite having an initially larger per capita GDP, they were developing countries that were heavily reliant on natural resources (such as Chile).[14] Although it is an SSA nation, Mauritius is included because of its post 1987 track record as one of only two fast-growth Sub-Saharan economies (the other is Botswana).

Take-off years for HPEs vary from 1960 (Republic of Korea and Malaysia) to 1989 (Viet Nam). The 'take-off' year is defined as the point at which a country started to implement a reform package, including structural changes in the functioning of the economy, that resulted in a period of sustained high growth rates. The group (table 2.21) includes five 'early risers' that took off between 1960 and 1970 (Republic of Korea, Malaysia, Indonesia, China and Bangladesh), three 'intermediate risers' which started growing rapidly in the late 1970s (Chile, Sri Lanka and Mauritius), and three 'late risers' that took off in the 1980s (India, Thailand and Viet Nam).

At the time of writing, 12 years were left until the 2015 target of the MDGs. Consequently, this report examines the first 12-year period following take-off for each HPE country as well the 12 years in which the benchmark economies achieved their maximum growth rates. Virtually all the HPEs analyzed sustained per capita GDP growth rates above five percent for at least 12 years between the take-off year and the present. The per capita growth rates during the fastest growth periods (table 2.22) ranged from 3.1 percent for Bangladesh (1973–1985) to 9.1 percent for China (1982–1994). The mean growth rate for the 12 years was 5.4 percent in both Malaysia (1985–1997) and Viet Nam (1988–2000).

For the entire post take-off period, varying between 12 years for Viet Nam and 41 years for Republic of Korea and Malaysia, per capita growth rates range from 1.8 percent in Bangladesh to China's 7.2 percent. The median is 4.4 percent (Mauritius). The difference in growth rates between the 12 fastest years and the first 12 years after take-off range from zero in Indonesia to 3.9 percentage points in China, with a median of 1.8 percentage points (Thailand). Over the entire post take-off period average per capita growth rates exceeded those of the first 12 years in a majority of cases (Chile, China, India, Republic of Korea, Malaysia, Sri Lanka, Viet Nam and Bangladesh), which suggests that there is a transition period to structural change that is followed by sustainable high growth rates.

	Goal			*Increase in annual growth (percent)*			
	Coastal	*Land-locked*	*Natural resource-rich*	*Coastal*	*Land-locked*	*Natural resources-rich*	*Coefficient*
				1.4	1.5	1.6	
	1.00	1.00	1.00	0.61	0.71	0.63	0.01938
	0.41	0.22	0.42	0.08	0.07	0.10	0.01938
	32.8	36.7	35.3				
	2.5	3.0	2.7	0.22	0.26	0.24	0.00088
	176.9	177.3	208.1				
	0.1	0.1	0.1	0.01	0.01	0.01	0.00088
	4.0	9.5	9.8				
	0.8	1.7	1.5	0.07	0.15	0.13	0.00088
	5.9	5.5	8.5	0.22	0.17	0.31	–0.00100
	21.8	25.6	22.1				
	1.7	1.7	2.1	0.15	0.15	0.18	0.00088

Malaria: WHO, 2003. The estimation of growth is made with the assumption that t in countries with strong prevalence of malaria, growth is reduced in 1%. Sachs and Bloom, 1998.
Water: African Development Bank Statistics. Life expectancy was calculated through a cross-section regression, that explains life expectancy using infant mortality rate, HIV prevalence and water. All coefficients were significant. Life expectancy coefficient is from Doppenholfer, Miller & Sala-i-Martin, 2000.

Structural change and economic transformation: an overview

As countries industrialize, labour shifts from low-productivity agriculture to higher-productivity manufacturing, whose share of both output and employment increases rapidly. Declining farm sector employment is offset by technological advances that raise productivity in agriculture, while the demand for services grows in the transaction-intensive manufacturing sector.

As manufacturing productivity grows, a second phase of structural change is characterized by growth in industrial output whereby, although the sector maintains its share of out-

put, its share of total employment falls. Surplus labour from agriculture and manufacturing is absorbed by the expanding service sector where productivity grows more slowly than in manufactures (Rowthorn and Wells, 1987; UNCTAD, 2003).

For late industrializers, the process is typically more capital-intensive, as late starters exploit the technology and equipment developed by earlier industrializers. This gives rise to faster productivity growth as late entrants catch-up with the

Table 2.21 Growth since take-off

Whole period		*Chile 1977–2000*	*China[1] 1969–2001*	*India[2] 1980–2001*	*Indonesia[3] 1967–2001*	*Korea, Rep. 1960–2001*	*Malaysia[4] 1960–2001*
Initial GDP per capita (1995 dollars)		2 206.6	94.2	228.0	245.3	1 324.9	975.0
Initial GDP per capita (PPP)		4 583.8	796.7	1 161.6	913.7	1 570.9	2 146.7
Per capita GDP growth (percent)							
First 12 years average GDP per capita growth		3.2	5.2	3.2	5.6	5.4	3.7
Whole period average GDP per capita growth		3.8	7.2	3.6	4.3	5.8	3.9
GDP growth (percent)							
First 12 years average GDP growth		4.8	7.2	5.3	8.1	8.0	6.7
Whole period average GDP growth		5.4	8.8	5.6	6.3	7.5	6.7
Shares in value added (percent)							
Agriculture	Initial	10.0	38.0	38.9	51.4	36.4	34.3
	12 yrs	8.7	31.8	31.3	27.3	27.0	26.6
	Last	8.5	15.2	25.1	16.4	4.4	8.5
Industry	Initial	36.7	35.6	24.5	12.7	20.3	19.4
	12 yrs	41.8	46.4	27.6	37.7	29.3	29.8
	Final	34.7	51.1	26.5	46.5	41.4	49.1
Manufactures	Initial	22.1	29.7	16.3	8.1	13.7	8.0
	12 yrs	18.9	38.5	17.1	11.7	22.3	13.8
	Final	16.3	35.4	15.5	26.1	30.0	30.6
Services	Initial	53.3	26.5	36.6	35.8	43.4	46.3
	12 yrs	49.5	21.8	41.1	35.0	43.8	43.6
	Final	56.8	33.6	48.4	37.1	54.1	42.4
Shares in Total Employment (percent)							
Agriculture	Initial	18.4	..	..	66.0	..	37.2
	12 yrs	19.4	68.7	66.9	..	50.6	..
	Final	14.4	47.5	66.7	..	10.9	..
Industry	Initial	24.1	..	..	8.9	..	24.1
	12 yrs	26.5	18.2	13.1	..	18.3	..
	Final	23.4	21.7	12.9	..	28.0	..
Services	Initial	57.5	..	..	25.2	..	38.7
	12 yrs	54.1	11.7	20.0	22.2	31.0	..
	Final	62.2	12.9	20.3	38.7	61.1	49.4

Source: UNIDO calculations based on World Bank, 2003.
Notes: [1] China data for employment is for 1998 for final year.
[2] India data for employment is for 1995 for final year.
[3] Indonesia data for employment is 1976 for initial year.
[4] Malaysia initial year for employment shares is 1980.
[5] Sri Lanka data for employment are 1981 for initial year and 1998 for final year.
[6] Viet Nam data for employment is for 1991 for initial year and 1997 for final year.

Table 2.22 Twelve year highest growth

Period		*Chile 1985–1997*	*China 1982–1994*	*India[1] 1987–1999*	*Indonesia 1967–1979*	*Korea, Rep.[2] 1965–1977*	*Malaysia 1985–1997*
Average GDP per capita Growth Rate (percent)		5.9	9.1	4.1	5.6	7.3	5.4
Average GDP Growth Rate (percent)		7.7	10.7	6.0	8.1	9.5	8.2
Shares in value added (percent)							
Agriculture	Initial	7.6	33.3	31.9	51.4	37.8	19.9
	Final	8.4	20.2	26.2	27.3	22.4	11.1
Industry	Initial	37.6	45.0	26.7	12.7	24.8	38.5
	Final	35.1	47.8	26.0	37.7	35.3	44.6
Manufactures	Initial	16.2	37.3	16.4	8.1	17.7	19.3
	Final	17.2	34.4	15.2	11.7	26.7	28.4
Services	Initial	54.8	21.7	41.4	35.9	37.3	41.6
	Final	56.5	31.9	47.8	35.0	42.2	44.3
Shares in Total Employment (percent)							
Agriculture	Initial	20.2	68.7	69.1	..	51.3	30.4
	Final	14.4	49.7	66.7	64.0	41.8	17.3
Industry	Initial	20.2	18.2	13.4	..	18.2	23.8
	Final	27.3	20.8	12.9	13.7	27.5	33.7
Services	Initial	59.6	11.7	17.3	..	30.6	45.4
	Final	58.3	11.6	20.3	22.2	30.7	49.0

Source: UNIDO calculations based on World Bank, 2003.
Notes: [1] India data for employment are 1990 for initial year and 1995 for final year.
[2] Republic of Korea data for employment is for 1969 for initial year.
[3] Viet Nam data for employment are for 1991 for initial year and 1997 for final year. For shares in exports data is for 1983 for initial year.

technological frontier. The degree of labour intensity depends on whether the pattern of industrialization favours the adoption of labour-saving innovations or is dominated by labour-intensive manufacturing activities.

Sri Lanka[5] *1977–2001*	*Thailand 1986–2000*	*Viet Nam*[6] *1989–2001*	*Mauritius*[7] *1977–2001*	*Bangladesh 1970–2001*
400.0	1 381.1	205.4	1 745.7	248.7
1 728.3	3 393.0	1 160.2	5 949.1	1 099.8
3.2	5.5		4.8	–0.2
3.3	5.0	5.5	4.4	1.8
4.4	6.7		5.8	2.4
4.6	6.1	7.3	5.5	4.8
30.7	15.7	42.1	22.6	54.6
25.6	12.2	23.6	13.7	39.8
19.5	10.3	..	6.3	23.3
28.7	33.1	22.9	25.7	8.7
26.8	38.2	37.8	33.4	17.2
26.7	40.5	..	31.2	25.1
23.1	23.9	15.2	15.6	5.8
15.3	29.4	19.6	25.2	10.7
15.8	32.0	..	23.5	15.1
40.6	51.3	35.0	51.7	36.7
47.6	49.6	38.6	52.9	43.0
53.8	49.3	..	62.5	51.6
45.9	66.7	74.7	29.4	..
48.7	51.3	68.8	17.3	58.8
41.6	48.8	68.8	11.1	62.1
18.6	10.6	12.1	24.5	..
20.5	17.7	12.5	42.3	11.0
22.5	19.0	12.5	39.0	10.3
29.3	22.6	13.3	42.9	..
30.8	31.0	18.7	38.5	24.2
33.4	32.2	18.7	49.9	23.5

[7] Mauritius data for GDP per capita is for 1980, for employment, 1980 for initial year.

Sri Lanka 1975–1984	*Thailand 1984–1996*	*Viet Nam*[3] *1988–2000*	*Mauritius 1985–1997*	*Bangladesh 1973–1985*
3.7	7.3	5.4	5.1	3.1
5.3	8.8	7.4	6.1	5.0
26.3	17.6	46.3	15.8	56.6
28.7	11.0	24.5	9.7	41.8
24.2	32.0	24.0	28.3	12.1
26.3	39.4	36.7	31.7	16.0
17.6	22.9	18.1	20.0	8.5
14.9	28.3	18.6	23.5	9.9
49.5	50.5	29.7	56.0	31.3
45.0	49.7	38.7	58.6	42.3
..	64.4	74.7	22.7	..
48.5	50.0	68.8	13.3	57.1
..	13.1	12.1	34.4	..
18.7	20.8	12.5	39.5	12.5
..	22.5	13.3	40.5	..
32.8	29.1	18.7	47.2	26.5

Successful industrialization episodes in developing countries are characterized by increased investment ratios and growing shares of MVA in GDP and of manufactures in total exports. Even some slow growing developing countries, notably in Latin America, have managed to expand the share of manufactures in total exports.

The major contrast lies in whether the larger participation of industrial goods in foreign sales is driven by natural-resource intensive manufactures or by skill-intensive high-tech industrial goods. This difference relates to both the allocation of capital accumulation and to the way countries integrate into world trade.

Structural change is characterized also by different rates of productivity growth across sectors, as well as by compositional change in the form of the transfer of labour from low productivity agriculture to higher productivity manufacturing and services. Although there are a number of reasons why productivity grows more rapidly in some sectors than in others, recent evidence suggests that the extent and manner in which developing countries participate in international production networks influences the nature of productivity growth.

Productivity grows faster where developing countries participate in skill-intensive, high-tech production networks than where their contribution is confined to outsourced labour-intensive, low-tech or natural resource based activities.

Structural change in the composition of employment and output

Three periods of HPE growth are examined to assess the nature and pattern of structural change. These periods are the 12 years after take-off, the 12 years during which output grew most rapidly and the entire period from take-off to the present.

Employment

During the initial years of rapid growth in most HPEs the share of manufacturing in total employment increased substantially, usually (though not in Chile and Sri Lanka) at the expense of agriculture (table 2.21). There are, however, some cases where employment growth in manufacturing during the early years was minimal (Sri Lanka and Viet Nam) but in Mauritius the share of industrial employment rose from 24.5 percent to 42.3 percent. Such discrepancies in the labour-intensity of industrialization may reflect differences in factor endowments, industrial policies, labour market arrangements and integration in international production networks.

In the second phase – after year 12 – industry's share of employment actually declined in Bangladesh, Chile, India and Mauritius, but it continued to increase in the other seven, especially in Republic of Korea and Indonesia, where manufacturing's employment share rose dramatically.[15]

During the 12 years of fastest growth since take-off (table 2.22, p. 48), three trends stand out:

- Industry's share in total employment increased in seven of the eight countries for which data are available. The exception was India where there was a marginal decline.
- In all cases, again except India, agriculture's share fell sharply. In India it declined modestly to 66.7 percent from 69.1 percent.
- Labour participation in services rose in most countries, though not in Chile or China and only fractionally in Republic of Korea. In most cases too the service sector's share increased less than that of industry.

During the 12 years of fastest growth since take-off, industry's share in total employment increased in seven of eight countries studied.

Output shares

The experience of the selected HPEs shows that there is no uniform pattern of structural change. Twelve years after take-off industry shares were around 30 percent of GDP for most HPEs and as high as 45 percent in Chile and China, both of which had started with more developed industrial structures. China had prioritized industry in its central planning while Chile had a well-developed copper-derivative sector. Typically, industry's share expanded at the expense of agriculture.

In most cases too, industry remained the lead sector beyond year 12 though not in Chile, India, Mauritius and Sri Lanka. During this phase agriculture's share in GDP declined dramatically as those of industry and services expanded.

The share of industry in output also rose during the 12 fastest growing years in all the HPEs, except for Chile and India. With the exception of Chile shares of agricultural output fell sharply during these years and, as with employment, the share of services also rose in most cases, though less so than that of industry.

In most cases industry remained the lead sector beyond year 12 – though not in Chile, India, Mauritius and Sri Lanka. During this phase agriculture's share in GDP declined dramatically as those of industry and services expanded.

The share of industry in output also rose during the 12 fastest growing years in all the HPEs, except Chile and India. With the exception of Chile shares of agricultural output fell sharply during these years and, as with employment, the share of services also rose in most cases, though less so than that of industry. On the whole, industry grew more rapidly during the initial 12 years than during the period of fastest GDP growth.

MVA

During the immediate post-take-off period, the pattern of industrial growth – natural resource extraction as well as manufacturing – diverged from that of MVA. Thus, in resource-rich countries such as Chile (copper), Indonesia (oil) and Malaysia (oil, tin and rubber), the share of MVA grew far less than that of industry; in Chile it actually declined.

In HPEs the share of manufactures in total exports increased significantly faster than the share of MVA in GDP.

Output shares of MVA for most HPEs at year 12 ranged between 15.3 percent in Sri Lanka to 25.2 percent in Mauritius. The two outliers were China, whose 38.5 percent share reflected the impact of central planning, and Bangladesh where MVA accounted for only 10.7 percent of GDP (table 2.21, p. 48).

In the subsequent period from year 12 until the present, the share of MVA in GDP rose in most HPEs except Chile, China, India and Mauritius. While both industry as a whole and MVA lost share in resource-rich Chile, the share of MVA grew more rapidly than that of industry in two other resource-abundant states, Indonesia and Malaysia, reflecting a shift away from resource-driven industrialization.

For HPEs as a whole, during the 12-year episode of fastest growth, the increase in MVA shares was greater than during the immediate post-take-off period, suggesting that a platform for subsequent accelerated industrialization was created during the 12 years after take-off (table 2.22, p. 48).

The composition of exports

A particularly striking aspect of structural change in HPEs was the performance of manufactured exports whose share of total exports increased significantly faster than the share of MVA in GDP (table 2.23). Indeed in Sri Lanka, the share of manufactured exports increased from 5.9 percent of the total to 51.6 percent, despite the substantial decline in MVA's share of GDP from 23.1 percent to 15.3 percent.

In India, Malaysia, Thailand and Mauritius, a similar trend is evident during the immediate post-take-off phase – the share of manufactured exports increased far more than the

Table 2.23 Share of manufactures in exports

Period	*Chile 1977–2000*	*China[1] 1969–2001*	*India 1980–2001*
Since take-off			
Initial share (percent)	10.7	..	58.6
12-years average (percent)	10.4	69.4	73.5
Final share (percent)	16.2	88.6	76.5
Period	*1985–1997*	*1982–1994*	*1987–1999*
12 year-highest-growth			
Initial share (percent)	6.9	47.7	66.4
Final share (percent)	15.6	82.3	79.2

Source: UNIDO calculations based on UNIDO Industrial Statistics Database, 2003.
Notes: [1] Initial year for China's manufactured shares in export is 1984.
[2] Initial year for Republic of Korea's manufactured shares in exports is 1962.

share of MVA in GDP. Only in Indonesia and Republic of Korea did MVA keep pace with manufactured exports in terms of market shares. Beyond year 12 this trend for manufactures to increase their share of total exports intensified except in those countries where the share of manufactures in exports was already very high (India, Republic of Korea and Thailand). This trend has continued up to the present despite the decline in MVA as a percentage of GDP in several HPEs.

Investment, trade and structural change

Typically, successful industrialization relies on investment in manufacturing and increasing shares of manufacturing in output and exports. Gradually upgraded manufactured exports enlarge the scope of the market, boost the rate of return on investment and provide the foreign exchange needed to finance capital goods and technology imports. Improved technology enhances productivity thereby facilitating the penetration of foreign markets.

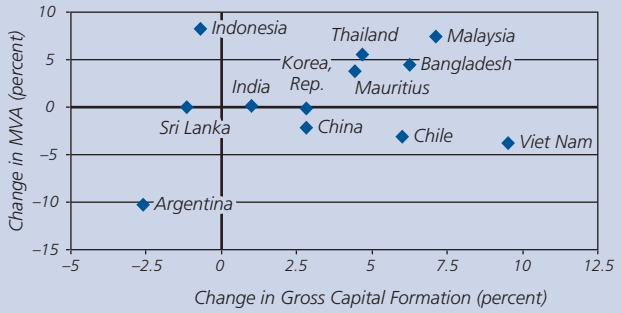
Gradually upgraded manufactured exports enlarge the market, boost rates of return and help finance capital goods and technology imports.

Data for all these variables in HPEs are not available for the 12 years after take-off or the 12 fastest-growth years, but performance since 1980 shows a strong positive correlation between investment and the rise in the shares of MVA in GDP and of manufactures in total exports in Bangladesh, Malaysia, Mauritius and Thailand. None of these had a large initial industrial base and all had specialized internationally in relatively labour intensive manufacturing activities (figure 2.7). In Malaysia, where industrialization was highly labour-intensive, the share of MVA in exports grew much more rapidly than its share in output.

Republic of Korea – an earlier industrializer – was very different. Investment ratios rose but the share of MVA both in output and exports was constant, while in China rising investment rates were associated with a small *decline* in the share of MVA in GDP. This reflects a slowdown from the very high initial levels of industrialization associated with the country's central planning policies. India's manufacturing shares and investment rates remained close to constant, suggesting that capital accumulation and the growth of manufactures were no longer the main contributors to growth. This role was taken over by the service sector, which has been the fastest grower since year 12, probably due to the rapid growth of the software industry.

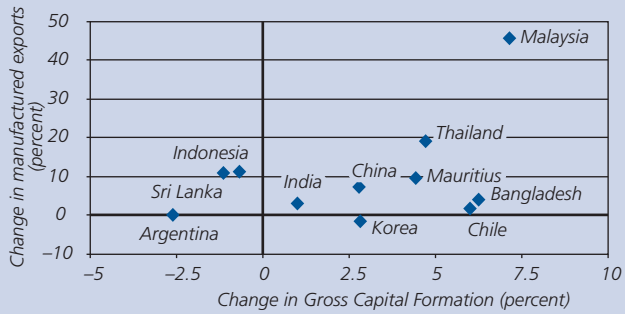
Increased investment appears to have contributed more to the industrialization of exports than of output (figure 2.8).

Figure 2.7 Changes in MVA versus changes in gross capital formation between 1980s and 1990s



Source: UNIDO Industrial Statistics Database, 2003 and World Bank, 2003.

Figure 2.8 Changes in manufactured exports versus changes in gross capital formation between 1980s and 1990s



Source: UNIDO Industrial Statistics Database, 2003 and World Bank, 2003.

Indonesia 1967–2001	*Korea, Rep.*[2] *1960–2001*	*Malaysia*[3] *1960–2001*	*Sri Lanka 1977–2001*	*Thailand 1986–2000*	*Viet Nam*[4] *1989–2001*	*Mauritius 1977–2001*	*Bangladesh*[5] *1970–2001*
2.1	19.6	5.2	5.9	43.7	3.2	22.2	58.8
2.9	83.6	10.2	51.5	74.2	na	52.0	61.5
56.4	90.7	80.1	76.6	75.6	na	74.2	90.7
1967–1979	*1965–1977*	*1985–1997*	*1972–1984*	*1984–1996*	*1988–2000*	*1985–1997*	*1973–1985*
2.1	59.3	27.2	1.7	33.3	3.2	45.6	57.3
2.9	84.8	76.6	26.6	71.4	na	71.1	65.8

[3] Initial year for Malaysia's manufactured shares in exports is 1964.
[4] Initial year for Viet Nam's manufactured shares in exports is 1983.
[5] Initial year for Bangladesh's manufactured shares in exports is 1974 and 1998 for final year.

Structural change and industry's contribution to overall productivity growth

HPE experience suggests that during episodes of very rapid growth, industry was the major source of economy-wide growth in labour productivity. While in Mauritius labour productivity was initially about the same in both agriculture and industry, in Thailand industrial productivity was nine times greater: the median country was China, where industrial workers were 3.65 times as productive as their farming counterparts (table 2.24).

There are also positive compositional effects as labour moves from lower-productivity agriculture to higher productivity industry and services. Accordingly, industrialization's contribution overall productivity growth is the result of: (1) improvements in industry itself, weighted by its share in total employment, plus (2) the increased employment of labour transferred from less productive agriculture, multiplied by (3) the differential in productivity between the two sectors.

The direct contribution of industry to overall productivity growth is very significant because it has greater potential than other sectors for technical progress and productivity growth arising from opportunities to catch-up with best-practice technologies. There are productivity gains also from the compositional shift of labour from agriculture to manufacturing, though this effect declines when industry becomes more capital intensive and agricultural productivity increases.

During periods of very rapid growth, industry was the main source of economy-wide growth in labour productivity.

In six HPEs – China, Indonesia, Republic of Korea, Malaysia, Thailand and Viet Nam – more than 30 percent of aggregate labour productivity growth is explained by industrialization (table 2.25). In China, Republic of Korea and Viet Nam, the

Table 2.24 Sectoral productivity

Period	*Chile 1985–1997*	*China[1] 1982–1994*	*Indonesia[2] 1967–1979*	*Korea, Rep.[3] 1965–1977*	*Malaysia 1985–1997*	*Sri Lanka[4] 1972–1984*	*Thailand 1984–1996*	*Viet Nam[5] 1988–2000*	*Mauritius[6] 1985–1997*
12 year-highest-growth									
Agriculture (percent)	4.0	5.9	3.4	4.4	3.1	2.7	3.3	3.9	3.8
Industry (percent)	0.8	10.5	..	..	3.3	..	4.5	10.5	–3.0
Services (percent)	3.4	9.4	..	..	4.3	..	3.9	1.2	4.1
Since take-off									
Period (percent)	*1977–2000*	*1969–2001*	*1967–2001*	*1960–2001*	*1960–2001*	*1977–2001*	*1986–2000*	*1989–2001*	*1977–2001*
Agriculture (percent)									
12 years	–0.2	2.0	3.9	3.4	..	3.5	3.1	3.9	4.1
Overall	1.6	3.0	2.3	5.2	..	1.6	3.1	3.9	4.0
Industry (percent)									
12 years	–0.6	..	..	..	..	1.2	2.3	10.5	1.8
Overall	1.4	8.6	..	5.3	..	1.3	2.3	10.5	2.5
Services (percent)									
12 years	0.5	..	..	..	..	3.5	1.7	1.2	2.7
Overall	1.5	8.3	..	1.6	..	2.0	0.9	1.2	3.0

Source: UNIDO calculations based on WDI 2003 and ILO, 2003.
Notes: [1] China Industry and Services first year data is for 1980 and final year data is for 1998 for 'Since take-off'.
[2] Indonesia data for final year in ' Since take-off' is 1998
[3] Republic of Korea Industry and Services first year data is for 1970 for 'Since take-off'.
[4] Sri Lanka first year data is for 1981 and 1998 for final year for 'Since take-off'.
[5] Viet Nam data for 12 year-highest-growth is for 1991 for initial year and 1997 for final year. For Since Take-off is for 1997 for final year.
[6] Mauritius data for Since Take-off is for 1980 for initial year.

Table 2.25 Contribution of industry to productivity growth

Period	*Chile 1977–2000*	*China 1980–2000*	*Indonesia 1976–2000*	*Korea, Rep. 1970–2000*	*Malaysia 1980–2000*	*Sri Lanka 1981–1998*	*Thailand 1986–2000*	*Viet Nam 1991–1997*	*Mauritius 1980–2001*
Direct contribution (percent of overall productivity growth)	18.38	37.80	10.28	32.58	27.03	20.98	13.33	42.37	14.76
Re-allocative contribution (percent of overall productivity growth)	–0.48	1.09	21.33	0.55	3.94	0.75	18.79	0.87	–1.90
Overall productivity growth (percent)	17.89	38.89	31.61	33.14	30.97	21.73	32.12	43.24	12.86
Share of re-allocative to overall contribution (percent)	–2.71	2.80	67.48	1.67	12.72	3.44	58.50	2.01	–14.79

Source: UNIDO calculations.
Note: Methodology based on Bailey, Hulten and Campbell, 1992.

Table 2.26 Aggregate productivity growth, unit labour costs and manufactured exports, 1980–2000

Country	Annual aggregate labour productivity growth (percent)	Annual growth manufacturing exports (percent)	Annual aggregate unit labour cost growth (percent)	Share of manufacturing to non-oil exports (percent)
Indonesia	4.4	12.0	–1.1	76.5
Korea, Rep.	7.9	12.1	–1.6	96.0
Thailand	–0.1	30.4	0.3	79.8
Malaysia	4.8	22.1	–0.8	89.7
Chile	3.0	14.0	–1.0	16.2
China	4.0	27.4	..	91.3

Source: UNCTAD, 2003.

bulk of the contribution took the form of increased industrial productivity rather than the indirect impact of the reallocation of labour.[16] Reallocation did, however, make significant contributions to aggregate productivity growth in Indonesia (67 percent of the total), Malaysia (13 percent) and Thailand (59 percent).

Industrialization contributed less to productivity growth in resource-abundant Chile and Sri Lanka and in Mauritius, where unskilled labour-intensive manufacturing was dominant. In this group too, reallocation played a very minor, and in Mauritius a negative one, because industrial productivity levels were very low.

HPE experience shows that:

- Reallocation effects were greatest where industrial productivity was much higher than in agriculture (Indonesia and Thailand) and where large numbers of workers shifted from agriculture to industry (Indonesia, Malaysia and Thailand).
- Late starters (Viet Nam) benefited from access to more modern technologies.
- Industrialization contributed least to national productivity growth in resource-abundant countries (Chile and Sir Lanka) and those that specialized in labour-intensive activities (Mauritius), where the productivity gap with agriculture was small.

High rates of aggregate productivity growth between 1980 and 2000 (7.9 percent a year) enabled Republic of Korea to reduce unit labour costs significantly, with the result that manufactured exports grew 12 percent annually and today account for 96 percent of non-oil exports (table 2.26 and UNCTAD, 2003).

Although aggregate productivity growth in China, Indonesia and Malaysia was less impressive than in Republic of Korea, these countries still achieved manufactured export growth of over 22 percent a year, apparently because they specialized in less capital- and skills-intensive products.

Remarkably, although aggregate productivity actually declined 0.1 percent a year in Thailand, exports of manufactures still grew at an annual rate of 30.4 percent, reflecting its highly successful focus on low-skilled labour-intensive manufacturing activities. In Chile, while aggregate productivity growth was positive and manufactured exports grew strongly, today they account for only 16 percent of non-oil exports, and MVA for only 16 percent of GDP. It appears that the relatively small contribution of industrialization to produc-

Table 2.27a Sectoral shares in manufacturing value added

	China		India				Indonesia				Korea, Rep. of			
Industrial sector	1990	2000	1970	1980	1990	2000	1970	1980	1990	2000	1970	1980	1990	2000
Sector I: Metalworking industry including computers and office equipment, telecommunications equipment and semiconductors	23.7	27.2	17.3	20.7	19.1	16.8	4.2	10.4	7.2	15.8	8.5	15.9	28.3	38.1
Sector II: Transport equipment	4.3	6.8	7.1	8.3	9.5	7.3	0.9	6.4	7.6	13.2	5.1	5.9	10.2	11.3
Sector III: Food, beverages, and tobacco	14.5	14.4	12.8	9.1	11.8	13.1	65.5	31.8	27.5	18.8	25.8	16.6	10.7	8.4
Sector IV: Natural-resource processing industries	25.0	27.0	25.3	23.9	26.4	30.8	4.3	14.3	22.9	19.5	16.5	21.4	20.0	18.4
Sector V: Traditional Labour intensive industries	29.4	20.5	35.8	36.5	29.0	28.5	25.1	37.2	34.8	32.5	16.5	21.4	20.0	18.4

Source: UNIDO Industrial Statistics Database, 2003.

Table 2.27b Sectoral shares in manufacturing value added

	Malaysia			Sri Lanka				Thailand			Viet Nam	Mauritius			Bangladesh			
Industrial sector	1985	1990	2000	1970	1980	1990	2000	1984	1990	1994	2000	1985	1980	1998	1970	1980	1990	2000
Sector I: Metalworking industry including computers and office equipment, telecommunications equipment and semiconductors	20.8	29.9	46.6	13.0	7.0	2.5	7.5	5.8	18.4	26.3	11.3	5.2	6.8	6.9	3.6	3.8	5.1	8.0
Sector II: Transport equipment	4.3	5.5	3.7	1.2	1.2	2.4	1.8	3.5	3.1	5.4	6.9	0.8	0.7	0.7	0.5	1.3	3.2	8.7
Sector III: Food, beverages, and tobacco	21.1	13.2	9.8	27.7	32.2	50.6	41.9	45.0	23.7	16.1	30.2	31.1	30.4	17.4	38.7	23.6	23.9	22.4
Sector IV: Natural-resource processing industries	25.0	22.9	19.4	14.8	12.0	8.2	9.7	16.9	8.1	8.9	9.2	5.4	5.3	5.8	8.9	12.0	14.2	6.7
Sector V: Traditional Labour intensive industries	25.9	26.5	18.2	39.3	29.7	35.2	37.0	26.5	46.7	31.8	41.9	57.5	56.8	69.3	47.7	59.1	53.1	53.7

Source: UNIDO Industrial Statistics Database, 2003.

tivity growth reflects continuing heavy dependence on natural resources.

The joint roles of reallocation and catching-up

Econometric analysis of reallocation and productivity growth over the period 1980 to 2000 yields the following conclusions[17]:

- High rates of upgraded technology-embodying capital accumulation translate into increased rates of output growth.
- The reallocation of workers from agriculture to industry contributes positively and significantly to growth.
- Where the potential exists for catch-up to international best practices in agriculture the impact on growth is both positive and significant.

The aggregate growth rate of an economy depends on developments at the sectoral level. Labour productivity increases in all sectors, though not at a uniform rate. Initially, labour productivity is lower in agriculture than in manufacturing or services and this gap widens before starting to narrow (Chenery, 1986). Experience in the HPEs supports this proposition.

Output growth will be influenced also by intersectoral linkages; the impact that changes in industrial and service sector output have on agriculture in the short run[18]. Empirical analysis shows that short-run increases in industrial growth rates have a positive, or at worst a neutral, impact on agricultural growth. This implies that there is no short-run competition for scarce resources between producers in the two sectors – usually because there is surplus labour but also because of productivity gains, especially in industry. Indeed, far from crowding out agriculture, industrial development impacts positively on the farm sector. But the evidence on the relationship between agriculture and services is mixed, though in a majority of cases the impact of service-sector development on agriculture being negative.

Structural change within manufacturing

Another aspect of economic transformation in the HPEs is the structural shifts experienced within manufacturing. For HPEs as a whole, growth was fastest in the metalworking and automotive industries, fuelled by high levels of engineering, R&D and capital intensity. Although the pattern was not uniform, in most HPEs the food industry lost market share.

The share of labour-intensive manufactured exports increased in most HPEs, usually led by textiles and clothing.

In China, Republic of Korea and Chile metalworking (including computers and office equipment, telecommunications equipment and semiconductors) and automotive industries gained at the expense of traditional labour-intensive and natural-resource processing industries. In Indonesia this expansion was achieved mostly at the expense of the

Table 2.28 Sectoral shares in manufacturing exports (percent)

	Chile			*China*			*India*			*Indonesia*		
Sector or group	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*
Group I	71.4	77.6	70.0	18.8	11.5	7.7	16.0	10.8	11.6	4.4	7.9	17.5
Food, Beverages and tobacco	12.2	18.0	23.8	17.0	9.9	5.4	15.1	9.8	10.3	2.8	6.1	14.2
Primary Metals, non-ferrous	59.2	59.6	46.2	1.8	1.5	2.2	0.9	1.1	1.3	1.6	1.8	3.3
Group II	13.4	14.5	17.1	48.5	42.7	39.5	45.5	42.6	40.1	2.9	20.0	36.5
Apparel and other textile products	0.2	1.2	1.7	39.1	33.8	27.2	34.3	33.4	32.8	2.7	15.3	23.8
Leather and leather products	0.1	0.6	0.3	3.0	5.1	7.4	9.2	8.2	5.0	0.1	2.6	5.7
Paper and paper products	7.0	5.8	7.3	1.5	0.6	0.6	0.1	0.1	0.2	–	0.9	4.7
Printing and publishing	0.1	0.3	1.0	0.1	0.1	0.2	0.2	0.1	0.1	–	–	0.1
Lumber, wood, furniture	5.8	6.3	6.5	1.6	0.9	1.9	0.5	0.1	0.5	–	0.3	0.5
Minerals and minerals products	0.2	0.4	0.3	3.2	2.3	2.3	1.1	0.7	1.6	0.2	0.8	1.8
Group III	8.0	1.6	2.6	7.7	9.6	8.8	9.1	7.3	8.5	0.1	1.4	3.6
Primary metals, ferrous	0.4	0.9	0.7	2.3	2.2	2.7	1.2	1.9	3.0	0.1	0.8	1.1
Nom-electrical machinery	0.5	0.3	1.2	2.7	5.0	3.2	4.4	3.4	3.2	–	0.2	1.0
Fabricated metals products	7.0	0.4	0.8	2.7	2.3	2.9	3.5	2.0	2.2	–	0.4	1.6
Group IV	2.2	1.7	3.4	4.2	18.0	21.1	9.3	6.6	7.1	8.8	14.1	28.6
Rubber products	0.3	0.4	0.6	0.4	0.4	0.5	0.6	0.9	0.7	–	0.3	0.9
Miscellaneous plastic products	–	0.1	0.4	0.3	0.8	2.4	0.2	0.4	0.3	–	0.2	0.7
Electrical machinery	0.3	0.2	0.7	2.7	8.6	15.1	2.5	1.9	3.3	0.5	1.0	10.1
Motor vehicles and transportation equipment	1.7	1.0	1.7	0.9	8.2	3.1	5.9	3.4	2.8	8.3	12.6	17.0
Group V	4.9	4.5	6.6	13.2	11.4	14.7	7.6	11.5	12.4	0.6	4.3	13.7
Chemicals and chemicals prod	4.9	4.4	6.4	12.1	8.0	6.2	6.6	10.3	10.6	0.4	2.7	7.1
Computer and office equipment	–	–	0.1	0.1	0.7	5.0	–	0.7	1.3	–	–	3.1
Instruments and apparatus	–	0.1	0.1	1.1	2.7	3.5	1.0	0.5	0.5	0.1	1.6	3.5
Other manufacturing	–	0.1	0.2	7.5	6.8	8.2	12.6	21.1	20.3	83.2	52.4	–

Sources: UNIDO calculations based on UNIDO Industrial Statistics Database, 2003.
UNIDO Industrial Development Report 2003/2004.
Industry, Environment and the diffusion of Environmentally Sound Technologies.

food industry, as the shares of traditional labour-intensive and natural-resource processing industries also increased, while in Bangladesh and Thailand the food industry lost market share to metalworking and transportation equipment. Sectoral shares within manufacturing grew most where labour productivity increases were greatest – most notably in the electrical equipment, metalworking and transport equipment industries in most HPEs. (tables 2.27a and 2.27b).

To ascertain whether this structural change in manufacturing output carried over into exports, productive sectors are classified here into five groups: (I) primary commodities, (II) labour- and natural-resource intensive, (III) low-technology-intensive, (IV) medium-technology intensive, and (V) high-technology-intensive.

The share of medium- or high-technology goods in total non-oil exports rose steeply in all HPEs except Mauritius. This trend was most marked in China, Indonesia, Republic of Korea, Malaysia, Sri Lanka, Thailand and Viet Nam, which enjoyed very high rates of industrial and manufacturing productivity growth.

The share of labour-intensive manufactured exports increased also in most HPEs, usually led by textiles and clothing, though China, India and Republic of Korea were exceptions. In the Republic of Korea the decline was very sharp, led by falling clothing and textile exports. Other HPEs filled the vacuum left by the Republic of Korea with increased export shares for textiles and clothing, especially in Bangladesh, Indonesia, Mauritius, Sri Lanka and Viet Nam.

Between 1980 and 1997 the share of exports of primary goods in total (non-oil) exports declined rapidly in China, India, Malaysia and Thailand, with more modest declines in Republic of Korea, Mauritius and Chile. But the share of primary goods in total exports increased in three other HPEs: Bangladesh, Indonesia and Sri Lanka (table 2.28, p. 56).

Structural change and poverty reduction in Sub-Saharan Africa

The analysis of structural change in the HPE countries provides a rough but nevertheless useful indication of the necessary level of industrial growth to have income poverty by 2015 in Africa.

The elasticity of industry to aggregate GDP has been higher than that of agriculture or services in a majority of countries.

First, the sectoral elasticities of GDP for the HPEs between 1961 and 2001, show that elasticity of industry to aggregate GDP has been higher than that of agriculture or services in a majority of countries.[19] In Republic of Korea, where the service sector elasticity is the highest, the demand for services grew more, proportionately, than income. As higher technology manufacturing is transaction-intensive, industrial growth also increases the demand for services (table 2.29, p. 56).

Subsequently the indirect poverty elasticities of sectoral development can be estimated using the sectoral elasticities

Korea, Rep. of			*Malaysia*			*Sri Lanka*			*Thailand*			*Viet Nam*			*Mauritius*			*Bangladesh*		
1980	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*	*1980*	*1990*	*1997*
7.9	4.5	6.2	22.8	10.1	9.4	2.7	2.6	3.3	33.9	22.5	20.5	15.6	29.4	22.6	6.7	2.4	6.2	6.0	16.3	7.6
6.4	2.9	2.2	13.9	8.1	7.5	2.7	2.4	3.3	24.0	21.2	17.9	15.1	29.1	21.7	6.7	2.3	6.1	5.9	16.3	7.5
1.6	1.7	4.0	8.9	2.0	1.9	–	0.2	0.1	9.9	1.3	2.6	0.5	0.3	0.9	–	0.1	0.1	0.1	–	–
40.4	33.4	19.7	3.4	8.0	7.8	12.6	34.5	74.1	10.6	24.0	19.9	12.2	6.8	57.4	27.3	58.8	85.0	69.5	69.2	89.2
30.0	21.4	12.7	2.6	4.8	3.9	11.7	32.9	67.0	9.2	16.0	10.8	9.8	5.5	26.3	26.3	54.4	80.5	60.0	62.5	83.5
6.9	8.8	2.8	0.4	0.4	0.3	0.1	0.6	4.9	0.7	5.3	3.9	1.3	0.7	28.9	0.7	0.5	0.6	8.5	6.3	5.1
0.8	0.7	1.4	0.1	0.5	0.6	–	–	0.3	0.2	0.2	0.9	0.1	0.3	0.3	0.2	0.1	0.2	1.0	0.3	–
0.1	0.1	0.2	0.1	0.1	0.1	–	0.1	0.1	–	0.1	0.1	0.2	–	–	0.2	0.1	0.4	–	0.1	–
0.2	0.2	0.3	0.1	0.2	0.4	–	–	–	0.1	0.2	0.4	–	–	0.2	–	–	0.1	–	–	–
2.5	2.3	2.3	0.2	2.0	2.6	0.8	0.9	1.8	0.5	2.2	3.9	0.7	0.2	1.7	–	3.7	3.2	–	0.1	0.5
14.9	11.0	12.9	1.2	3.6	4.8	0.3	1.4	1.5	1.9	3.9	6.5	1.0	1.4	1.3	1.1	0.9	0.8	1.2	–	0.3
9.4	5.6	4.8	0.1	0.7	0.8	–	0.1	–	0.7	0.4	0.8	–	1.3	0.1	–	–	0.1	–	–	–
1.6	3.3	6.2	0.8	2.2	2.9	0.2	0.7	0.9	0.4	2.2	4.1	0.7	0.1	0.7	0.5	0.7	0.7	1.1	–	0.2
3.9	2.1	1.8	0.3	0.6	1.0	0.1	0.6	0.5	0.8	1.4	1.6	0.3	0.1	0.4	0.6	0.2	0.1	0.1	–	0.1
23.8	34.1	40.6	28.8	45.2	55.0	1.4	4.3	8.6	7.1	15.1	28.0	1.4	5.6	14.2	4.8	0.8	1.3	0.3	0.1	1.0
2.9	1.5	1.3	0.3	0.6	0.6	0.3	1.1	3.6	0.5	0.7	1.0	0.1	–	0.2	–	–	–	–	–	–
0.6	1.0	0.7	0.4	1.7	2.2	–	0.9	2.6	0.4	1.4	1.7	–	–	0.8	0.1	0.1	0.3	–	–	0.1
12.1	24.7	36.5	10.8	29.1	42.4	0.3	0.7	2.1	5.3	10.8	21.7	0.4	0.3	8.4	3.9	0.5	0.8	0.3	–	0.2
8.2	6.9	2.2	17.4	13.8	9.8	0.9	1.6	0.4	0.8	2.3	3.5	0.9	5.3	4.8	0.9	0.2	0.1	–	–	0.7
8.7	12.1	20.6	1.8	8.2	23.1	6.5	10.7	12.4	4.3	18.5	25.0	7.5	0.8	4.5	4.2	5.8	6.7	1.5	1.8	1.8
4.7	4.4	10.0	1.4	3.2	5.4	3.3	1.6	0.8	0.9	2.3	5.3	1.4	0.3	1.6	0.7	0.9	0.7	1.3	1.5	0.9
0.5	4.1	8.7	–	2.3	16.3	–	0.1	2.3	–	6.8	14.4	–	0.1	0.2	–	–	–	–	–	–
3.5	3.6	1.8	0.4	2.6	1.4	3.2	9.1	9.3	3.4	9.4	5.4	6.1	0.5	2.7	3.4	4.8	5.9	0.2	0.3	0.9
4.2	4.9	–	42.0	25.0	–	76.4	46.5	–	42.2	15.9	–	62.3	56.0	–	55.9	31.3	–	21.6	12.6	–

Table 2.29 Sectoral GDP elasticities

Country	*Agriculture*	*Industry*	*Services*
Bangladesh	0.19	0.22	0.28
	(3.70)	(4.86)	(3.90)
Chile	0.10	0.49	0.19
	(1.43)	(7.72)	(1.97)
China	0.12	0.49	0.24
	(4.24)	(16.45)	(6.56)
India	0.16	0.28	0.14
	(5.81)	(4.27)	(1.18)
Indonesia	0.13	0.51	0.28
	(3.64)	(10.69)	(8.19)
Korea, Rep. of	0.05	0.32	0.62
	(3.08)	(9.23)	(9.45)
Malaysia	0.08	0.37	0.36
	(3.27)	(6.82)	(6.45)
Mauritius	0.06	0.42	0.28
	(1.91)	(6.42)	(2.49)
Sri Lanka	0.13	0.24	0.18
	(1.82)	(3.08)	(3.73)
Thailand	0.06	0.38	0.28
	(2.29)	(7.72)	(6.82)
Viet Nam	–0.02	0.38	0.19
	(–0.24)	(4.33)	(3.75)
Panel set	0.23	0.30	0.36
	(17.29)	(18.63)	(19.76)

Source: UNIDO calculations.
Note: Values in brackets denote the t-statistics.

Table 2.30 Sub Saharan African countries: Poverty elasticities to sectoral GDP

Group statistics	*Poverty elasticity of growth*	*Agri-culture*	*Industry*	*Services*
Coastal				
Average (weighted)	1.24			
Median	1.20			
Standard deviation	0.60	0.28	0.37	0.45
Minimum	0.30			
Maximum	2.30			
Natural resources-rich				
Average (weighted)	1.00			
Median	1.00			
Standard deviation	0.40	0.22	0.30	0.36
Minimum	0.40			
Maximum	1.70			
Land-locked				
Average (weighted)	0.72			
Median	0.70			
Standard deviation	0.30	0.16	0.22	0.26
Minimum	0.20			
Maximum	1.30			

Source: UNIDO calculations based on Tables 2.16 and 2.29.

of output drawn from the HPE experience and the poverty elasticities of growth for SSA (table 2.30). Whenever industrial value added (IVA) increases by one percentage point, poverty headcounts fall by between 0.22 percent in land-locked countries and 0.37 percent in coastal ones. Significantly, the poverty elasticities of industrial development are larger than those of agriculture to GDP growth, which vary between 0.16 and 0.28.

Above all, these estimates suggest that in order to cut income poverty by half in SSA, the growth rates required for IVA are nine percent and six percent per annum in land-locked and natural resource rich economies, respectively.[20] It should be kept in mind that while these implicitly required IVA growth rates may look large, they are not unreasonable. IVA may grow at accelerated rates starting from a low base following structural and functional reforms. In addition, these calculations assume that the other sectors of the economy do not grow *pari passu,* whereas analysis of structural dynamics show us that industrial growth tends to also pull development in agriculture and services.

The policy implications for poverty reduction are crucial. Most Poverty Reduction Strategy Papers (PRSPs) make agricultural and rural development the priority because three quarters of the world's poor live in rural areas and depend on agriculture for their livelihood. HPE experience confirms that rapid

Box 2.2 Rural enterprise development support in Ghana: reducing poverty by linking rural production with urban markets

The Rural Enterprise Development Support Project being implemented by UNIDO in the Volta, Eastern and Western regions in Ghana aims at promoting micro- and small-scale enterprises in rural areas through small groups of food processors, comprised of mainly women entrepreneurs. The project seeks to increase their productivity and market access by linking with urban markets and providing a comprehensive package of business development services with a focus on developing entrepreneurship, increasing product quality, applying appropriate technology and providing better access to credit.

The training focuses on some of the key constraints faced by the rural micro- and small-scale enterprises (MSEs), and women micro-entrepreneurs in particular, such as low levels of technology and product quality, strong competition due to low barriers of entry and lack of diversification, difficulties in obtaining finance, lack of information on business development services, technologies and market conditions.

By helping to improve the quality of their products and developing the respective standards, the project aims to enhance the marketability of the products of rural agro-processors especially in higher-value markets through linkages with potential urban lead firms. This requires, introducing appropriate technologies and equipment as well as awareness of health and safety requirements.

An important aspect of promoting rural development through agro-processing and MSEs is the facilitation of access to finance. This is done by helping the entrepreneurs with the formulation of a business and feasibility plan, and through collaboration with rural banks, where the management has been trained in micro-finance management and group lending, as well support through the Social Investment Fund (SIF) initiative that is supported by the Government of Ghana, African Development Bank (ADB), UNDP and the Organization of the Petroleum Exporting Countries (OPEC).

Launched in February 2003, by the end of that year the project had mobilized and trained a total of 18 groups involving 647 people, and had plans under way to expand support to further 30 groups during 2004 – some of which will become leaders and trainers. Through the techniques developed during the training and the technology upgrading, one rural group proved that it could produce in two days what it would have produced previously in one month. Although, it is difficult to judge the overall impact of the project so early in its implementation, it provides a good example of delivering a complete package of support and interventions targeted at non-agricultural aspects of rural development.

Source: UNIDO, 2003.

Table 2.31 **Inequality and the Social Development Index**

Group or country		Year		Gini coefficient		Social development Index[1] 1963
		Take-off	Data	Income	Land 1960	
Sub-Saharan African countries	Coastal		2000	44.09		–0.78
	Land-locked		2000	36.53	47.9	–1.12
	Natural resources-rich		2000	43.55		–1.14
Benchmark countries	Chile	1977	1971	46.00	..	1.39
	China	1969	1980	32.00	..	..
	India	1980	1977	32.14	52.0	–0.28
	Indonesia	1967	1964	33.30	56.0	–0.40
	Korea, Rep. of	1960	1961	32.00	39.0	0.85
	Malaysia	1960	1970	50.00	47.0	..
	Sri Lanka	1977	1973	35.30	..	0.35
	Thailand	1986	1986	47.40	46.0	0.50
	Viet Nam	1989	1992	35.70	..	..
	Mauritius	1977	1980	45.70	..	..
	Bangladesh	1970	1973	36.00	45.0	..

Source: Dollar and Kraay , 2002; Rodrik and Alesina ,1993 and Adelman and Morris,1967.
Note: [1] The social development index was devised by Adelman and Morris in 1967 using factor analysis employing 22 indicators and the data on GNP per capital collected during 1960.

growth in agricultural productivity is a precondition for economic takeoff and sustained poverty reduction. But the experience of these countries also supports the view that agricultural growth, especially at the initial stages of development, is not an end in itself but a vehicle for facilitating industrialization. Efforts to promote rural development and alleviate poverty can be more effective if rural incomes can be raised through small scale manufacturing activities, for example in agro-processing. Therefore, the contribution of agricultural development to poverty reduction in SSA should take the form both of raising rural incomes directly while facilitating movement of surplus labour out of agriculture into more productive, higher paid, industrial and service activities (boxes 2.2 and 3.6).

This would involve both productivity and infrastructure enhancement along with improvements in the health, sanitation, education and property rights of the rural poor. Structural change in the HPEs also strongly suggests that poverty reduction in SSA will not occur in the absence of accelerated industrial and service sector development.

Non-economic conditions in the High Performing Economies prior to take-off

Initial conditions, including non-economic factors such as geography, ethnic diversity, civil unrest and educational capital have been found to have profound effects on economic performance and development of countries (Chapter 1 Annex). Controlling for other factors such as initial level of income, a comparison with the initial conditions prevalent in the HPEs at their point of take-off suggests that non-economic initial conditions in SSA represent a cost in terms of forgone growth of between 0.6 and 1.6 percentage points. Initial conditions in economic and market factors result in a further 0.4 to 1.1 percentage points in forgone growth.

Some of the most important sources of forgone growth are low life expectancy (between 0.2 and 0.8 percentage points), adverse geography (between 0.3 and 0.5 percentage points) and real exchange rate distortions, which can be taken as a proxy for institutional quality (between 0.4 and 0.7 percentage points) (Chapter 1 Annex).

Because six HPEs are located entirely within the tropics, the proportion of land between the tropics does not appear to have been a constraint on subsequent growth. However, an index of the coastline to land area shows that SSA is in a very disadvantageous position compared with the HPEs because the majority of SSA countries do not have direct access to natural ports and waterways (Chapter 1). The index for the HPEs ranges from 0.16 (unfavourable) for China to 8.72 (favourable) for Mauritius, with a median of 1.42 for Malaysia. In SSA, the index ranges between zero for land-locked countries to a maximum of 0.22 coastal economies. An application of the coefficients estimated by Bloom and Sachs (1998) to these different conditions suggests this factor accounts for 0.1 percentage points in forgone growth in SSA relative to the average HPE.

Some of the important causes of forgone growth are low life expectancy and adverse geography.

SSA is at a considerable disadvantage, relative to the HPEs, in respect of income distribution. Income inequality in the HPEs, measured by Gini coefficients at the time of take-off, ranged from 32 (China and Republic of Korea) to 50 (Malaysia). But seven of the 11 HPEs had Ginis below 40, whereas in 1999 only four out of 39 SSA countries have Ginis of less than 40.

The estimates suggest that this pattern of income distribution in SSA could entail growth losses relative to the median HPE of up to 1.1 percentage points. Nevertheless, the fact

Table 2.32 **Population, Education and Health Indicators**

	Year		Population (million)	Net primary school enrolment (percent)	Net secondary school enrolment (percent)	Illiteracy Rate (percent of people above 15 years)	Life expectancy at birth (years)
	Take off	Data					
Sub-Saharan African countries							
Coastal		2001	11.14	68.0	27.0	37.0	50.0
Land locked		2001	14.13	58.0	23.0	43.0	46.0
Natural resource-rich		2001	13.90	68.0	42.0	19.0	42.0
Benchmark countries							
Chile	1977	1977	10.66	94.0	33.4	9.7	67.2
China	1969	1970	796.03	97.4[4]	63.3[3]	47.1	61.7
India	1980	1980	687.33	..	40.7	59.0	54.2
Indonesia	1967	1967	109.51	72.4[1]	17.5[1]	43.9	46.0
Korea, Rep of	1960	1960	25.00	94.5[2]	37.7[2]	13.2[2]	54.2
Malaysia	1960	1960	8.14	88.1[1]	33.1[1]	41.9[1]	54.3
Sri Lanka	1977	1977	13.96	..	89.4[3]	16.1	66.7
Thailand	1986	1986	51.95	85.4[1]	25.0	9.3	66.3
Viet Nam	1989	1989	64.77	..	40.9	9.9	68.5
Mauritius		1980	0.97	79.3	56.1	26.0	66.0
Bangladesh	1970	1970	66.48	49.8	17.5[3]	75.4	48.6

Source: World Bank, 2003 and African Development Bank Statistics.
Notes: [1] Data for the year 1970. [2] Data for the year 1975. [3] Data for the year 1980. [4] Data for the year 1990.

that Chile, Malaysia, Thailand and Mauritius managed to grow fast despite relatively unequal initial income distributions suggests that ways can be found to circumvent the obstacles posed by inequality by improving other initial conditions and by applying pro-poor growth policies (table 2.30, p. 56).

The analysis of the impact of initial educational attainment in HPEs shows that the majority of SSA countries are currently lagging, sometimes significantly, behind the initial enrolment rates of all the HPEs, with the exception of Bangladesh (49.8 percent) and China (60 percent)[21]. The median primary enrolment in the HPEs is 88 percent (Malaysia) and the maximum is 97.4 percent (China), with eight of the 11 HPEs achieving initial rates in excess of 70 percent. In contrast, the SSA rates vary between 58 percent for land-locked nations and 68 percent in coastal countries (table 2.32).

SSA countries lag even further behind in secondary enrollment rates. The minimum secondary enrolment rate in the HPEs was 17.5 percent (Indonesia and Bangladesh, two early risers), while the maximum reached was 89.4 percent in Sri Lanka, with a median of 37.7 percent (Republic of Korea, an early riser). On the other hand, the secondary enrolment rates in the SSA countries ranged between 23 percent in the land-locked countries and 42 percent in resource-abundant ones. However, overall primary education enrollment is found to have a rather small affect in explaining the forgone growth difference between SSA and HPEs as explained in Chapter 1 Annex.

Finally, the main source of lost growth in SSA arises from the difference in life expectancy between SSA and the HPEs. Although life expectancy is used here as an overall proxy for comparing health conditions, there is no doubt that pandemics such as HIV/AIDS and tuberculosis pose major public health challenges with serious fiscal implications for SSA countries – challenges that HPEs were spared during their take-off years (table 2.32).

Main lessons from High Performing Economies' experience

Because the experiences of the HPEs are so diverse there is no single, unique HPE industrialization model that SSA countries can seek to emulate. Furthermore, the world has moved on since the many of the HPEs set off on their journeys towards sustained industrial development and structural change. Initial conditions in SSA are, on the whole, less favourable, while the international economic environment has been changed almost beyond recognition by globalization, the speed of technological advance, trade liberalization, global foreign direct investment (FDI) flows, production-sharing, China's accession to the World Trade Organization (WTO) in 2001 and preferential trade agreements.

There is no single, unique HPE industrialization model that SSA countries can seek to emulate.

Accordingly, there can be no guarantee that industrialization strategies and models that were successful over the last 30 years will prove equally so at the start of the 21st century. Even if SSA countries had the resources and initial conditions to match Bangladesh, Malaysia or Chile and even if there were a single model for SSA policymakers to copy, the rules of the game have changed so radically that the scope for contemporary Africa to replicate the Asian past successfully can be ruled out (see Chapter 6).

Because the future will be different from the past, the lessons for SSA countries of HPE industrialization and structural change must be interpreted with great caution. That said, HPE experience provides a number of important lessons:

- Agricultural development as a platform for industrialization. Linkages with agriculture played an important role in some of SSA's more industrialized countries – Côte d'Ivoire, Kenya and Zimbabwe. HPE (and global) experience shows that over time agriculture's share of output and employment falls, leaving manufacturing and services to take up the slack by creating jobs and providing goods and services (box 2.1).
- As a late starter, SSA is disadvantaged to the extent that in the HPEs the industrialization process for latecomers was more capital- and skills-intensive. Given SSA's resource endowment, this underlines the necessity of strengthening the financial infrastructure so that savings can be mobilized more effectively than at present, while creating an investment-friendly business environment to foster both domestic and foreign investment, while government itself invests heavily in infrastructure and skills development.
- HPE experience highlights the critical role of manufactured exports. Despite the evidence suggesting that land-locked countries find it difficult to break into global export markets for manufactures, the recent experience of Lesotho, is encouraging. While such export-platform success is explained partially by special factors (AGOA and Taiwanese investment), it demonstrates that SSA countries can become significant exporters of manufactures, as have South Africa (motor vehicles and components) and Mozambique (aluminum).
- A related lesson, vividly illustrated by China, is the requirement to maintain competitive exchange rates. Unfortunately, SSA policymakers have tended to focus more on exchange-rate management as an anti-inflation device rather than an as an incentive to exporters.
- Very high levels of underemployment and disguised unemployment in SSA's agriculture offer scope for substantial productivity gains initially in farming itself, but subsequently in manufacturing and to a lesser degree, in services, as low productivity workers shift into higher productivity secondary and tertiary activities. Because productivity levels in African agriculture are so low, there is considerable opportunity for productivity gains due to compositional change as well as to catch-up effects in manufacturing as newer technologies are adopted.
- Adverse initial conditions in SSA explain much of the difference between growth rates in SSA and those in the HPEs. This is a disturbing finding because even where they are amenable to change at all, initial conditions can be improved only gradually. This implies that, if not tackled swiftly enough, SSA late-starters risk falling even further behind technologically. The MDGs amount to a bold step by the international community to help producing an accelerated improvement on initial conditions.

The overriding conclusion to be drawn from the HPE experience is not just that there are no short cuts to industrial growth, but also that carefully crafted country-specific strategies are required. There is a broad range of policies that were implemented successfully in HPE countries, largely focused on private sector led capacity building in technology and trade. Recent experience in SSA suggests that emulating the HPEs depends on ensuring that such capacity building is granted the priority it warrants along with other economic and social development priorities.

There are no short cuts to industrial growth, and carefully crafted country-specific strategies are required.

Conclusions and prospects

In seeking to reach their MDGs by 2015 with the support of the international community, most SSA countries have a Herculean task on their hands. The MDG of halving income poverty by 2015 implies a dramatic turnaround in the Sub-Saharan economy, reversing the negative per capita income growth rates of –1.2 percent in the 1980s and –0.4 percent in the 1990s. UNIDO's estimates show that the most frequent annual per capita growth rate required in SSA to achieve the poverty reduction goal stands at around four percent. Thirty of the forty-eight SSA countries for which data is available require annual growth rates of between two and six percent a year – which far exceeds the most recent World Bank forecast for longer-term growth rates in the region (World Bank, 2004).

Required growth rates are lower for resource-rich economies with energy and/or mining deposits, highest for land-locked economies. Few countries are well-placed to reach their MDGs: Benin, Cape Verde, Equatorial Guinea, Malawi and Uganda have reduced poverty and their MDG-required per capita GDP growth is less than two percent.

Even if SSA countries were close to take-off, top growth rates are unlikely to be reached before 2015.

The evidence examined in this chapter suggests that – on the assumption of unchanged policies, an unaltered global trade environment and current levels of foreign assistance and FDI inflows – few SSA countries will attain their MDG goals. However, because these growth projections assume unchanged patterns of income distribution, it is possible, though unlikely, that even if SSA countries fail to reach required growth rates, at least some of them may still manage to reduce poverty substantially by reducing income inequality.

Additionally, prompt improvements in the non-poverty MDGs would spillover into growth while also helping reduce

income inequality and alleviate poverty. This is particularly true of improvements in education, gender equality, health and the environment, which would have a positive effect on growth through better qualifications of the labour force, longer life expectancy, higher productivity and reduced fertility rates. UNIDO's calculations suggest that the achievement of non-income poverty MDGs would help to raise growth between 1.4 and 1.6 percentage points.

In all three regional groups, the greatest contribution to growth from the achievement of the non-income poverty MDGs would come from achieving universal primary education, which lifts growth rates by between 0.61 and 0.71 percentage points a year. The reduction of child mortality would have similarly substantial effects, boosting growth by between 0.22 and 0.26 percentage points. Combating HIV/AIDS and other diseases (Malaria and Tuberculosis) would add between 0.29 and 0.44 percentage points to annual growth. In the context of the MDGs, these potential gains are substantial.

A common feature of HPEs is that they started from a small industrial base and specialized in labour-intensive manufacturing.

Useful lessons can be gleaned from the experience and associated structural change within the 11 HPEs. Most of the HPEs appear to have undergone 'warming up' periods following their take-off, meaning that growth accelerates approximately twelve years after take-off. The implication is that, even if SSA countries were close to their take-off point, their maximum growth rates are unlikely to be reached before 2015. On the other hand, structural change became more pronounced during the 12 fastest growth years after takeoff. This was especially so for the share of manufacturing in total exports, which rose sharply despite the fact that the share of MVA in GDP was increasing at a slower rate and, in some instances, even declining.

It is clear that there was no single, unique HPE model. Experience varied considerably between countries, some of which could be explained by whether the country was an early, intermediate or late starter. A key determinant of these differences was the level and allocation of investment. In several HPEs the rising share of MVA in GDP was closely correlated with the level of investment. A common feature of these HPEs is that they started from a small industrial base and that they specialized internationally in relatively labour intensive manufacturing activities.

HPE experience shows, too, that industrialization was facilitated by rapid growth in agricultural productivity, which released the labour required by industry. Furthermore, industrial productivity grew more slowly in countries that either took off earlier or that specialized in resource-intensive industrial activities or in labour-intensive manufactures.

Compositional change – the shift of resources, especially labour, from low productivity agriculture to higher productivity manufacturing – is likely to have a strongly positive impact in SSA economies, partly because of the large gap between relative productivity per worker in agriculture and manufacturing. The combination of rising productivity in agriculture, partly attributable to Green Revolution effects, and the shift of workers into manufacturing, increases output per worker in the economy as a whole.

There are important lessons for SSA in the growth of manufactured exports in HPE countries. While the immediate challenge for SSA countries is to diversify their export portfolios and reduce reliance on primary commodity exports, it is also essential to move upmarket into faster-growing export markets for medium- and higher-technology products. This is all the more important given the competitive strength of Asian exporters – China, India, Viet Nam, Bangladesh, Sri Lanka – in labour-intensive manufactured exports.

From a poverty reduction viewpoint too, the HPE experience shows that rapid agricultural productivity growth is a key condition for take-off and sustained poverty reduction. HPE experience shows that agricultural and rural development are not an end in itself but a means of facilitating industrialization. Therefore, the contribution of agricultural, and particularly, rural development to poverty reduction in SSA would have to come both from raising rural incomes and from facilitating the movement of the rural poor towards more productive, higher paid, industrial activities. This development would obviously have to include improvements in the health, sanitation, education and property rights of the rural poor. The structural change in the HPEs also strongly suggests that the reduction of poverty in the medium and long run in SSA will unquestionably have to be related to the development of manufactures and services.

Unfavourable initial conditions in SSA are estimated to reduce potential growth by between 1.6 percentage points in coastal and 2.7 percentage points in land-locked economies annually vis-à-vis the HPEs. Significantly, policy sensitive conditions explain more than half of this forgone growth.

Industrialization was helped by growth in agricultural productivity, which released the required labour.

Although adverse conditions in the economic structure of SSA countries are a constraint on growth, their impact varies considerably with respect to the particular condition. Thus HPE experience suggests that a high proportion of primary exports to total exports – as in SSA – is not of itself a serious obstacle to take-off. Most HPEs were initially primary product exporters that managed to diversify their exports via industrialization. Again this is a situation in which policy has the potential to succeed in surmounting unfavourable initial conditions.

Similarly, the fact that countries with initially low endowments of skilled workers like Indonesia, Thailand and Malaysia, managed to upgrade industrial output and exports successfully, implies that deficiencies in these requirements can be compensated with other initial conditions and policies.

Indicators of income distribution, social capabilities and institutional quality show SSA at a disadvantage when compared with the HPEs at the point of their take-off. But investment in infrastructure and education underpinned by appropriate policies transformed unfavourable initial conditions into a platform for industrialization. SSA countries can do the same by building functional institutions that can implement and enforce sound policies.

A further important lesson from HPE experience is the need for heavy investment in infrastructure, especially given the wealth of evidence showing the severe extent to which SSA exporters are disadvantaged by high transport costs and inefficient transport networks.

Comparisons between SSA countries and the HPEs are positive also in respect of unchangeable, or slowly changing, conditions, such as geography, dependence on natural resources and ethnic diversity. With the exception of geography, SSA is not materially worse off than were the HPEs. Moreover analysis of growth determinants suggests that the relative abundance of oil and minerals in the resource-endowed SSA countries should raise their growth rates relative to HPEs, provided the revenues from these resources are not lost to corruption and rent-seeking activities.

However, a word of caution is in order as to how far these findings can be formalized given the variegated past and prospective development trajectories within SSA.

At one extreme is South Africa with a well-diversified industrial structure and competitive exports of manufactures in a number of industries. At the other, are a large number of countries in which manufacturing accounts for no more than ten percent of GDP and whose industrial exports are negligible.

In between these two poles, lie a handful of countries that have progressed – or are progressing – on the strength of historical accidents, such as colonialism, because they have developed manufacturing activities linked to primary product exports or, in a tiny handful of cases, because they have managed to establish export platforms integrated with international producers of clothing and textiles.

Chapter 2 Annex: Statistical methodology[22]

(a) Empirical results of the analysis on share of manufacturing in GDP

The most recent fit of Chenery-Syrquin type equations including African countries is by O'Connell and Ndulu, 2000, using the same equations, i.e. the natural logarithm of the share of manufacturing in GDP as a function of the natural logarithms of income per capita and population, as well as their squared values. Thus,

$$\ln(s_M) = \alpha_0 + \alpha_1 \ln(y) + \alpha_2 \ln(P) + \alpha_3 \ln(y^2) + \alpha_4 \ln(P^2) + \varepsilon$$

where s_M ... Manufacturing share in GDP
α_0 ... Constant
y ... Income per capita in dollars
P ... Population in millions
ε ... Error term

Estimates of coefficients α_1 and α_2 are assumed to be positive, and of α_3 and α_4 negative. The regression results are shown in Table 2A.1.

Table 2A.1 SSA: Fit of Chenery-Syrquin cross-section model. Dependent variable: Natural logarithm of manufacturing share in GDP

Variables	*Coefficients*	*t-statistic*	*Significance level*
α_0	0.898	0.280	0.781
ln(y)	0.169	0.169	0.867
ln(P)	0.458	2.620	0.012
$\ln(y^2)$	–0.001	–0.016	0.988
$\ln(P^2)$	–0.097	–2.135	0.039

Notes: Degree of freedom: 43; correlation R^2: 0.170; F-statistic: 2.001 with 0.114 significance level.

(b) Results on the determinants of MVA level

In UN-DESA, 1963, MVA for aggregate manufacturing and for individual subsectors were made a function of income per capita and population. Income per capita was meant to account for the level of economic development attained, and population for size effects. The model was based on initial work on industrial patterns done by Chenery, 1960. Here the model is modified by including a population squared variable to account for scale dis-economies, applying this to cross section data for 44 SSA countries.

$$\ln(Y_M) = \alpha_0 + \alpha_1 \ln(y) + \alpha_2 \ln(P) + \alpha_3 \ln(P^2) + \varepsilon$$

where Y_M ... MVA in million dollars
α_0 ... Constant
y ... Income per capita in dollars
P ... Population in millions
ε ... Error term

Results are shown in Table 2A.2 below.

Table 2A.2 SSA: Modified UN cross-section model including income per capita, population and population squared variables. Dependent variable: natural logarithm of MVA

Variables	*Coefficients*	*t-statistic*	*Significance level*
α_0	–3.036	–3.035	0.004
ln(y)	1.060	7.334	0.000*
ln(P)	1.840	7.849	0.000*
$\ln(P^2)$	–0.215	–3.507	0.001

Notes: Degree of freedom: 43, correlation R^2: 0.786, F-statistic: 49.071 with significance level better than 0.001.
* Significance level better than 0.001.

(c) Manufacturing Structure

UNIDO's International Industrial Statistics database includes up to a total of 21 SSA countries, but data is not available for each subsector and country.

Due to lack of a sufficient number of countries reporting the respective data, petroleum and coal products, basic metals, electrical machinery, and transport equipment could not be included in the analysis. The absence of data for a sufficient number of countries in these industries also serves as an indicator of the relatively low level of industrial development attained so far in SSA.

Income per capita and population data are drawn from our SSA database for 2001. Individual country value-added industry data for the various subsectors from 1993 to 2000 were obtained from UNIDO Statistical Yearbooks (1996 to 2003).

Another potential source of estimation error is in the conversion, to US dollars, of country value added data originally provided in national currencies. The conversion was done using the yearly conversion factors provided by the World Bank 2003(a).

The model utilized is that presented in UN-DESA, 1963, where the logarithm of MVA for each subsector is made a function of the logarithms of income per capita and population, plus a residual factor estimated for each country from the fit for aggregate MVA. The residual from the aggregate fit is thus 'distributed' among the component sectors and should contribute to a better fit.

$$\ln(Y_M^j) = \alpha_0 + \alpha_1 \ln(y) + \alpha_2 \ln(P) + \ln(d_j) + \varepsilon$$

where Y_M^j ... Sectoral value added of sector j in million dollars
α_0 ... Constant
y ... Income per capita in dollars
P ... Population in millions
d_j ... Ratio between the actual and calculated value of value added for sector j
ε ... Error term

Results of the estimation are shown in Table 2A.3.

The estimated coefficients represent the respective partial elasticities of value added with respect to income per-capita and population respectively. The linear logarithmic expressions used are derived from the production function type

Table 2A.3 **SSA: Fit of Selected manufacturing branches and aggregate manufacturing industry value added data. Dependent variables: Natural logarithm of sectoral value added**

	Coefficients				
Branch (ISIC Rev. 2)	*Income* α_1	*Population* α_2	*Number of observations*	*F-statistic*	*Correlation* R^2
Total Manufacturing (300)	1.06 (7.33)	1.84 (7.849)	44	49.071 (0.000)*	0.786
Food products and Beverages (311/2, 313)	1.062 (3.18)	0.777 (3.24)	18	7.801 (0.003)	0.626
Textiles (321)	1.563 (3.63)	1.286 (3.904)	19	9.194 (0.001)	0.648
Wearing Apparel, leather and fur prod., footwear (322, 323, 324)	1.015 (1.42)	0.294 (0.51)	14	1.589 (0.253)	0.323
Wood and wood products (331)	0.892 (1.43)	0.610 (1.39)	14	1.501 (0.274)	0.310
Paper and paper products (341)	0.356 (0.606)	0.564 (1.24)	15	3.731 (0.045)	0.504
Printing and publishing (342)	0.815 (2.69)	0.587 (2.53)	15	5.118 (0.019)	0.583
Chemical products (351, 352)	0.906 (1.76)	1.214 (3.14)	16	3.690 (0.043)	0.48
Rubber and plastic products (355, 356)	0.949 (1.60)	1.065 (2.37)	14	2.250 (0.145)	0.403
Non-metal mineral products (36)	0.597 (1.73)	0.558 (1.93)	19	1.70 (0.210)	0.254
Metal products (381)	1.178 (3.39)	0.970 (3.43)	17	5.922 (0.009)	0.577

Notes: Numbers in parenthesis below the estimated coefficients are the respective t-statistic. Numbers in parenthesis below the F-statistic for each estimated branch equation are the respective significance levels.

expression $Y_M^j = k \cdot y^{\alpha_1} \cdot P^{\alpha_2}$, which becomes

$\ln(Y_M^j) = \kappa + \alpha_1 \ln(y) + \alpha_2 \ln(P)$, with $\kappa = \ln(k)$ and since

$\frac{dY_M^j}{dy} = \alpha_1 \cdot y^{\alpha_1 - 1} \cdot P^{\alpha_2}$ then $\alpha_1 = \frac{\frac{dY_M^j}{dy}}{\frac{Y_M^j}{y}}$, which is the definition of the elasticity of Y_M^j with respect to *y*.

(d) Relationship between income poverty and other Millennium Development Goals and indicators

The poverty reduction goal is inextricably linked with the other MDGs, particularly those relating to education, health, gender and environment. Since poverty is multifaceted and goes beyond the depiction of poverty headcount, the goals themselves are thought to be mutually reinforcing. On the other hand, as this Report argues, a number of the structural impediments the MDGs are addressed to, such as low primary and secondary schooling and high mortality rates due to HIV/AIDS, malaria and tuberculosis, can be thought of as adverse initial conditions that reduce actual and potential economic growth rates.

In order to shed light on some of these interrelationships, the contribution of the achievement of the non-income poverty MDGs to economic growth are calculated using the coefficients estimated by Doppenholfer, Miller and Sala-i-Martin (2000) for the cross-elasticities of school enrolment, infant mortality and life expectancy to economic growth and those by Sachs and Bloom (1998) for malaria's impact on economic growth. African Development Bank (2003) data were used to estimate the current conditions in SSA for primary and secondary school enrolment, infant mortality, maternal mortality and water access. The corresponding growth rates are estimated by extrapolating the improvements that would result in these areas from the achievement of the MDG targets. In the case of the health-related indicators (HIV/AIDS, water access, infant mortality and maternal mortality) the elasticities between these and economic growth rates were calculated by estimating the life expectancy gains from the respective improvements. Unfortunately there is little empirical evidence in the literature on the *direct* impact of improvements in these social conditions on the poverty headcount – there is more on the *indirect* impact through economic growth.

The above regressions do not shed light on the possible direction of causality between improvements in social conditions, reductions in headcount poverty and poverty reduction. To the extent that such effects can be de-constructed, the impact on the removal of structural impediments through the achievement of the MDGs appear to contribute significantly to economic growth and, subsequently, poverty reduction.

(e) Reallocation effects and catching-up

The aim of this exercise was to measure the contribution of industrialization to growth via the 'catching up' effect to the technological frontiers in the agricultural and industrial sectors, internal catching-up, the reallocation of labour to manufacturing activities and factor accumulation.

Dorwrick and Gemmell (1991) (DG) methodology is used

to test the hypothesis that sectoral disequilibrium varies systematically according to the level of development. This framework takes into account the effects of capital deepening and resource re-allocation on average GDP growth $\dot{Y}$. It also captures the effects of different rates of technological change across sectors and of catching-up between sectors. The model to be estimated is:

$$\dot{Y} = \alpha \frac{dK}{Y} + \alpha_1 \ln\left(\frac{Y}{L}\right)\frac{dK}{Y} + \beta \frac{I}{Y}\dot{L}_i + \mu \frac{A}{Y}\dot{L}_a + \left(\lambda_a^1 - \lambda_i^1\right)\frac{A}{Y} +$$

$$\lambda_a^2 \frac{A}{Y}\ln\left(\frac{\pi_a}{\pi_a^*}\right) + \lambda_i^2 \frac{I}{Y}\ln\left(\frac{\pi_i}{\pi_i^*}\right) + \lambda_a^3 \frac{A}{Y}\ln\left(\frac{\pi_a}{\pi_i}\right) + \varepsilon$$

where $\frac{dK}{Y}$ … Investment ratio

$\ln\left(\frac{Y}{L}\right)\frac{dK}{Y}$ … Cross term of log of GDP per worker and investment ratio

$\frac{I}{Y}\dot{L}_i$ … Change in industry labour weighted by industry's share in GDP

$\frac{A}{Y}\dot{L}_a$ … Change in agriculture labour weighted by agriculture's share in GDP

$\frac{A}{Y}$ … Agriculture's share in GDP

$\frac{A}{Y}\ln\left(\frac{\pi_a}{\pi_a^*}\right)$ … Log of relative productivity in agriculture to international productivity in agriculture weighted by agriculture's share in GDP

$\frac{I}{Y}\ln\left(\frac{\pi_i}{\pi_i^*}\right)$ … Log of relative productivity in industry to international productivity in industry weighted by industry's share in GDP

$\frac{A}{Y}\ln\left(\frac{\pi_a}{\pi_i}\right)$ … Log of relative productivity in agriculture to productivity in industry weighted by agriculture's share in GDP

The first four terms of the regression capture the growth due to factor accumulation, both capital and labour. The first term is capital accumulation that could be proxied by the investment to GDP ratio and its coefficient is the marginal return to capital. The second term is a cross term that captures differences by level of development (measured as the logarithm of the GDP per capita) in the return to capital. Labour growth is split into labour growth in industry and labour growth in agriculture and its coefficient should reflect the labour productivity differentials between industry and agriculture that result from barriers to the transfer of labour between sectors. This productivity differential stimulates the process of inter-sectoral labour transfer, raises aggregate labour productivity and moves sectoral marginal products towards equality.

Because the focus is medium term growth, the data are trended or averaged over periods of five years: 1980–85; 1985–90; 1990–95; 1995–00.

The model has some deficiencies in that it does not include the service sector, the government sector and the export sector. Furthermore, capital and labour utilization rates are not included, while the endogeneity of technological change due to increasing returns to knowledge and specialization is not tested. Also, human capital is omitted. As human capital is an input in the production process, it should be included as an additional and potentially important explanatory variable.

The results of the regression are presented in Table 2A.4. Column (1) shows the results that attain when the term that interacts investment rates with GDP is not included in the regression. The effects of the inclusion of a term that interacts the investment ratio and the logarithm of the GDP per capita are shown in the second column while column (3) depicts a simpler version of the productivity catch-up, that uses logarithm of income per capita as the only productivity regressor (besides input accumulation coefficients).

Table 2A.4 Contribution of industrialization to growth

Coefficient	*(1)*	*(2)*	*(3)*
α	0.24 (3.91)**	0.32 (0.91)	0.25 (4.58)***
α_1		–0.01 (–0.24)	
β	1.09 (4.26)***	1.05 (3.99)**	0.93 (3.72)***
μ	–0.18 (–0.37)	–0.18 (–0.95)	–0.10 (–0.19)
$\lambda^1_a - \lambda^1_j$	–0.10 (–1.01)	–0.10 (–0.95)	
λ^2_a	–0.05 (–2.17)**	–0.05 (–2.05)*	
λ^2_j	0.00 (0.24)	0.01 (0.35)	
λ^3_a	0.07 (1.78)*	0.08 (1.77)*	
Intercept			–0.28 (–1.07)

Notes: t-statistic in parenthesis.
* Significant at 10percent level.
** Significant at 5percent level.
*** Significant at 1percent level.

Case study: The impact of trade preferences and China's accession to the WTO[23]

Sub-Saharan countries have recently benefited from two trade initiatives by industrialized countries that grant them preferential access to US and EU markets. However, the beneficial impact of the two initiatives – the United States African Growth and Opportunity Act (AGOA) and the European Union's Everything But Arms (EBA) scheme – might become partially eroded by two developments: China's accession to the WTO in 2001 and the scheduled final phase-out of the Multi-Fibre Agreement (MFA) in 2005. This case study explores the implications for SSA economies, and especially for the apparel and textile industries, of these four developments whose interaction is likely to have far-reaching effects.

AGOA

AGOA, enacted in May 2000 and further expanded in August 2002, is designed to encourage SSA countries to open and deregulate their economies, improve macroeconomic policies, implement structural reforms and embrace globalization. Those countries willing to follow such a development path – to date 36 of 48 SSA countries have qualified for AGOA – enjoy increased preferential access to the US market.

Since the 1970s, industrialized countries have offered non-reciprocal trade preferences to developing countries under the Generalized System of Preferences (GSP). AGOA represents an improvement over the GSP in two main respects – existing preferential market access under GSP has been extended in time and the range of products has been widened to include petroleum products, apparel, previously subject to MFA quotas and tariffs, as well a large number of agricultural and industrial products.

The net effect of AGOA was to increase coverage of SSA exports to the US from 17 percent of the total (based on trade figures for 2000) to 72 percent. However, because this includes petroleum products, the largest US import from SSA, which attracted a pre-AGOA import duty of only 1.5 percent, the main positive impact of AGOA is confined to those products that have significant protection. These are estimated to account for only five percent of total US imports from SSA and about a quarter of non-oil imports. On conservative estimates, AGOA was expected to bring about an eight to 11 percent increase in the region's non-oil exports (Mattoo, Roy and Subramanian, 2003) with apparel being by far the major beneficiary.

To date, US imports from AGOA-eligible SSA countries have grown 60 percent, and while this has had a major positive impact on economies such as Lesotho, SSA clothing exports to the US accounted for only 1.6 percent of the total in 2001.

EBA initiative

The EU's EBA initiative, approved in January 2001, abolishes tariffs and quotas on imports of all goods, except arms that originate in LDCs, which includes most SSA countries. EBA grants duty-free access with no quantitative restrictions to imports of all products from the LDCs except arms and ammunition. Liberalization was immediate except for three items – bananas, rice and sugar where tariffs are being gradually reduced to zero – by 2006 for bananas and by 2009 for rice and sugar.

Most of the items covered by EBA already received duty-free access under GSP or the Cotonou Agreement. However, EBA represents an advance on GSP because it is not time-bound, whereas the current GSP ends in 2004. The initial impact was negligible because only a small proportion of SSA exports was affected (Brenton 2003).

Given the nature of comparative advantage in SSA countries – factor endowments, physical infrastructure and the stage of technological development reached – the two initiatives, especially AGOA, are designed to promote the expansion of clothing exports to the US and EU markets while also encouraging the diversification of export product lines and destinations. The clothing industry, in particular, is seen as a starting point for accelerated industrialization in SSA.

There is, however, a risk that this will be undermined by two aspects of global trade liberalization – the final dismantling of the MFA and China's accession to the WTO. According to some estimates (Lanchovichina and Martin, 2001), China's accession to the WTO will enable it to increase its share of world clothing exports from 19.6 percent in 1995 to 47.1 percent by 2005. Had WTO access not occurred (the counterfactual scenario in the simulations below), this share would actually decline to 18.5 percent.

The corresponding increase in output would be 263.5 percent (57 percent in the counterfactual case). Such massive expansion, driven by China's abundant supply of low-wage of labour, may undermine the competitiveness of the exports of apparel from SSA countries, despite preferential access under AGOA and EBA.

As a result, the well-intentioned strategy implicit in AGOA/EBA might foster an export-based apparel industry in SSA that may be unable to withstand the competitive challenge from China. This underlies the need for a much broader strategy to facilitate industrial capability building and export diversification in SSA.

Quantifying the impact

The impacts of AGOA, EBA, the dismantling of the MFA and China's accession to the WTO are quantified by means of simulations using the Global Trade Analysis Project (GTAP), a computable general equilibrium model for the world economy. The simulations are designed to:

- Ascertain the likely benefits, in terms of aggregate welfare, GDP, exports and factor rewards that SSA countries would obtain from participation in AGOA and EBA.
- Predict possible changes in the direction of the external trade of SSA countries.
- Measure the impact of the trade initiatives on the SSA apparel industry – output, employment, exports, prices and profitability.
- Quantify the structural changes in SSA countries induced by AGOA and EBA.
- Examine whether changes in the profitability of clothing manufacture and export in SSA countries would encourage foreign direct investment in the industry in SSA rather than in China.

Main findings[24]

- Both AGOA and EBA offer important benefits for SSA countries, especially the least developed ones, particularly in the textile and apparel industries.

- As the output and export shares of these industries are relatively small, the aggregate benefits of these trade initiatives are not as large as the sectoral ones.
- The more developed SSA economies benefit less from these initiatives because they receive less generous concessions than their less developed counterparts.
- China's entry into the WTO has positive aggregate effects on the SSA economies, in terms of increased exports, improved terms of trade, faster GDP growth and greater welfare improvements. The downside is the adverse impact of China's accession on textile and apparel industries in SSA, especially in the more developed countries.
- China's WTO accession, allied with trade liberalization in China itself, would increase demand for SSA exports to all destinations.
- But the elimination of MFA quotas on Chinese exports arising from its entry to the WTO would transform China into the world's leading exporter of apparel and textiles, especially the former. This may slow down, or even reverse, the development of the clothing and textile industries in SSA countries – a prime objective of AGOA. SSA's more industrialized countries would be harder hit than their less developed counterparts because they are less sheltered by AGOA from Chinese competition in the US apparel market. The possible eventual imposition of safeguards by industrialized countries on textile and apparel imports of Chinese origin may cushion the negative impact of China's entry on the SSA textile and clothing industry but not eliminate it altogether.
- AGOA and EBA will make it more attractive for foreign firms to invest in SSA's clothing and textile sectors to exploit the preferential market access available under AGOA and EBA. Indeed this is already evident in LDCs like Lesotho. However, the simulations suggest that this influence may not have the effect of diverting inward FDI from China to Africa or of encouraging Chinese firms to relocate in SSA. Nevertheless, an incipient wave of FDI from East Asian origin (mostly Korean and Taiwanese) is taking place, along with important US investment in the area that takes advantage of the maquiladora ingredients of AGOA.

The economic impact of AGOA and EBA

This section quantifies the expected benefits of AGOA and EBA for the SSA economies and estimates the extent to which these benefits may be eroded by China's entry into the WTO. 2005 is chosen for the exercise because it is a year when the impact of China's entry into the WTO will be more clearly felt and also when the MFA will be finally dismantled and when the AGOA rules of origin that currently apply to more developed SSA countries will be extended to the least developed states[25].

Table 2C.1 details the aggregate effects on SSA economies for both the least developed economies (Africa 0) and the more developed (Africa 1). There are three different scenarios – the counterfactual, which is the situation assuming that China would not have joined the WTO, (column 1), the accession scenario (column 2) and the accession scenario with safeguards aimed at limiting the growth and penetration of Chinese imports.

Table 2C.1 Aggregate effects on SSA from AGOA, EBA and China accession to WTO

	Counterfactual (1)	*Accession (2)*	*Accession with safeguards (3)*
Welfare Gains			
Africa 0	43.5	43.6	43.6
Africa 1	28.2	43.6	43.6
Real GDP			
Africa 0	37.2	37.2	37.2
Africa 1	22.4	22.5	22.5
Exports			
Africa 0	14.4	14.2	14.2
Africa 1	18.9	19.6	19.6
Terms of Trade			
Africa 0	15.8	16.2	16.2
Africa 1	15.6	16.1	16.2

Source: UNIDO calculations.

China outside the WTO (counterfactual)

Column 1 shows the combined impact of AGOA, EBA, MFA and productivity growth on SSA economies between 1997 and 2005. SSA LDCs benefit most with welfare gains (measured in terms of consumption) of 43.5 percent. The more developed economies enjoy smaller, but still significant, gains.

Table 2C.2 shows that dismantling the MFA has marginally negative impacts on both groups of countries while AGOA has a marginally positive effect in the LDCs, but a negligible impact on the more advanced countries. The only sizeable effect is that from EBA on the LDCs where the implications for both exports and the terms-of-trade are very favourable. The impact on the more advanced economies is again negligible. The reason for this is that a large number of the more advanced economies are not eligible for EBA, while the percentage of clothing exports to the US from countries that could potentially benefit from AGOA – an import duty on apparel imports of 12.8 percent – is very small because of AGOA's restrictive rules of origin.

Table 2C.2 Sources of gains

Counterfactual	*MFA*	*EBA*	*AGOA*	*Total*
Welfare				
Africa 0	–0.058	0.726	0.013	0.681
Africa 1	–0.072	0.006	0.001	–0.065
Real GDP				
Africa 0	–0.011	0.138	0.000	0.127
Africa 1	–0.021	0.000	0.000	–0.021
Exports				
Africa 0	–0.068	4.726	0.007	4.665
Africa 1	–0.208	0.015	0.000	–0.193
Terms of Trade				
Africa 0	–0.139	1.728	0.024	1.613
Africa 1	–0.167	0.006	0.000	–0.161

Source: UNIDO calculations.

Table 2C.3 The accession scenario					
	MFA	*EBA*	*AGOA*	*China*	*Total*
Welfare					
Africa 0	–0.070	0.729	0.025	0.008	0.692
Africa 1	–0.123	0.006	0.216	0.000	0.109
Real GDP					
Africa 0	–0.023	0.138	0.010	0.000	0.125
Africa 1	–0.054	0.000	0.093	0.000	0.039
Exports					
Africa 0	–0.112	4.746	0.061	–0.043	4.652
Africa 1	–0.315	0.015	0.006	0.834	0.540
Terms of Trade					
Africa 0	–0.107	1.737	0.081	–0.043	1.668
Africa 1	–0.163	0.006	0.290	0.011	0.144

Source: UNIDO calculations.

China in the WTO

In LDCs the main welfare and GDP gains emanate from EBA, whereas in the more advanced countries they stem from AGOA. For exports, the main gain by far for LDCs comes from EBA with a small positive effect from AGOA. Post-WTO accession China has a small negative effect on LDCs.

However, more advanced countries gain from increased exports to China, because China's entry raises global real income by a third, thereby boosting demand for SSA exports to all destinations. Significantly too, the positive AGOA effect is greater following China's accession to the WTO, reflecting favourable terms-of-trade and export volume effects.

Direction of trade

China's accession to the WTO is by far the dominant force, though initially EBA is the driver. Apparel exports from SSA's LDCs to the EU grow 34.8 percent, the bulk of which (+29.5 percent) is attributable to EBA. But exports to the US fall 8.3 percent due to the dismantling of the MFA and some diversion of African LDC exports to the EU. Exports to China increase 14.9 percent.

But clothing exports from the more developed SSA countries to the US increase 22.5 percent, while those to the EU grow only six percent, reflecting some loss of market share by these countries to their least developed SSA counterparts. Exports to China rise some 329 percent.

Trade shares

Despite gains from both AGOA and EBA, China's accession leads to a decline in SSA's market share of world apparel trade from 1.4 percent in 1997 to 1.2 percent.

In 1990, textiles and apparel represented 5.2 percent of SSA exports increasing to 6.9 percent by 1999 – a growth rate of 35.8 percent a year. Eighty percent of the $433 million increase in clothing sakes to the US between 1990 and 1999 is attributable to SACU[26] and Mauritius.

This increase in apparel exports during the 1990s was driven by sales to the US, which had a tight quota policy towards Chinese exports of these manufactures. In the EU, where the quotas are less stringent, the annual average growth rate of SSA exports was only 1.2 percent.

Structural change

Table 2C.5 shows the composition of SSA exports to all destinations and how they would be affected by the trade initiatives and associated trends in global economic growth. In the counterfactual scenario, the share of clothing, textiles and extractive sector exports increases, but the share of manufac-

Table 2C.4 SSA exports						
	1990		*1999*		*Growth*	
	Value (billion dollars)	*Share (percent)*	*Value (billion dollars)*	*Share (percent)*	*1990–1999 (percent)*	*Annual average (percent)*
Total	48.60	100.0	49.60	100.0	2.1	0.2
Total textiles and clothing	2.50	5.2	3.40	6.9	35.8	3.1
Textile fibres	1.33	2.7	1.41	2.8	6.4	0.6
Textile yarn, fabrics, etc	0.23	0.5	0.21	0.4	–9.6	–1.0
Clothing and accessories	0.95	1.9	1.78	3.6	88.0	6.5

Source: Mattoo, Roy and Subramanian, 2002.

Table 2C.5 Export structure (percent shares)						
Sector	*Initial Africa 0*	*Initial Africa 1*	*Counterfactual Africa 0*	*Counterfactual Africa 1*	*Accession Africa 0*	*Accession Africa 1*
Food	24.7	13.5	23.2	8.0	8.2	4.2
Extractive	32.4	31.9	37.5	32.7	32.6	5.1
Inputs	2.8	1.6	2.5	1.8	1.8	0.4
Manufactures	17.8	34.1	13.2	24.1	24.5	73.5
Textiles	1.4	1.6	2.0	1.4	1.2	1.6
Apparel	1.4	1.2	1.5	1.1	0.7	0.3
Services	19.1	16.0	20.2	30.8	31.0	15.0

Source: UNIDO calculations.

Table 2C.6 Production shares (percent)						
Sector	*Initial Africa 0*	*Initial Africa 1*	*Counterfactual Africa 0*	*Counterfactual Africa 1*	*Accession Africa 0*	*Accession Africa 1*
Food	33.2	19.4	32.6	17.9	32.7	17.9
Extractive	6.9	8.1	7.1	8.0	7.1	8.0
Inputs	0.7	0.6	0.6	0.6	0.6	0.6
Manufactures	9.1	18.8	7.8	16.2	7.7	16.1
Textiles	0.8	2.3	0.7	2.2	0.7	2.1
Apparel	1.0	0.5	1.0	0.4	0.9	0.4
Services	48.3	50.4	50.2	54.8	50.3	54.9
Source: UNIDO calculations						

tures declines to 13.2 percent from 17.8 percent. This reflects the combined positive impact of EBA and AGOA on apparel and textile exports. Although these gains are wiped out by China's entry to the WTO, there is a major increase in exports of manufactures to almost a quarter of total exports – the result of China's own trade liberalization and the associated accelerated growth in world income.

In the more developed SSA states, textiles retain their market share of total exports (1.6 percent) after accession but the clothing industry is hit hard and its share of exports falls by three-quarters to 0.3 percent. Again, the most striking outcome by far is the increase in the share of manufactured exports from 34.5 percent in 1997 to 73.5 percent after China's accession.

However, this increase in manufactured exports is not reflected in output patterns. In both groups of SSA countries the output shares of the clothing and textile industries decline only marginally after China's accession. Of greater concern is the sharper decline in the share of MVA in GDP. Table 2C.6 shows it declines some 15.5 percent to 7.7 percent (post-accession) from 9.1 percent in the LDCs and to 16.1 percent from 18.8 percent in the more developed economies.

The clothing industry

Although manufacturing industry's output share declines in both LDCs and more developed economies, the shares of apparel and textiles are relatively stable. However, in the counterfactual scenario, output and exports increase some 27 percent in LDCs, mostly on the strength of increased employment as the industry becomes more labour-intensive. Accession, however, has a negative impact so that output growth is only 17 percent while exports fall by 16.4 percent.

In the more developed economies, output grows 14 percent but export expansion is only 3.8 percent in the counterfactual scenario. Output actually declines 2.8 percent after accession while exports fall by a third, partly reflecting the impact of AGOA's restrictive rules of origin that have a greater impact on the more advanced SSA economies.

The textile industry

Both groups of countries benefit from AGOA, EBA the dismantling of the MFA and rapid growth of the Chinese economy as shown in the counterfactual scenario. Output rises nearly 21 percent in the LDCs (15.6 percent in the more advanced economies) while exports rise 24 percent (5.4 percent in the more developed countries).

China's accession (table 2C.8, Column 3) leads to much slower output and export growth in the LDCs while in the more advanced countries slower output growth is accompanied by a sharp 12.6 percent decline in exports.

FDI flows

There appear to be no serious bottlenecks likely to constrain expansion of China's apparel industry post-WTO accession. Accordingly, if Chinese firms are to relocate to SSA, the prof-

Table 2C.7 Wearing apparel in SSA (percent changes)						
Sector	*Counterfactual Africa 0*	*Counterfactual Africa 1*	*Accession Africa 0*	*Accession Africa 1*	*Accession with Safeguards Africa 0*	*Accession with Safeguards Africa 1*
Output	23.6	14.3	17.3	–2.8	20.6	3.2
Exports	27.2	3.8	–16.4	–33.2	0.3	–16.2
Source: UNIDO calculations						

Table 2C.8 Textiles in SSA (percent changes)						
Sector	*Counterfactual Africa 0*	*Counterfactual Africa 1*	*Accession Africa 0*	*Accession Africa 1*	*Accession with Safeguards Africa 0*	*Accession with Safeguards Africa 1*
Output	20.8	15.6	12.7	9.6	14.3	10.5
Exports	24.1	5.4	6.5	–12.6	11.1	–7.3
Source: UNIDO calculations						

itability of investment in the latter must rise relative to that in China itself. The simulations suggest that improvements in SSA's competitive position attributable to AGOA and EBA will help to narrow the gap between profitability in China and in SSA countries, but not sufficiently to close it.

AGOA and EBA have induced FDI flows to the apparel industry in some African countries (Lesotho, Namibia, Swaziland) and the analysis in the background paper suggests substantial scope for increased inward investment in the future. Influences making for increased FDI in the textile and apparel sectors include the lack of supply of textile inputs, the need to expand capacity to fulfill contracts from US, and the negotiations for a Free Trade Area between SACU and the US.

Nevertheless, the benefits from AGOA, based on GTAP simulations and other sources, may not be enough to promote a significant surge in FDI.

Consequently, over the next few years capital investment and productivity gains are expected to be only minor.

Notes:

In this chapter 'Manufacturing industry in Sub-Saharan Africa: The record' is based on a background paper by S. Teitel (2004). 'Industrialization and poverty reduction: Lessons for Sub-Saharan Africa' and 'Insights from HPEs' are based on background paper by G. Sanchez e. a. (2004). However, the views expressed here are of UNIDO and do not necessarily reflect those of the authors.

1 'Economic growth is intrinsically tied to the dynamics of production structures and to the specific policies and institutions created to support it, especially those that facilitate the diffusion of innovations and the creation of linkages among domestic firms and sectors' (Ocampo, 2004).

2 See point a in the Technical Annex at the end of this chapter for details of the analysis.

3 Considering the impact of the population squared variable, the elasticity of MVA with respect to population declines to a value of 1.70 (i.e. by 7.6 percent) for a country with a population of five million inhabitants, and to 1.80 (i.e. by 1.8 percent) for a country with 50 million inhabitants. Thus the difference in the impact of population compared to income per capita remains quite large.

4 In the latter's' case MVA is far less than predicted using the residuals estimated through the Chenery equations.

5 For a broad, historic, overview of the world demographic transition see, Lee, 2003, and for a view on the African prospect see Gabre-Madhin and Johnston, 2003.

6 For a comparison with East Asian countries see Gabre-Madhin and Johnston, op. cit.

7 See Chapter 2 Technical Annex for a more detailed discussion.

8 Please refer to Technical notes in the second part for a definition of high-technology exports.

9 The measure of poverty both nationally and globally has been the subject of a controversial and growing literature. One of the major problems arise from the large discrepancies between poverty headcounts measured using national account statistics versus household surveys. The data used in this report originates from World Bank indicators, which are used by the UN to monitor MDG targets that are in turn calculated using household survey data. In general it must be noted that both national accounts statistics and household survey data have significant drawbacks. For example, national accounts measure income poverty using the total GDP, which includes much more than household consumption, such as private investment or government spending, giving a lower poverty headcount relative to a common poverty line (Ravallion, 2004b). For an informative overview also see Deaton 2000; Deaton 2003 and The Economist 13 March 2004. Beyond the technical problems surrounding national and global measurements of income and consumption poverty, there is also an important technical consideration regarding to use of headcount as a poverty measurement. In effect, headcount ratios hide the depth of poverty in a country, especially if the majority of the population lives around the $1 a day line. Alternatively, for example, the poverty gap ratio measures the mean distance below the $1 (1993 PPP US dollar) a day poverty line, expressed as a percentage of the poverty line. This is particularly important in poor countries that are most vulnerable to external shocks or are extremely unequal. For further discussion on other measures of poverty see World Bank, 2000.

10 Bourguignon (2001) used this methodology to calculate poverty headcounts given mean income and the log-normal income distribution which is estimated using the Gini coefficient as a measure of inequality. Although the method has drawbacks such as the invariability of Gini coefficient, distributional affects can be introduced by decomposing growth and income distribution effects as Bourguignon 2001 points out.

11 This classification was provided by UNDP and it is not based on poverty level but on PPP GDP per capita in dollars (UNDP, 2003).

12 This line of work has been pursued by Collier and Dollar (2001), who map out prospects of poverty based on a constant elasticity of 2. Ravallion and Chen (1997) found an elasticity of poverty relative to mean income of around three (an increase in mean income of one percent reduces the poverty headcount by three percent), while Besley and Burgess (2003) estimated an elasticity of 0.73 for a wide variety of countries, but only 0.49 for SSA countries. This means that a one percent rise in incomes reduces the poverty headcount by only 0.49 percent. However, it is widely recognized that this elasticity is not constant and that it varies considerably across countries.

13 See Chapter 2 Annex, section d, for information on the methodology used.

14 The GDPs at the takeoff years are presented in table 2.21, measured in real dollars of 1995 and in PPP-dollars.

15 Relative industrial employment may have continued to grow beyond year 12 in all of these countries, with deindustrialization of employment starting later than suggested here. Indeed, in Republic of Korea industry's share of employment share continued to increase until it reached 35 percent of total employment in 1988. It has since declined to 28 percent.

16 Similar calculations for China in Lu 2002 state that the reallocation effect was relatively small. 'Hardly was the allocative efficiency of the Chinese economy satisfactory in an international perspective ... In the period under study (1986–2000), China achieved spectacular economic growth above nine percent per annum. The annual contribution of reallocation effect during the period under study was, however, only 0.3 percentage points for both the industrial sectors and the six major sectors in the whole economy.'

17 For the regression results please refer to the Chapter 2 Technical Annex, point e.

18 See Chapter 2 Technical Annex.

19 Data availability determined that the base year differed from 1961 in several cases: China (1966), Republic of Korea (1971), Malaysia (1971), Mauritius (1981) and Viet Nam (1986).

20 The required IVA growth rates compatible with halving the income poverty by 2015 are estimated using the sectoral GDP elasticities of poverty presented in Table 2.30. The analysis in Chapter 2 finds that for landlocked countries the elasticity of poverty with respect to Industrial Value added is approximately 0.22, which means that one percentage point increase in IVA is associated with a 0.22% decrease in poverty headcount. By rounding up these numbers we can estimate that to decrease poverty by 50% by 2015 requires approximately a 200% increase in IVA over the next 12 years, which is tripling of the value today. Then using the 110-rule for tripling it can be shown that for IVA to triple in 12 years, a growth rate of approximately 9% is needed. In the case of natural resource rich economies, approximately 0.40 elasticity implies a required 125% increase in IVA, which can be roughly calculated by using the rule of 70 for doubling to be approx-

imately 6%. Country specific elasticities can oscillate substantially around these means.

[21] Along these lines, Rodrik 1994 in his account of the East Asian 'miracle' finds that controlling for initial level of GDP per capita, primary enrollment and two measures of inequality (income and land) can explain almost 90 percent of the subsequent growth in Republic of Korea and Taiwan. What's more, these variables would explain about 50 percent of the growth difference between the East Asia and the rest of the developing countries in the sample. Roemer 1996 comes to different conclusions with respect to human capital.

[22] This note and the respective discussion in the text is based on Teitel (2004) (sections a, b and c) and on Sanchez 2004 (section d).

[23] This case study is based on Sanchez 2003.

[24] The findings must be interpreted with caution to the extent that they are derived from a static, competitive, general equilibrium model of the world economy. Accordingly, the model does not capture dynamic effects of increased FDI in SSA countries. This may be particularly relevant for FDI by US firms in SSA's clothing industry designed to exploit the maquiladora element of AGOA, whereby after 2005 free access to the US markets is granted only to exports of apparel that are made of yarn of US origin or yarn from other eligible SSA economies. Because of these reasons, these estimates should be taken as a lower bound of the expected benefits of these two trade initiatives. The model does not take account of surplus labour in the SSA economies: AGOA and EBA may generate a much stronger supply response in output and exports than estimated.

[25] A bill is currently before Congress seeking to extend AGOA from 2008 to 2015.

[26] SACU countries are Lesotho, Namibia, South Africa and Swaziland.

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Forging ahead

CHAPTER 3

Enlisting the private sector in poverty reduction

Poverty Reduction Strategy Papers: an overview

Poverty Reduction Strategies (PRS) are the principal national policy tool in the efforts to achieve the MDGs. The PRS approach introduced jointly by the World Bank and the IMF within the context of the Comprehensive Development Framework (CDF) was a response to a longstanding demand by the developing countries to have ownership of the policy designs to be implemented domestically. That said, PRSPs have clearly been built on the already existing development strategies produced nationally and internationally. So far 28 countries in SSA have submitted either a full or an interim PRSP. Further eight countries are in the process of preparing one.

By 2001 there had been private sector participation in only about a third of countries with PRSPs.

A 'typical' PRSP, which takes an average of 26 months to prepare, consists of detailed plans, targets, programs, monitoring and reporting arrangements in respect of public-sector and governance responsibilities (IMF and IDA, 2003a). It generally contains at least four core policy elements:

1. Macroeconomic stabilization measures designed to create an enabling environment within which private-sector initiatives can succeed and prosper.
2. Associated structural reforms – such as privatization and restructuring of the financial sector – and institution-building and capacity-building measures that are essential to sustained development.
3. Explicit poverty reduction strategies – specifically increased spending on education, health and social welfare, along with targeted rural development measures designed to alleviate rural poverty.
4. A variety of 'enabling environment' and 'investment climate' initiatives designed to facilitate a robust private sector response.

Participation in the PRSP process has spread significantly in the last three years. All PRSPs include a section detailing the measures taken to ensure widespread participation in the consultations during the design and actual writing of the papers, and best-practice examples have been emerging on ways of increasing participation by previously 'voiceless' groups. The joint World Bank and IMF staff assessment of the PRSPs points out that the participation of the private sector, trade unions and marginalized groups, as well as parliamentarians and line ministries, has been on the increase – but with some caveats[1]. For example, the CDF Secretariat reported that by 2001 there had been private-sector participation in only about a third of countries with PRSPs. (World Bank, 2001)

Although much progress has been made in ensuring countries' broad ownership of the strategies, some problems persist. First among these is the multiplicity of strategies and demands on the countries by different donors and international agencies as well as domestic political actors, to produce such documents. Many poor countries have to deal with up to 50 donors simultaneously, each with their own set of priorities and conditionalities. It is not always clear if enough effort has been put into aligning the strategies so that the work does not have to be duplicated and there can be a general consensus on the priorities. Some of these competing interests are recognized by the Joint IMF and World Bank Progress Report, which points out that PRSPs, as instruments charged with multiple objectives, inevitably cause tensions – for example between the expectations of the international community and country ownership (IMF and IDA, 2003b).

Many poor countries have to deal with up to 50 donors, each with their own set of priorities and conditionalities.

There is also often a conflict of timeframes – between those of the MDGs set for 2015, the typical PRSP which often covers a span of 3–5 years, and other agencies' strategies and initiatives. Even though a number of recent PRSPs, such as those of Ethiopia and Cameroon, try to integrate long-term MDG targets and goals into their medium-term program and PRSP policies, much needs to be resolved in terms of policy

and budget formulation for this to become the mainstream practice.

Then there is the issue of ownership versus empowerment of local stakeholders. While national ownership can be increased just by changing perceptions, national empowerment cannot. The latter entails a greater say by national actors (government and civil society) in the actual design of policies (Stewart and Wang, 2003).

Another widely recognized problem is lack of focus. In their joint assessment of PRSP implementation, the IMF and World Bank note that the average length of PRSPs has increased from 70 pages in 2000 to more than 190 pages in 2003. While length is not necessarily an issue on its own, the report concedes that 'it can exacerbate the problem of focus and make the priority issues appear more diffuse' (IMF and IDA, 2003b). The lack of focus is not only a matter of design but might well be a consequence of the difficult trade-offs countries have to make while preparing a PRSP.

There is often a conflict of time-frames between the MDGs, the typical PRSPs and other agencies' strategies and initiatives.

The PRSP approach, at least in theory, should be seen as an attempt to bring together the macro-, meso- and the micro-economic fundamentals to deal with a long-persisting, false dichotomy between economic and social development. However, a plain reading of the PRSPs reveals that material constraints are often seen to be the cause of a disconnect between the necessary micro interventions and the macroeconomic considerations. Time and again, PRSPs are full of hopeful policy implementation matrices that find no matching financial framework when it comes to outlining the medium-term budget, and hence interventions have to be scaled down in line with existing resources so as to avoid a financial gap. This leads to the fear that if social development objectives are given the priority they deserve, then macroeconomic targets will not be met, which in turn reduces the chances of achieving economic growth in the short run. The Zambian PRSP displays such trade-offs between macroeconomic balances, necessary investments to overcome structural impediments and long-term versus short-term policies[2].

Many PRSPs actually provide alternative scenarios revealing the necessary resource requirements for costed actions and for those that have been scaled down to the existing budget.[3]

While these are significant trade-offs that need to be dealt with in timely fashion, there is little recognition of the difficulties experienced in ensuring that financial inputs and enabling environment conditions yield tangible results. Macroeconomic stability institutions are an important part of any sustainable development strategy, but ensuring their success in the SSA countries depends on a deeper understanding of the way decisions are made in response to the available incentives, and of how formal and informal institutions interact. Social institutions matter in deciding how the winners and losers from intended policy reforms react, and how rents are distributed. Thus, political economy may have more to do with macroeconomic disequilibria than strictly 'wrong' policies (Wohlmuth e. a., 2004, p.24).

Misalignments between the presented macroeconomic prescriptions and the perceived urgency of social needs have caused diverse grievances. These include complaints from the civil society about the way consultations on the macroeconomic framework are conducted between the donors, international financial institutions and national finance ministries, and Millennium Project's stress on the discrepancies between the funds needed to achieve the MDGs and the budgets in the current PRSPs. Clearly, much is required including significant increases in Official Development Assistance (ODA) from the donors along the lines of promises made at Monterrey, Doha and Johannesburg, and improved participation of the private sector and civil society at the budgeting, implementation and monitoring stages of the PRSPs. Another pressing need, beyond the expansion of domestic and international resources directed to poverty reduction, is to understand the particular processes involved in triggering the necessary levels of economic deepening and structural change. These are largely missing in the current approach.

Private sector and poverty reduction

Although *achieving* the MDGs will demand large public investment in social overheads, *sustaining* the MDGs over time will depend largely on the nature and robustness of the private sector response to the poverty reduction policies. And there is no reason why mobilizing the private sector should await until the MDGs are achieved. Doing so may well jeopardize the success of current efforts in such direction.

Development policy has to combine private sector development policies with macroeconomic ones.

There is consensus, too, that low-income African economies will not break free from the shackles of poverty unless and until they diversify their economies, especially through industrialization. As emphasized earlier, structural change and productive development play important roles in promoting economic growth and poverty reduction. As a result, development policy has to combine private-sector development (PSD) policies – especially relating to SMEs – with macroeconomic policies in an optimal way to enhance growth and reduce poverty.

Several PRSPs highlight this. 'The cornerstone of the government's strategy', says the 2003 Cameroon PRSP, 'rests on

a dynamic private sector which would drive economic growth, while efficiently distributing its fruits, contribute to stronger domestic savings and become an effective partner for foreign investors.'

Experience over the last 25 years confirms that there is no single magic-bullet formula that will transform low-income, agriculture-based, technologically backward economies. While PRSPs acknowledge this reality, the limited private-sector response in most Sub-Saharan economies, with a few shining exceptions (Botswana, Mauritius, Mozambique and South Africa), and de-industrialization in a majority of the economies, imply that PRSP strategies are failing to deliver in these crucial aspects.

Slow progress in poverty reduction can be attributed to shortcomings in respect of these – private sector development, including industrialization, and structural reform, including institution-building. It is in these two fields that governments and donor agencies have made least progress. Where PSD is concerned, this is because the skills, expertise and culture required are not necessarily part of their core competencies.

While PRSPs cover in great detail the roles of governments and donors, including policies and spending programs, their treatment of private enterprise is on the whole superficial. Implicit in most PRSPs is the assumption that the combination of macroeconomic stability and structural reform will ensure increased investment and job creation in the private sector. However, if the necessary links between macroeconomic and microeconomic fundamentals are not knitted, this will just not come about.

Slow progress in poverty reduction can be attributed to shortcomings in respect of private sector development and structural reform.

A number of explanations are suggested for this relative neglect of the role of private enterprise; it has been attributed to problems arising from the scale, scope and nature of private sector activity in SSA, as well as to shortcomings in the design of the participatory process and the implementation of the PRSPs.

Private sector capacity

One of the recognized problems in SSA is the scarcity of reliable data on the size, structure and potential of the private sector. Data covering the private sector's share of output, employment and exports are seldom available. For example, in 2000, the International Finance Corporation (IFC) estimated that the informal private sector accounted for 52 percent of GDP, while the public sector's share was 26 percent, and that of the formal private sector, 22 percent. In Zambia, only 12 percent of the labour force is employed in the formal sector (Mwanawasa, 2002).

A stylized analysis of the private sector activity in SSA reveals the dominance of smallholding agriculture in the rural areas and the prevalence of the informal sector in the urban centers. Household surveys conducted between 1999 and 2000 in Ethiopia show that household-owned agricultural enterprises account for 73 percent of the total income in rural areas and 63 percent in the whole economy. In urban areas, only 30 percent is earned from household enterprises other than agriculture and another 41 percent from wages or salaries from formal employment. In the whole economy only 8 percent of total income is attributable to formal salaries and 8.7 percent to non-agricultural household enterprises (FDRE, 2002). Moreover, as most enterprises were started during the import-substitution era (1974 to early 1990s), the introduction of liberalization policies has led to a halving of capacity utilization since the early 1990s.

SSA displays a dominance of smallholdings in rural areas and of the informal sector in the urban centres.

Private activity in the region is highly concentrated in a handful of countries: South Africa, Nigeria, Côte d'Ivoire, Kenya, Zimbabwe, Botswana, Namibia and Ghana.

The structure of private activity in the region – dominated numerically by small-scale and informal, enterprises, with no focal point and no organizational structure for lobbying activity – largely determines how the sector interacts with the other stakeholders in the PRSP process. The chambers of commerce or industry, the privately funded thinktanks and technical associations needed to provide private sector consensus on the measures needed to spur private sector investment and output growth, are either weak or simply non-existent. Such institutions are themselves a function of industrialization and unlikely to develop in its absence, unless funded from abroad as in the case of some African thinktanks.

Even where the organized private sector does exist, it is unrealistic to expect profit-motivated entrepreneurs to involve themselves in a process lasting more than 26 months from which they see very little direct gain. Not only that, but for multinationals for whom Sub-Saharan business is typically one percent of their operations, the incentive to participate in PRSP preparation is virtually non-existent, other than, perhaps, in oil- and mining-dominated economies. To the extent that they do participate, multinationals and big domestic firms are driven more by considerations of image and perceived political correctness.

Participatory process design

Interaction between government officials and donors, on the one side, and private entrepreneurs on the other has often been minimal. Consequently, the enormous detail, the minu-

tiae of PRSP participation, construction, implementation, financing, monitoring and reporting, contrasts starkly with the superficial treatment of the main actor in the process – the private sector.

Although PRSPs refer frequently to private sector participation in their preparation, there is little evidence from the finished product that this has had an impact on the content of the papers. There is little to suggest, either, that those responsible for the PRSP design have used a case approach to examine what works and what does not work in PSD in the region.

It is also unclear where the dividing line is drawn between consultation and participation. It is the norm in many African countries for governments to consult the private sector when national budgets are being drawn up or when major economic reforms are under consideration. It does not follow that private sector viewpoints are incorporated in the budget or reform program, nor indeed that agreed measures are implemented effectively. In fact, even when a relatively comprehensive strategy is fleshed out for PSD and structural change, recurring and personnel costs are often left out of the budget, thus jeopardizing the continuity and sustainability of such policies[4].

Hence, soliciting private sector views is the easy part. For example, the Tanzanian PRSP (2003) says, 'The overarching focus of government policy is to maintain a conducive environment for private sector led growth.' Subsequently, the establishment of the Tanzania National Business Council and, in July 2002, an International Investors Round Table (IRT), was designed to enhance dialog with the private sector. A year later, however, participants at the second meeting of the IRT noted that 'little tangible progress 'had been made in tackling the issues of land reform, local government taxation and general efforts to improve the investment climate that had been flagged for attention in mid-2002.

It is unclear where the dividing line is drawn between consultation and participation

In addition, there are inherent drawbacks in the consultation process. The process can be very lucrative for rent-seekers. For example, accountancy firms consulted on budget content have a vested interest in promoting complex tax systems that broaden their income-generating base. Even when not driven by ulterior motives, it is common that the consultation process ends up becoming a 'venting-out' of long-held grievances, such as the high cost of electricity or the condition of the airports. While these are often accurate depictions of the situation the private sector faces, there is a need for a true two-way consultation if there are to be effective partnerships between the public and private stakeholders.

The private sector at the implementation stage

At the implementation stage, the relative sparseness of private sector goals and targets mean that there is little to gauge the participation and effectiveness of private sector efforts in achieving the aims of the PRSPs. While they contain detailed plans and targets with respect to public sector and governance responsibilities, there are no specific targets for the private sector (beyond the projected increases in private investment, for example in the cases of Madagascar, Cameroon etc.). When included, the indicators related to industry are overwhelmingly aggregate, such as the growth rate of manufacturing's contribution to GDP and of manufacturing employment. For private enterprises that have an outcome-oriented outlook, the lack of such targets might mean that no action is undertaken or that the PRSPs are not taken seriously at all.

The lack of private sector targets might mean that no action is taken or that the PRSPs are not taken seriously.

Another problem faced at the implementation stage is that the participation of the private sector is largely constrained by the resources available to the firms and the persisting problems in the investment environment. For example, the Ethiopian PRSP notes that the participation in bids by local contractors is very low since, because of lack of access to financing, the domestic enterprises have problems in meeting the advance payment requirements. Considering the need to enhance the mobilization of domestic resources to produce sustainable results in PRSP implementation, it is necessary to take much fuller advantage of the existing wealth-creating potential embedded in domestic enterprises.

Good practices and policy recommendations

The discrepancies between the timeframes of the PRSPs and the MDG targets, together with mismatches between affordable and actual MDG-related needs in the highest-priority countries, have prompted an initiative to enhance the existing PRS. The Millennium Project, in which the World Bank and IMF are participating, is working with selected number of UN Country Teams to help countries engage in MDG-based planning. This is done with the view that 'by adopting a 2015 time horizon, countries can significantly expand human resources and basic infrastructure, both of which are considered short-term "capacity constraints"' (Millennium Project, 2004).

The Millennium Compact outlined the main tenets of the broad-based strategy for the MDG-based planning that covers six policy clusters, including the design of industrial development policies to bolster non-traditional private sector activities, with special attention to small and medium-sized enterprises.[5] In this vein, policies that will ensure long-term sustainable growth spearheaded by the private sector need to be brought to the core of the PRSPs.

Policies to ensure sustainable growth led by the private sector need to be brought to the core of the PRSPs.

Future PRSs should build on the emerging good practices in PSD strategies and ensure that private-sector participation is more effective in terms of poverty reduction than in the past. The success of the PRS will increasingly depend on their strength in the following areas, among others:

- Advancing with PSD strategies.
- Integrating trade policy in the PRSP agenda.
- Improving public-private consultation and partnership.
- Financing industrial growth.
- Integrating mechanisms for private sector to cope with external shocks and volatility.

Advancing with private sector development strategies

While it is clear that there is are no short-cuts for achieving the strong private sector response needed to help halve African income poverty in little more than a decade, it is important for each country to draw on international lessons while trying to adopt MDG-based PRS, adapting best-practice examples to its own circumstances. It is clear that the design and timing of policies will be influenced by opportunities arising from country-specific factors such as geographical position, comparative advantages and resource endowments.

Table 3.1 Priority areas for improving the investment climate: percentage of PRSPs identifying as a priority area

Priority area	*Percent*
Improving macroeconomic stability	94
Supporting SMEs	78
Infrastructure	81
Governance and corruption	78
Improving the regulatory environment	72
Promoting FDI	66
Trade policy	63
Finance	72
Improving Legal Systems	72

Source: IMF, 2003a.

The PRSPs include measures to improve the regulatory environment as well as explicitly targeting improved governance and reduced corruption as priority measures for stimulating private sector investment (table 3.1). The implication is that enterprise-level competitiveness will respond to, and benefit from, improvements in the macroeconomic and institutional environments that PRSPs set out to achieve. Furthermore, the critical-mass approach to business competitiveness is already built into the thrust of PRSPs at the very basic level of investment in education and health and infrastructure.

Competitive economies are the product of competitive enterprises. These, in turn, thrive where the appropriate prior conditions are in place. At their current stage of development, undeniably most Sub-Saharan economies have much to gain from across-the-board measures to improve framework conditions (see box 3.1, p. 80).

Institutional quality has a very strong positive effect on the rate of industrial growth, both by increasing the volume of investment and the efficiency of resource allocation. In addition to macroeconomic stability and enforceable contracts and property rights, three particular types of market-supporting institutions matter in this context: those relating to regulations, social stability and conflict management (Rodrik, 1999). The market economy needs to be embedded in a set of non-market institutions that promote entrepreneurship and investment while also ensuring that the economic outcomes and socially desirable goals are not at odds with one another. Functional policies for strengthening the microeconomic fundamentals of productive development pay higher dividends when they rest on the basics of good governance, sound institutions, and efficient markets.

Institutional quality has a strong positive effect on the rate of industrial growth.

Some recent PRSPs seek to identify sources of competitiveness and potential growth poles at the national level. For example, Cameroon prioritizes competitiveness using Domestic Resource Cost coefficients to identify industrial subsectors that are, or have the potential to become, competitive. Only two industrial branches are deemed competitive by this standard: wood and beverages, which account for 28 percent of MVA (Cameroon, 2003).

However, beyond the sectoral vision incorporated into the Cameroonian PRSP, firm-level competitiveness needs to be further integrated into the agenda. Here the objectives are clear: to encourage firms to step up the sophistication of their production techniques, increase value-added by extending their participation in the value chain, embrace modern branding and marketing techniques, professionalize management and build a regional presence.

Box 3.1 Burkina Faso: facilitating and monitoring Private Sector Development

In its 'determination to make the private sector the engine of growth' Burkina Faso has launched a programme to support competitiveness and business development.

The government's PRSP Progress Report (December 2003) not only sets out the steps taken to enhance its business environment and foster private sector investment, but also includes the unusual step of listing selected competitiveness indicators that are being monitored. These include the number and value of enterprises authorised under the investment code, the number of new industrial plants and the employment generated, as well as details of business costs (electricity, water and telecommunications) and infrastructure developments (numbers of telephone lines and cyber cafes).

A committee was set up in mid-2002 whose tasks include improving the legal climate for business, and strengthening and supporting private sector institutions.

This focus goes back to 1996 when Burkina Faso, in line with its convergence commitments under the West African Economic and Monetary Union (WEMOA) began dismantling industrial protection leading to the repeal of the Declining Protection Tax. This was followed by deregulation of the oil and gas distribution market, allowing new entrants to the industry resulting in increased competition and improved service.

More recently, the government has set up a 'One-Stop Shop' and trade facilitation centre that has cut the time taken to establish a new business to 15 days from the previous minimum of 3 months. In 2001, the first democratic elections were held for the Burkina Faso Chamber of Commerce and Crafts, while a National Truckers Council, largely representing the private sector, was also established.

The government and the private sector now hold annual meetings, whose concrete results include:

- Relaxation of the bonded warehouse regime
- Creation of a special fund for technical education, occupational training and apprenticeship, and
- A special programme to provide firms with computer equipment as part of their modernization.

The government's policy programme for private sector development includes commitments to further privatisation, increased infrastructure investment and measures to promote mining, agro-industry and the livestock sector. A Burkina Faso Enterprise office was set up in September 2002 along with Fasonorm, whose task is to improve export quality.

Specific measures being taken to reduce the costs of doing business – especially in electricity and water supply, telecommunications and transport. These include plans to set up or strengthen regulatory bodies for the industries concerned. Since 2000, the cost of international and inter-city domestic telephone calls has more than halved, while the opening up of the industry to allow two private cellphone operators has increased competition, reduced some costs and increased teledensity from 5.2 telephone lines per 1 000 people to 17.7.

Electricity interconnections with neighbouring countries (Ghana and Côte d'Ivoire) should translate into lower tariffs, which in any event have not been increased for 10 years. Transport costs have been cut for both freight and passenger traffic.

Source: Burkina Faso: Ministry of Economy and Development, 2003.

Promoting functional private sector development policies

An industrial development strategy needs to pay attention to the supply of non-financial services, especially those aimed at entrepreneurial, technological development and trade capacity-building, including export promotion and the development of local industry outsourcing, particularly by SMEs; the capacity of technological institutions to deliver support services to industry; and business consortia to improve access to markets, finance and input factors. The establishment of productivity councils might be an important step forward in this direction.

Technology support and infrastructure institutions

Metrology, standards, testing and quality institutions

Metrology, standards, testing and quality institutions (MSTQ) are the basic infrastructure of technology, providing the essential public goods for all productive activities.[6] The ISO has introduced the best-known non-technical quality management standards in use today – the ISO 9000 series – that is becoming an absolute must for potential exporters. By end-2002, 562 000 ISO 9000 certificates had been granted. The whole of Africa, including South Africa, had 3 000; excluding South Africa, it had only 672, accounting for a paltry 0.1 percent of the world total (table 3.2). East Asia excluding Japan, in contrast, accounted for 20 percent. Latin America and the Caribbean only accounted for 2.9 percent; one of the symptoms of its lagging competitiveness (Chapter 7).

The widespread use of modern standards, backed by certification from accredited laboratory facilities and metrology service providers, is a *sine qua non* of industrial development. This is vital to the diffusion of technology and the upgrading of quality to competitive levels. Moreover, there is enormous scope for private testing and metrology laboratories to provide services to industry.

Private participation in the provision of MSTQ services must be encouraged.

It is therefore imperative to strengthen the MSTQ system in Africa. Standards bodies must improve their laboratories and skills and get them accredited internationally. Metrology services must be able to cover the majority of needs of exporters. Private participation in the provision of MSTQ services must be encouraged, with the national bodies willing to withdraw from the (remunerative) business of testing. This will not suffice unless enterprises are persuaded of the need to upgrade quality, use standardization and improve calibration. Thus, awareness raising has to be a major part of MSTQ activity. The imposition of more rigorous technical standards by rich countries on imports makes it all the more important to improve MSTQ facilities to the requisite levels.

Most African countries have national standards institutions, which serve as repositories of international standards and

develop standards of their own. The industrially more advanced countries like Zimbabwe and Kenya have large and relatively well-staffed standards bodies, while the less industrialized countries have relatively weak bodies that cannot serve the quality, certification and calibration needs of their industries. Some, as in Kenya, have laboratories accredited by foreign countries and most offer metrology services.

Most African countries suffer from a widespread lack of quality awareness in industry, and agencies lack the resources to raise it.

However, most African countries also suffer from a widespread lack of quality awareness in industry, and standards agencies lack the resources to raise this awareness. Exporters in most countries have to send their products and equipment for certification and calibration abroad (mainly South Africa) to meet international demands, which imposes a cost disadvantage. Standards bodies find it hard to recruit and retain employees of the right quality: salaries are often too low to attract the best graduates and scientific personnel, and many tend to leave as soon as better alternatives emerge in the private sector. Most institutions are unable to self-finance their

Table 3.2 ISO 9000 certificates awarded in Africa and regional World shares by end 2002

Country or Region	*Number*
Angola	5
Benin	2
Botswana	6
Cameroon	7
Central African Republic	2
Chad	2
Congo, Democratic Republic	0
Congo, Rep. of	0
Côte d'Ivoire	25
Ethiopia	1
Gabon	5
Ghana	5
Guinea	0
Kenya	46
Madagascar	0
Malawi	2
Mali	0
Mauritius	210
Mozambique	7
Namibia	17
Niger	2
Nigeria	85
Senegal	15
Sierra Leone	0
Somalia	1
South Africa	2 625
Sudan	10
Swaziland	29
Tanzania	5
Uganda	72
Zambia	21
Zimbabwe	91
Africa	3 298
Africa excl. South Africa	672
LAC	16 168
East Asia excl. Japan	114 609
World	561 747
	World shares (percent)
Africa	0.6
Africa excl. South Africa	0.1
LAC	2.9
East Asia excl. Japan	20.4

Source: ISO, 2002.

Box 3.2 Mauritius: successful technology institutions and support schemes

The fast growth of manufactured exports in Mauritius has been accompanied by a system of technology support that has a number of strengths. It consists of several institutions involved in metrology standards, testing and quality, productivity improvement, training, SME support and diffusion – and it has been improved in recent years. This applies especially to the Mauritius Standards Bureau (MSB) and to the Technology Diffusion Scheme (TDS).

The Mauritius Standards Bureau (MSB) is the official body in charge of metrology, standards, testing and quality services in the country. It has a total staff of 63, with 30 scientists, engineers and technicians, and a recurrent budget in 1995–96 of US$ 800 000. In the mid-1990s the MSB was assisted by a World Bank project on 'Technical Assistance to Enhance Competitiveness', with a US$ 3.5 million loan plus US$ 1.5 million from the government. A twinning arrangement was made with the Singapore Institute of Standards and Industrial Research (SISIR) to upgrade its expertise. The potential for learning from collaboration with world best-practice institutions has been successfully exploited in Mauritius: both the World Bank project and the twinning arrangement have greatly enhanced MSB's capabilities.

The MSB has six divisions (Standards Development, Quality Assurance, Metrology, Engineering, Chemical, Documentation and Information), and it expects to reach the target of 50 percent self-financing soon. As in industrial countries, the quality-assurance and testing services are already self-financing. The MSB is planning to set up a National Accreditation System for testing and calibration laboratories, that appears to be needed urgently for the more than 25 private laboratories in the country, most of which have shown interest in accreditation. The quality of services provided by the MSB is high, according to the evidence gathered from a field survey of a sample of local enterprises, most of which rated these services 'useful' or 'very useful'. The quality and effectiveness of the MSB is certainly partly responsible for the growing numbers of Mauritian firms obtaining ISO certificates: 92 at the end of 1999, the third-largest number in SSA (excluding South Africa), after Kenya and Zimbabwe, in spite of the small size of the Mauritian economy.

The Technology Diffusion Scheme (TDS) was a project funded by the World Bank intending to create a market for technology services by temporarily lowering the cost of purchasing them. The rationale behind it was to support the demand for consulting services by firms at least 51 percent privately owned, by subsidising their cost. It was hoped that this would stimulate firms' responses and efforts to use the services offered by the several institutions existing in the country, and enhance their acceptance by industry. The TDS was expected to generate strong demonstration effects and spillovers to other firms.

The project started in 1994 with a total funding of US$ 2.7 million to be disbursed in four years. It was set up under the Ministry of Industry and Industrial Technology, and managed by a private contractor. It granted firms half the costs of buying competitiveness services such as improved productivity, quality and design services, and information on new technologies. Each firm could receive one grant per service and thereafter would have to pay full market cost. According to preliminary indications, the project has been very successful. A thorough assessment of the project's achievements has not been attempted yet, and would be very useful, but there is ample evidence to argue that the firms supported have often multiplied their sales and exports.

Source: Lall and Wignaraja, 1998.

activities by selling their services. However, there are some examples of successful technology institutions in Africa; Mauritius is one (box 3.2, p. 81).

R&D

It is a common misconception to regard R&D as a luxury that poor countries cannot afford. Much of R&D, even in industrialized countries, goes into absorbing and adapting new technologies and keeping track of technological changes in the world. The successful countries in East Asia invest significantly in R&D, both in the enterprise sector and in the government, to fuel the technological upgrading that their export competitiveness requires. R&D is equally necessary for retaining competitiveness in the primary sector; one reason why countries like Malaysia do better than Africa in similar products (rubber and palm oil) is that they have effective public institutions conducting R&D into productivity-raising measures.

The bulk of R&D in Africa, low as it is, is conducted in public institutions. Most of it is of poor quality and irrelevant to the needs of industrial enterprises. African governments have not given much priority to industrial research, in private or public institutions.

The poor performance in this field reflects not just internal constraints, but also technological apathy in much of local industry. Most enterprises are not technologically active and aware; few have responded to liberalization through technology-based upgrading. In the absence of technological activity in enterprises, it is difficult for R&D institutions to provide effective assistance: in technology linkages the receiving side is as important as the provider.

The bulk of R&D in Africa is conducted in public institutions; most is of poor quality and irrelevant to the needs of industry.

The strengthening of technological activity by institutions thus requires policies to promote enterprise R&D. This is partly about offering fiscal incentives: tax deductibility is a basic requirement, but governments in newly industrializing and industrialized countries often go much further. They offer tax credits for increased R&D spending; some give tax vouchers or subsidized credit for enterprises to contract research to R&D institutions. It is also partly a question of changing the 'technology culture' of industry, and this is a far more difficult task. However, well-designed and targeted programs, like the SPREAD program in India (box 3.3) can be helpful in stimulating technological effort and links with R&D institutes.

Box 3.3 Promoting links between R&D institutions and industry: The Indian example

In recent years, the Indian government has tried to reform the 42 public research institutes under the Council of Scientific and Industrial Research (CSIR). These large and expensive entities had been largely 'ivory tower' institutes with few linkages to industry, producing technologies with little commercial application and doing research that industry had little use for. With the help of the World Bank, in 1991 the government launched an industrial technology development project, with one component aimed at promoting industry-sponsored research at a number of public research institutes, as well as institutes of technology, universities and private research foundations. This component, the Sponsored R&D Promotion Fund, was initially allocated US$ 15 million, and was later allocated another $10 million and renamed the Sponsored Research and Development (SPREAD) program. The SPREAD component aimed at promoting research awareness especially among small and medium-sized companies and changing the 'research culture' of the research laboratories and higher-education establishments, orienting them more towards industry.

The funds to finance the contracting of research were provided as loans rather than grants, but the loans were conditional on the success of the project and had a slight subsidy element as compared to market interest rates. Enterprises could also elect to take a royalty option. The finance covered up to 50 percent of the cost of the research project contracted by industry. The projects could cover pre-feasibility studies, laboratory trials, prototype building and pilot plant operations for the development of new products and processes, significant improvements to existing products or processes and scaling-up of technology.

The fund was administered by Industrial Credit and Investment Corporation of India, ICICI, the leading private sector development finance company. The research projects were appraised by a Technology Group in ICICI, and had to be carried out within two years. Firms receiving support had to show that what was being sponsored was additional to what they were doing earlier.

By mid-1995, 53 firms had contracted 55 projects under the SPREAD program, with an average project size of $400 000 and a loan component of $170 000 (42.5 percent). There were no failures, but three projects were canceled. Most of the companies in the program had never contracted research to a public research institute before; of the 53 involved, 23 were small, 22 medium-sized and 10 large. Their activities spread over pharmaceuticals, electrical and electronics, chemicals, machinery, metallurgy, automotive, biotechnology, food processing, paper, rubber and polymers. Some 60 technology institutes were involved, including 16 institutes of technology and science, 12 universities, 4 private research foundations, and 28 government laboratories. A broad range of new or improved technologies, some fairly sophisticated, developed. Overall, the project is highly successful: the subsidy element was minimal and there was a real change in the technology culture of industry.

The World Bank project had a separate component supporting the upgrading of five R&D institutions and orienting their efforts towards providing technology services to industry. The support took the form of interest-free loans rather than grants, forcing the R&D institutions to focus on financial management and rates of return. Most targeted institutes were able to modernize and upgrade their physical facilities, enter new areas of research and change their work practices to link up with industry. The Indian government later extended this component to several other CSIR laboratories, and over time the network more than doubled its share of earnings from contractual research to industry. Many laboratories went through a major cultural change, showing proactive management in public R&D with money earned from industry, foreign clients and international patents. Some, like the National Chemical Laboratories in Pune, now earn over 60 percent of their revenues from services to industry; a large part of this arises from contracts to companies abroad.

Source: UNIDO.

Extension and productivity services

Extension and productivity services for firms, particularly for SMEs, are basic public goods. Small and micro-enterprises the world over lack the size, resources and skills needed to undertake various kinds of technological and training activities, and all countries, even the most advanced, assist them with subsidized services. Especially in SSA, SMEs require specific services to help increase their size and upgrade their technology to be able to enter export markets (Wohlmuth e. a., 2004).

The services take many forms, from technical and management advice to benchmarking, marketing advice, financial assistance (including risk financing for innovation) and training. The most effective extension services provide a combination of inputs, and actively reach out to enterprises that lack the time and information to approach them.[7] Productivity centres are a special form of extension, geared to analyzing and addressing productivity gaps, in particular in technologically advanced activities.

Especially in SSA, SMEs require specific services to help increase their size and upgrade their technology.

All African countries have extension services. Some of these, like GRATIS in Ghana (box 3.4) have been quite effective in supporting the use of simple technologies by micro-enterprises.

However, extension services in many countries suffering from poor economic growth have deteriorated over time. Those that depended heavily on donor financing (as in Tanzania) have seen their resources diminish and their facilities grow progressively obsolete and inadequate. As with other public technology institutions, their salaries have been low and motivation poor. Most extension services have been passive, waiting for enterprises to approach them rather than proactively going out to discover their problems and find suitable solutions. And few agencies have the capabilities needed to support SMEs in complex new technologies or to assist them in building export capabilities – the structural change that African industry needs lacks the kind of technical support now common in most East Asian countries. In this regard more needs to be done which will help to mobilize a critical mass of private entrepreneurs and push forward market development. However, it is important that in the long term these institutions can evolve and transfer some of their roles such as financing, as well as strategic and management advice to private firms.

Box 3.4 Technology transfer to micro- and small enterprises in Ghana: GRATIS

The Ghana Regional Appropriate Technology Service (GRATIS) was created by the government under the Ministry of Industries, Science and Technology in 1987 'to promote grass-root industrialization in Ghana' with the assistance of two donors, the Canadian Agency for International Development (CIDA) and the European Commission. This institution's mandate is to serve as a vehicle in transferring intermediate technology to the ten regions of the country. This is to be achieved by providing consulting services as well as training to micro- and small-scale industrialists. The project initially aimed at reproducing the success story of the Technology Consultancy Centre in the 'Suame Magazine', in Kumasi. A complementary objective appears to be to halt migration to large towns and cities, and encourage educated and experienced people to return to the rural areas and set up productive enterprises.

Apart from its head office, GRATIS has nine Intermediate Technology Transfer Units (ITTU). In addition to providing technical information and training, the units' main functions include the manufacture of equipment for rural industries and provision of advice on small-scale engineering and manufacturing industries. Demonstration workshops are set up in each of the ITTUs for potential clients of new industrial processes. GRATIS also helps clients to obtain machinery under a hire-purchase scheme, and provides subsidized loans for a maximum of seven years at about 20 percent interest rate. The GRATIS network employs a total of 287 people, however, pays low salaries that make it difficult to retain the best employees.

Its achievements include building a network of nearly 16 000 beneficiaries (micro- and small entrepreneurs, apprentices and trainees, i.e. an average of 53 beneficiaries per employee in 1998). It provides them with a variety of services, such as technical training in textiles, design of industrial parts and equipment, manufacturing of industrial spare parts, repair of industrial machinery, and apprenticeship training in automobile repairs.

Among its main strengths are close contact with enterprises, with monthly meetings of clients' associations, its national coverage with ITTUs in all 10 regions, its practical and problem-solving orientation and ISO 9000 awareness training. A source of weakness is its dependence on government subsidies and donor support. In 1997 the percentage of total costs covered by own earnings was only 46 percent; in 1998 it reached 53 percent. Its loan recovery ratio is estimated to be only about 52 percent.

An indication of the value of the initiative is manifested by GRATIS' exports of services to neighbouring countries. It has exported shea-butter machinery to Burkina Faso on three occasions (1990, 1992 and 1999), cotton-spinning wheels to Uganda to make thread oil extraction, and it helped develop fish smokers in Mauritania.

Source: Lall and Pietrobelli, 2002

Export Processing Zones

To date, with the partial exception of Mauritius, export processing zones (EPZs), special economic zones, free zones, and similar programs have been far less successful in SSA than elsewhere. This, in and of itself, is no reason to abandon them.

In the world almost 42 million people are employed in EPZs, 30 million of which in China alone. Out of the almost 560 000 people SSA employs in EPZs, 156 500 are located in 4 countries in the Indian Ocean (Madagascar, Maldives, Mauritius and Seychelles) and South Africa.

The WTO Agreement on Subsidies and Countervailing Measures (ASCM) has limited the use of export subsidies and specific incentives.[8] While WTO rules do not specifically target EPZs, a number of the subsidies and incentives that have been used under these initiatives have become either prohibited or actionable in the WTO[9]. Under this rules, for example, a tax holiday traditionally given to exporting firms in EPZs is clearly prohibited. However, the Special and Differential Treatment clause of the ASCM exempts LDCs and countries with less than $1 000 GDP per capita from the phasing out of

actionable subsidies until they achieve 'export competitiveness' in one or more products[10]. There is also a longer phase-out period for a third group of developing countries, which was extended till the end of 2007 after the Doha round (Haywood, 2003; ICTSD, 2002).

This policy flexibility provided by the ASCM for least developed and low-income countries can be an important advantage for countries in SSA when trying to promote manufacturing and exporting activity through the use of EPZs, as other competitors will be increasingly limited in their use.

However, like foreign direct investment (FDI), EPZs by themselves do not guarantee success in the absence of capacity in the domestic firms to establish backward and forward linkages, diversify their output and upgrade their capabilities. Exposing only part of industry to the rigours of globalization may protect and even entrench uncompetitive enterprises elsewhere.

EPZs cannot substitute for economy-wide productivity gains and improvement of business environment conditions, they can help to give the necessary impetus and support to the private sector. Undoubtedly, each country needs to consider the feasibility of establishing EPZs, taking into account issues like transportation and geographical positioning as well as designing the subsidies and incentives with enough flexibility for the eventual phase-out of prohibited and actionable subsidies (box 3.5).

Box 3.5 Freight costs constrain exports

Transport costs are a major obstacle to industrialization and export expansion in Sub-Saharan Africa. In 2001 freight costs, as a percentage of import value, averaged 13.8 percent in Sub-Saharan Africa, more than double the world average of 6.11 percent and almost 60 percent above the average for developing countries as a whole (table B 3.5).

Land-locked countries in Africa are at a huge disadvantage with freight costs averaging 20.7 percent of total imports (by value) – the figure reaches 32.8 percent in Mali, 22.7 percent in Burkina Faso and 22.7 percent in Malawi. Freight costs are highest in southern Africa (16.42 percent) and West Africa (13.9 percent) and lowest in countries on the Indian Ocean (12.2 percent) and in East Africa (12.4 percent).

The data again raise the question whether selective measures, ranging from EPZs to tax incentives or subsidies for exporters, make sense in a land-locked country where freight costs are prohibitively high. Inland traffic costs are far higher than in the US ($1.10 per km) and the EU ($1.65 per km). Depending on the route, they range from as high as $4.94 in West Africa to only $1.38 to $1.53 on some Southern African routes.

High freight costs in land-locked countries can be attributed to the inefficient management of transport facilities, poorly maintained infrastructure and equipment, trade imbalances (trucks and vessels travelling empty or with small load factors in one direction), inadequate overall infrastructure and cumbersome government regulations.

Table B 3.5 Freight costs as a percentage of import value

Region	*Freight Costs (Percent of Import Value)*
World	6.11
Industrialized Countries	5.12
Developing Countries	8.70
North Africa	11.21
Indian Ocean countries	12.23
East Africa	12.35
Africa	12.65
Sub-Saharan Africa	13.84
West Africa	13.90
Southern Africa	16.42
Land-locked African countries	20.69

Source: UNCTAD, 2003a.

Given appropriate institutional and policy environments, transport costs can be reduced. Inland costs are much more competitive in Southern Africa, reflecting the more developed infrastructure and probably better management of port handling services in the region.

Operational efficiency at sub-Saharan ports is improving, due to privatisation, with private operators taking over container handling at Djibouti, Dar-es-Salaam and Maputo. Transport sector investment is also benefiting from private sector involvement.

Source: UNCTAD, 2003a.

Gender and Private Sector Development

Gender equality and empowerment of women are an important and integral part of the MDGs. While women are the majority of world's poorest people, those living on less than $1 a day, they are also a critical part of the solution toward economic prosperity. As mentioned earlier, not only has women's education been found to have significant impacts on achieving the other MDGs, for example infant mortality and reproductive health, but improvements in gender equality also tend to correlate with higher growth in the economy. In this respect, it is widely recognized that women's participation in private-sector development, especially through their role in the micro, small and medium-scale enterprise (MSME) sector, is critical. Unfortunately, PRSPs have seldom incorporated appropriate policies to tap into women's entrepreneurial potential in SSA.

SSA has one of the highest proportions of women in the labour force, most of them employed in the informal sector and basic survival activities.

SSA already has one of the highest proportions of women in the labour force – 42 percent in 2001 – among the developing countries, a majority of whom are employed in the informal sector and basic survival activities (World Bank, 2002a). Approximately two thirds of women in the labour force in SSA are estimated to be informal entrepreneurs, own-account workers or unpaid family workers. However, the rich history of women traders across the Southern African Development Community (SADC) region and parts of West Africa testifies to the true potential of women in PSD in the region (Muzvidziwa, 2004). Although it is difficult to get gender-disaggregated data on the sectoral composition and occupational structure of formal manufacturing activities, women are mainly concentrated in a limited number of

labour-intensive industries such as textiles, footwear, leather and food processing (Chambalu, 2003).

There is a need to increase opportunities available to women in SSA in order to mobilize their entrepreneurial potential, and to provide technical and financial assistance to existing female entrepreneurs, to upgrade their capabilities and formalize their activities. Among the factors to be considered in this effort are the disparities between men and women in ownership of productive assets (including educational and transportation assets), access to market information and credit, and mobility. Also, the fact is that women are often more constrained by the lack of infrastructure and services suited to their needs, which limit their participation in education and income generation because of the exclusive demands placed on their time by household chores in many cultures.

Efforts have been increasing to incorporate a gender-sensitive approach to PSD, as in the Integrated Training Program for Women Entrepreneurs in Food Processing Industry in Tanzania, which was first designed and implemented by the Small Industries Development Organization (SIDO) and UNIDO in 1993 and subsequently implemented under the UNIDO's Integrated Program (UNIDO, 1999). Such programs not only increase the technical capabilities and productivity of micro- and small-scale enterprises operated by women, but also provide a channel for networking and new entrepreneurial development opportunities for increasing numbers of women. In order for these initiatives to be scaled up, a number of structural impediments have to be addressed through the PRS, including infrastructure, education and financial market development.

Informal and rural sector

A custom-made set of strategies is also needed to help upgrade the informal sector so dominant in these economies, so as to successfully tap into the available micro-entrepreneurial potential. At present, the PRSPs devote little attention to how to upgrade the informal sector. This is partly due to the lack of sufficient data about the size, scope and characteristics of informal sector agents. Informal activity often fills an important gap in developing-country markets that the poor cannot access, providing low productivity, low quality and high-price goods and services (UNDP, 2004). Informal activity sustains a large number of poor families, but it also denies them safer and cheaper access to goods and services. It tends to flourish not only because of the big legislative and tax burden often imposed on formal enterprises, but also because informal enterprises find it difficult to upgrade and expand due to the lack of credit, deficiencies in property rights institutions, and appropriate infrastructure. While there is a large amount of potential collateral in the form of land assets in the informal and rural sector that could be used for enterprise development, in the absence of appropriate finan-

Informal activity sustains a large number of poor families, but also denies them safer and cheaper access to goods and services.

Box 3.6 Rural industry and poverty reduction: lessons from China's Township and Village Enterprises (TVEs)

During a period of remarkably rapid structural transformation in China's post-1978 reform period some 400 million people were lifted out of poverty as agricultural productivity increased and surplus workers left the land for better paid off-farm jobs. Rural incomes grew much more rapidly than those in urban areas so that between 1978 and 1984 the rural-urban income ratio increased from less than 40 percent to 55 percent.

In this initial reform period, poverty reduction was driven by rural reforms, including the establishment of Township and Village enterprises (TVEs) that contributed enormously to poverty reduction. Strong growth was achieved mainly through the shift of labour from agriculture to rural industry, with agriculture's share of total employment declining to 53 percent in 1985 from 62 percent in 1978, while that of TVEs doubled from 7 to 14 percent over the same period, reaching 21 percent in 1995.

By 1993 there were 1.5 million TVEs in rural areas, employing some 52 million people. They accounted for approximately a third of GDP, and over 70 percent of output and 58 percent of employment in rural industry. Since 1987, TVEs have been allowed to participate directly in international trade – not just as sub-contractors to state-owned enterprises – resulting in a dramatic increase in exports from nine percent of the total Chinese exports in 1986 to over 40 percent ten years later.

The distinguishing characteristic of TVEs is that they are owned by the local government or collectively by members of a village not by either the state or by private entrepreneurs. In an institutional environment where private enterprise has been slow to develop because property rights are not clearly defined and enforced, as in many parts of SSA, such a pattern of ownership has intrinsic appeal. Moreover TVEs are particularly important in the production of labour-intensive, low cost and essential consumer products, as well as in the production of some hi-tech consumer products for export.

They serve a dual purpose – contributing to output and job growth while also serving the needs of the community either by reinvesting after-tax profits in community projects or using the funds to provide public goods. In 1992, 59 percent of TVE after-tax profits were reinvested while 40 percent were devoted to local public expenditure (A Statistical Survey of China, 1992).

The similarities between China of the late 1970s and SSA early in the 21st century are striking. Like China a quarter of a century ago, SSA is characterized by inefficient economies (misaligned prices, overvalued exchange rates, weak and unproductive firms) high unemployment and extreme poverty. In China, rural industrialization, driven by the TVE model, was a major initial contributor to poverty reduction.

Arguably, the same could be achieved in SSA. The real lesson of TVEs is that they offer a hybrid – but transitional – model appropriate for countries with under-developed property rights systems as in SSA. This does not mean that SSA should seek to replicate an institutional system unique to China. Institutions do not travel well and cannot therefore be easily translocated from one cultural milieu to another. Over the years, many African countries have experimented with community-based development projects, often under the guise of cooperatives, with limited success. The challenge is to reform these institutions along lines that 'fit' SSA's initial conditions while simultaneously satisfying socio-political and poverty reduction imperatives.

Sources: Sachs and Woo, 1997; World Bank, 2003a; Yingyi Qian, 2003.

cial institutions and non-financial support institutions, most of the potential goes untapped (UNDP, 2004).

It is important that lessons are learned from previous experiences of regional development strategies that produced unviable industrial development plans. There are tensions between the needs of rural and other disadvantaged areas, where the majority of the poor live, and the need to ensure a sustainable urban industrial base. Creating off-farm employment opportunities in the rural areas while increasing agricultural productivity are indispensable but they cannot substitute for a long-term strategy to create jobs especially in urban areas by means of sustainable industrial development. The example of the Township and Village Enterprises in China is intriguing in this connection, although the potential for their replicability in Africa is subject to doubt (box 3.6, p. 85).

Integrating trade policy in the Poverty Reduction Strategy agenda

The integration of trade-capacity-building policies into the overall strategy is still very weak in the case of most PRSPs. For example, Benin's PRSP identifies the narrow export base and limited market access as trade-development constraints. However, there are instances where trade policy analysis appears to lack internal consistency, with several countries focusing on export promotion, while downplaying the implications of import restrictions for export incentives as well as actually advocating import-substitution policies (IMF and IDA, 2003a). Moreover, there is little focus on the capacity of the domestic private sector to conform to the technical standards and regulations in foreign markets and to become competitive, which involves a slow and costly process of capability building.

There is little focus in PRSPs on the capacity of the private sector to conform to technical standards and regulations in foreign markets.

This is an important handicap, as many countries now recognize that the deficiencies in trade capacity are often not properly addressed through aid. While most attention has been given to trade negotiations and trade policy, an important bottleneck remains in the inability of LDC firms to reach international markets with their products (box 3.7).

The IMF conservatively estimates that if barriers to trade were reduced by 50 percent, the developing countries would obtain additional benefits in excess of $100 million per year. Obviously, this estimate assumes that the developing countries are actually in a position to take effective advantage of the reduction in trade barriers, which is far from granted. Just for textiles, apparel and other labour-intensive manufactures, UNCTAD estimates that developing countries' export earnings would increase by $500 million per year if they were able to take full advantage of industrial-country market-opening moves (quoted in UNIDO, 2003c).

So far only three countries in SSA, Mauritius, South Africa and Mozambique have managed to tap into global networks for developing their manufactured exports base. In 2001, Africa, along with South Asia and the Middle East, accounted for only two percent of developing world's exports of parts and components. Two-thirds of that two percent come from only two countries, India and South Africa. Yet, participation in global production chains makes a major contribution to industrial and export growth with manufacturing growing faster in the 20 countries with the highest shares in exports of components and parts – 5.3 percent annually, almost double the developing country average of 2.8 percent.

SSA countries should use strategies of gradual liberalization combined with 'supply-side' measures to conserve capabilities and capacities.

SSA is missing out also in the related activity of offshoring service tasks and outsourcing.[11] In 2001, the offshoring of service tasks such as data entry, call centers, tele-marketing and transaction processing, as well as R&D, was worth over $25 billion. About half of this business is carried out in developing countries, mostly Asia (India and, to a lesser degree, China and Indonesia). Only one African country, South Africa, features, with an output value of $10 million. Outshoring is a significant venue through which SSA firms can realize some of the benefits from technological upgrading through linkages with foreign firms. However, it is largely missing due to the lack of capabilities and conducive institutional and market conditions.

The secret of effective trade policy for successful industrialization lies in combining the sheltering of learning with the stimulation of investment in competitive capabilities. This can be done by offering limited protection and complementing it with strong export and learning incentives that offset high learning costs, the risks and uncertainties of adopting new technologies and entering new markets, or widespread externalities. Countries can become efficient if supported in 'relearning' and given the time to change and upgrade capabilities. Thus, liberalization must be gradual, not to slow down adjustment but to allow adequate learning and relearning.

Interventions such as these are difficult to design. They require a lot of information as well as strong leadership commitment to competitiveness, flexibility in policymaking, a skilled and insulated bureaucracy, supportive interventions in factor markets, close interaction with industry, and exposure to export competition to discipline both firms and the government. It is not just newly industrializing countries that have used this kind of interventions to promote industrialization. Nearly all the currently industrialized countries used trade policy and other instruments intensively during

critical periods of their development. Rich countries continue to use (prolonged) protection to ease the transition for threatened industries; their textiles and clothing policies (embodied in the MFA) are an excellent example of gradual liberalization.

While some of the measures used in the past by developed countries are no longer feasible due to international trade rules, LDCs and countries with less than $1000 per capita income – which covers most of SSA – have some leeway in using a number of these measures until they achieve export competitiveness. Therefore SSA countries should to use similar strategies of gradual liberalization combined with 'supply-side' measures such as those discussed in this Report.

Another important aspect of trade capacity building in SSA is the provision of technological services such as those related to testing, metrology, certification and accreditation. As a result of bold steps towards trade liberalization taken during the last decade, access to developed-country markets is less and less constrained by tariffs and quantitative restrictions and, increasingly, by non-tariff barriers (NTBs). Particularly important among these are the conformity requirements that result from the growing concern of industrial-country populations with health, safety and the environment. To overcome existing, emerging and potential technical barriers, developing countries must be ready to meet increasingly stringent requirements applied to their products, particularly by means of sanitary regulations.[12] The inability to do so entails high actual and potential economic and social costs. A regional approach to providing these services which allows cost and technology sharing among SSA countries makes eminent sense, as is the case with the West African Economic and Monetary Union (UEMOA).

Improving public-private consultation and partnership

In their most recent review of progress in the implementation of PRSPs, the IMF and the World Bank noted that 'no single institutional model has emerged which consistently delivers better results.' It adds, however, that ever more governments are actively soliciting the views of the private sector (IMF and IDA, 2003a).

The African Peer Review Mechanism can be extended to encourage African countries to learn from each other's PSD policies.

The capacity of both public and private sectors need to be increased if they are to form effective partnerships. While there is an important role to be played by formal industry organizations such as chambers of industry, it is necessary to clarify the capacity-building needs of private sector beyond these organizations. The introduction of realistic but tangible targets to be achieved by the private sector as well as the public ones in terms of PSD can significantly improve the quality of consultations between the parties and produce more outcome-oriented partnerships. Overall, a culture change is needed whereby policymakers acknowledge that crucial to poverty reduction is the 'crowding in' of private entrepreneurship and investment.

One of the important channels for enhancing the role of private sector is suggested by the Ethiopian PRSP, which proposes, for internationally funded projects, the local sourcing of inputs from domestic entrepreneurs rather than the use of imported materials. By abandoning tied aid to LDCs, and making sure that development aid projects do not exclusively use industrialized-country goods and services, the donor countries can help to enhance the capacity of the domestic private sector.

NEPAD (New Partnership for Africa's Development) has a significant role to play in facilitating deeper forms of business, government and donor cooperation. For example, the current African Peer Review Mechanism (APRM), which has so far concentrated on governance issues, can be extended to provide an incentive for African countries to learn from each

Box 3.7 Going regional: the Africa Productive Capacity Initiative

The Conference of African Ministers of Industry (CAMI), gathered in subregional meetings held across the continent during 2002 and 2003, agreed to undertake the Africa Productive Capacity Initiative (APCI), a comprehensive program to develop subregional value chains, based on the existing strengths and competencies of the regions, enhanced by new investment in infrastructure, human, and physical capital. The backdrop to this is that over the years, while much attention has been focused on trade negotiations, there has been a lack of corresponding attention to productive capacity, which defines the ability to produce goods meeting current market requirements, or building the capacity to upgrade in order to tap future ones.

The initiative will focus on deliverable objectives around building and harmonizing industrial strategies and policies, at both regional and national levels, based on the value-chain approach to productive capacity-building. While final agreement has yet to be reached by the CAMI members on the exact details of the initiative, the partnerships will be facilitated via regular benchmarking of industrial performance and competitiveness indicators through NEPAD's African Peer Review Mechanism. APCI also aims to highlight specific parts of the value chain where different regions have a comparative advantage and suggest subregional programs in Eastern, Central, Western, Northern and Southern Africa for productive capacity-building in these segments.

Responding to the NEPAD's call for a common vision for robust economic growth and commitment to the MDGs, APCI is a collaborative effort that entails public-private partnerships at different levels. NEPAD, African Business Roundtable and international bodies spearheaded by UNIDO are collaborating with EAC, SADC and other regional organizations, intergovernmental as well as private, to put this scheme into practice. As part of the efforts to prepare a comprehensive framework of programs, UNIDO has been providing technical support using the expertise gained through the Integrated Programs now being carried out in a number of the countries in the region[1].

Source: UNIDO 2003a.

Note: [1] UNIDO currently has 18 Integrated Programs in SSA, in Burkina Faso, Burundi, Cameroon, Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Kenya, Madagascar, Mali, Mozambique, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda, as well as a further 4 in Northern Africa.

other in terms of PSD policies. Along these lines, APRM can be utilized to create competition in policy reforms, as well as informing potential investors and breaking widespread perceptions about Africa's investment environment (Bond, 2004, p.23).

Financing industrial growth: investment promotion and foreign direct investment

Private-sector capital formation in Sub-Saharan Africa averaged about 11.5 percent of GDP over the last 20 years (table 3.3). As noted earlier, one of the most striking realities about Africa's failure to industrialize in the last few decades is that it has been a net exporter of capital. For example, around 70 percent of Nigeria's private wealth is believed to be held outside of Nigeria (Chapter 1). This reflects the fact that, for a number of reasons, the investment climate in much of SSA has been unsatisfactory. It is obvious that such low investment ratios will not translate into strong growth – especially where, as in Africa, much of the capital stock is obsolete or in disrepair and needs urgent renewal. In this light, the amount of private capital held outside of Africa represents not only a past failure but also a major opportunity (table 3.3).

Capital-market development, FDI and the repatriation of capital are not accorded serious attention in the PRSPs.

It is clear that, in low- and middle-income Africa, domestic savings fall well short of the levels needed to finance an industrial revolution. Not only that, but even in cases where domestic savings levels are adequate, intermediation systems fail to translate the savings into profitable investment. In part, this reflects structural weakness in banking systems, the underdevelopment of capital markets or the extent to which investible surpluses are held in the public sector, as in oil-exporting countries. From this, four priorities for successful industrial development follow:

- The restructuring of weak, inefficient financial systems.
- The development of domestic capital markets.
- The encouragement of FDI, not only for its contribution to bridging financial or foreign-exchange 'gaps', but even more because of the access it provides to skills, technology, patents, export markets, networking and production-sharing opportunities.
- The promotion of policies to attract African capital that is held abroad back to the continent.

Significantly, capital-market development, FDI and the repatriation of capital are not accorded serious attention in the PRSPs, whereas invariably financial sector restructuring is (rightly enough) treated as an important priority.

Table 3.3 Private and public investment, 1975–2000

	Share in GDP (percent)		
	1975–1984	*1985–1989*	*1990–2000*
Gross Domestic Investment	20.8	15.3	16.7
Gross Public Investment	8.9	7.0	5.8
Gross Private Investment	9.9	9.3	11.3
Statistical discrepancy	2.0	1.0	0.4

Source: World Bank, 2002b.

Recent trends

Since the 1990s there has been a pronounced shift in the composition of capital flows to Sub-Saharan Africa: the share of FDI has grown, while those of bank, trade and bond lending and, to a much lesser degree, official flows have declined in importance. In the first half of the 1990s, ODA inflows at $88 billion were ten times as great as FDI ($8.8 billion). Between 1996 and 2000, FDI's share of total inflows increased to one-third, while that of ODA fell to two-thirds. By 2001, which was a bad year for FDI given the global slowdown and the events of September 11, 2001, the share of FDI had risen to 36 percent[13].

The trend is striking. Net ODA fell by almost a third from $17.7 billion in 1995 to $12.7 billion in 2001. Over the same period, net FDI increased more than five-fold to $5.6 billion. In the first half of the 1990s, inward-bound FDI averaged 6.1 percent of gross fixed capital formation; between 1997 and 2002 this ratio doubled to 12.2 percent[14] (UNCTAD, 2003b).

This shift has been accompanied by a change in the attitudes of many African governments towards inward FDI. They have begun to introduce investor-friendly measures. The drive to attract FDI reflects, first and foremost, acceptance of private enterprise as the driving force in economic development, as well as the belief that FDI brings with it many benefits, such as technology and access to foreign markets. In addition to this, some impressive corporate results from the companies that have entered SSA markets, and their commitment to macroeconomic reforms, have uplifted the stockmarkets and subsequently the credit ratings in a number of countries such as Ghana.[15]

FDI flows into SSA are very unevenly distributed, and the region is not a player in the mergers and acquisitions market.

However FDI does not automatically guarantee faster growth (Lipsey, 2002). There is a clear complementarity between sound micro and macro policies and ability to benefit from FDI. The better the standard of education and infrastructure, the greater the clarity and observance of property

Table 3.4 Leading recipients of aggregate net resource flows, 1996–2001

	Values (million dollars)				Shares (percent)	
Country	*Total*	*FDI*	*Other Private*	*ODA*	*Private*	*ODA*
Angola	6 116	6 174	–182	124	98.0	2.0
Cameroon	1 334	275	–286	1 345	–1.0	101.0
Côte d'Ivoire	2 137	1 871	–1 105	1 371	35.8	64.2
Ethiopia	4 057	795	–215	3 477	14.3	85.7
Ghana	4 062	519	464	3 079	24.2	75.8
Madagascar	2 352	191	–12	2 173	7.6	92.4
Malawi	2 195	300	–7	1 902	13.3	86.7
Mozambique	5 841	1 350	–80	4 571	21.7	78.3
Nigeria	2 345	7 224	–1 479	–3 400	245.0	–145.0
Senegal	2 575	626	21	1 928	25.1	74.9
Sudan	2 802	1 809	–	993	64.6	35.4
Tanzania	5 490	1 079	–108	4 519	17.7	82.3
Uganda	4 401	950	–	3 451	21.6	78.4
Zambia	3 363	877	24	2 462	26.8	73.2
Zimbabwe	1 501	750	–488	1 239	17.5	82.5
SSA (excl. South Africa)	91 000	31 131	–4 441	64 310	29.3	70.7
South Africa[1]	38 265	7 650	29 430	1 185	96.9	3.1

Source: World Bank, 2003b.
Note: [1] South African figures do not include those for 2001 because of major distortions in that year arising from the restructuring of the De Beers group of companies.

rights, the larger the gains from any given level of FDI inflow.[16]

Two aspects of the recent growth in FDI in SSA stand out. First, that flows are very unevenly distributed; they are dominated by South Africa, which is a significant participant in brownfield (merger and acquisition) inflows, and by exporters that target primary sector activities such as oil and gas. Very few investors pursue manufacturing activities, though since 2000 there have been growing AGOA-related inflows into the clothing and textile sectors. Second, that SSA (South Africa aside) is not a player in the mergers and acquisitions market, which partly accounts for its relative marginalization in global flows as a whole: the region's share of the global inward stock of FDI has more than halved since 1980, from 4 percent to 1.7 percent in 2002 (UNCTAD, 2003b).

Private-sector contacts are the most important source for potential investors to learn of investment opportunities in a country.

A new survey of foreign investors in ten African countries (UNIDO, 2003b), with responses from 758 enterprises that are at least 30 percent foreign-owned, provides helpful guidelines for policymakers. The ten countries covered account for some 27 percent of the inward stock of FDI for Sub-Saharan Africa. While the findings give support to earlier ones about the sectoral composition and technological sophistication of FDI in Africa there are important policy implications that follow from the survey.[17]

First, it found that while the bulk of FDI targets domestic markets, there is an increasing contingent of export-oriented investors, especially in agribusiness and clothing, exporting over 75 percent of their output, partially due to the incentives offered by initiatives like AGOA and EBA. It also found that foreign investors do put a strong emphasis on general business-climate conditions. These include political and economic stability, a country's legal framework, investment climate transparency, quality of infrastructure, low labour costs and the availability of skilled labour. The survey finds that such elements as investment incentives, the availability of local suppliers and raw materials, government support services and the quality of life were only of secondary importance.

This finding is not all that surprising, given that the survey also finds that backward linkages are generally weak. Almost 30 percent of respondents say that less than one-tenth of inputs was sourced locally, while two-thirds say that less than half the inputs are locally sourced. Local sourcing is relatively higher in agri-business and food and beverages, but clothing manufacturers source the bulk of their requirements offshore.

Particularly significant is the finding that private-sector contacts 'are the most important source for potential investors in terms of creating awareness of investment opportunities in a country.' Two-thirds of investors were made aware of an investment opportunity through business-related contacts; Investment Promotion Agencies accounted for only 10 percent of contacts. This highlights the importance of policies

Table 3.5 FDI flows from major investors to Africa by sector, 1996–2000

Sector	*FDI inflows (billion dollars)*	*Distribution (percent)*
Primary	17.3	54.6
Manufacturing	6.5	20.6
Services	7.9	24.8
Total	31.7	100.0

Source: UNCTAD, 2002.
Note: Major investors from France, Germany, Japan, Netherlands, Switzerland, UK and USA.

that promote entrepreneurship across the board. It also poses an important challenge for domestic policymakers: the need to reform investment promotion activities in line with the capital and technology-related mobilization needs of each country. Such a reform should consider the particular capacity-building needs of the various support organizations as well as the domestic private sector's capacity to draw on backward linkages with foreign investors.

Equipping the private sector for external shocks and volatility

Natural disasters, large changes in the price for a country's exports or imports, and conflict are all negative shocks that can easily throw vulnerable low-income countries off the track of meeting the MDGs (Happe, Hussein and Refier, 2003). SSA is the most vulnerable region in the world, followed by South and Southeast Asia, and Latin America and the Caribbean. Between 2000 and 2003 there were 425 recorded incidents of disasters in SSA (compared to 191 in East Asia or 130 in North America). They killed more than 23 000 people and affecting many more thousands (CRED, 2004).

Year after year in SSA countries, droughts, earthquakes, civil conflicts and sharp falls in commodity prices push millions already living in abrupt poverty to the edge of survival. The primary consequences of these shocks are lower economic growth, macroeconomic instability, lagging social indicators and loss of productive capacity, which often affect the poor disproportionately.

SSA exports have experienced roughly twice as much terms-of-trade volatility in the last decade as East Asia.

Important among these, in the context of PRSs and PSD, is vulnerability to external shocks that hamper the productive capacity of the private sector. There are numerous examples of this in SSA in the last decades. For example, the drought in Zimbabwe in 1991–92 reduced production of maize (the staple food) by 83 percent and of cotton by 72 percent, resulting in widespread poverty. At the same time, water shortages not only affected the quality of the main export crop, tobacco, lowering the prices it fetched in international markets, but also resulted in power rationing due to shortages in hydroelectric generation. More recently, the fall in world cocoa prices and increase in oil prices between 1999 and 2000 reduced Ghana's foreign exchange earnings by about $900 million, or 13 percent of its GDP, in 1998 (Happe, Hussein and Refier, 2003). Another striking example of vulnerability to costly terms-of-trade shocks is the case of Zambia where, so the PRSP points out, the withdrawal of the Anglo American Company due to falling world copper prices threatens the livelihoods of many in the formal sector.[18]

All in all, SSA exports have experienced roughly twice as much terms-of-trade volatility in the last decade as East Asia's in the 1970s, 1980s and 1990s, and nearly four times as much as those of the industrial countries (World Bank/IMF cited in UNCTAD, 2001, p. 38). This situation has been exacerbated by Africa's inability to break into international trade in manufactures and market dynamic products.

However, beyond abstract calls for diversification, most PRSPs fail to explicitly include measures to absorb such shocks. The PRSs should consider incorporating alternative mechanisms for the types of shocks to which each country is prone – such as cooperatives, insurance systems and revolving funds, in addition to international assistance (box 3.8).

Important to the ability to cope with external shocks and volatility is the strength of domestic conflict-resolution institutions (Rodrik, 1998). The participatory process that has been initiated through the PRSPs should be furthered to enable governments, private sector and civil society to design policies that ensure that external shocks do not create a long-term poverty trap by aggravating the losses. Participatory democracy is a venue for deciding the particular coping mechanisms needed to face natural disasters, terms-of-trade shocks and post-conflict situations. One big challenge in this area is addressing the ethno-linguistic divisions that have been hampering private sector development in a number of

Box 3.8 Productive capacity-building in post-crisis SSA economies

Productive capacity-building initiatives in post-crisis countries do not only help to recover capacity lost due to military conflicts and natural disasters. They also contribute to peace and stability by creating economically viable communities by developing sources of sustainable livelihoods and activities that reduce poverty, create employment and exploit the country's potential for industrial development. As such they are an important component of post-crisis rehabilitation, together with international disaster and humanitarian relief and national efforts towards reconciliation.

UNIDO has been working in post-crisis countries such as Sudan and Sierra Leone as part of its efforts to contribute to revival and stabilization, focusing on its core competencies of industrial reconstruction and development. UNIDO's Integrated Program in Sudan, which has been included as one of the major industrial sector inputs into the I-PRSP, incorporates projects to specifically promote the revival of local productive capacities in agro-processing and other vital goods, and the establishment of units producing low-cost building materials for local housing in selected post-conflict and rural areas. The program also reaches out to women and young entrepreneurs who have been victims of war to assist them with income generation through informal manufacturing. Similarly, the proposed program that has been agreed with the government of Sierra Leone concentrates on post-conflict capacity-building for SMEs, consisting of general support; product improvement; and support to regional production-centred capacities to build skills in the fabrication of tools, spares and machinery for industry.

Post-crisis rehabilitation of productive capacity in SSA is an important aspect of future conflict *prevention,* and should be considered as complementary to other measures that try to insure that sudden shocks do not result into poverty traps as they have done in the past in SSA.

Source: UNIDO

societies, through democratic and participatory institutions. Although important lessons can be learned from other ethnically divided high-performing economies such as India, this requires a deeper understanding of the particular context of social institutions in SSA countries.

Notes:

This chapter is based on a background paper by A. Hawkins (2004). However, the views expressed here are of UNIDO and do not necessarily reflect those of the author.

[1] For example, Cameroon's participatory consultations involved more then 10 000 people in several rounds. However, concern has been expressed that participation has been more 'broad' than 'deep', partially due to the lack of sufficient expertise and information among the stakeholders. (IMF/IDA, 2003b, p. 6)

[2] The Zambian PRSP mentions questions such as: Is it advisable to undertake immediate investments in institutional reforms that may reduce capital expenditures? What is the balance between economic and social investments, increased budget deficit and higher interest rates in the short term versus higher growth in medium to long term? Is it possible to induce a significant slow down in inflation that allows for financing of private sector development in low inflation, low interest rate environment? (2002, p.17)

[3] In order to improve reporting on MDGs, the IMF management has recently decided to include a standard table on the goals, targets, and associated indicators for 2015, and performance to date in all staff reports for Poverty Reduction and Growth Facility (PRGF) countries and those middle income countries where achieving the MDGs is a high priority.

[4] This problem is vividly highlighted in the Zambian PRSP. Zambia is one of the few countries with a specific budget allocated to PSD activities, which equals 1 percent of the total PRSP budget totaling $1.2 billion, already scaled down from $4 billion costed proposed actions (2002, p.158).

[5] The six policy clusters include i) Public investment in basic human needs; ii) Human rights for women and other excluded groups; iii) Small-farm productivity in marginal agricultural lands; iv) Industrial development policies v) investment in infrastructure; vi) Environmental sustainability and urban management (see UNDP, 2003, p.18).

[6] Standards are a set of technical specifications used as rules or guidelines to describe the characteristics of a product, a service, a process or a material. Export activity now requires the increasing use of recognized standards and their certification by internationally accredited bodies. Such certification reduces transactions costs, information asymmetries and uncertainties between the seller and the buyer with respect to quality and technical characteristics. Metrology provides the measurement accuracy and calibration without which standards cannot be applied. The application of standards and the certification of products necessarily imply (accredited) testing and quality controlservices.

[7] The experience of Taiwan, which probably has the best SME support system of any developing country, suggests that the best way to help SMEs is by combining support in an attractive package rather than delivering each piece separately. SMEs avoid going to support institutions where a lot of time and formalities are involved. They often cannot even identify and define their needs clearly enough to seek remedies. Thus, a service that can reach out, help firms to define their problems and devise a package of measures that deals with these problems has the best chance of success.

[8] Yet, There were about 3 000 EPZs in 116 countries by 2002, a major increase from only 75 in 1975 (ILO, 2003).

[9] Prohibited subsidies are specific subsidies that are given based (in whole or in part) on exports or use of local raw material. All other specific subsidies are actionable. Specific subsidies also include subsidies applied to only part of the area of a country unless they are applied by a city, state, province for all companies under their jurisdiction. There was a set of non-actionable subsidies that have already expired.

[10] Export competitiveness is achieved if the export of that product has reached a share of at least 3.25 percent in world trade for two consecutive years. When export competitiveness is achieved export subsidies will have to be phased out gradually over a period of 8 years.

[11] Outsourcing of especially medium and high skills jobs in the IT sector to a few developing regions such as Bangalore in India has recently created unfounded fears in some industrialized countries such as the United States. It should be noted, however, that without the necessary adjustments in institutions and market conditions for technological innovation there cannot be any sustained expansion of employment in these environments.

[12] For example, the new EU food safety regulations due to come into force by January 2005 will make it mandatory for all fruits and vegetables to be traceable at all stages of production, processing and distribution. This is expected to raise overheads of suppliers from many SSA countries such as Kenya as much as 60 percent. The EU has been providing training for exporters and technicians through a 30 million (Euro) Programme spread across 77 African, Caribbean and Pacific states. But there has been no support for additional costs for infrastructure needed for compliance, which is an important hindrance for many small producers (Financial Times, 7 April, 2004).

[13] These figures exclude South Africa.

[14] Excluding 2001 because of serious distortion of inward inflows by the De Beers/ Oppenheimer restructuring.

[15] In 2003, the Ghana Bourse, with a U.S. dollar return of 144 percent, outpaced 61 markets around the world surveyed by Databank Financial Services, Ltd. Furthermore, the improvements in the stock exchange performance in Ghana has been matched with a significant reduction in the cost of doing business by 35 percent and an improvement in the conditions for opening new business. For example, the time it takes to open a business went down from 129 to 85 days (World Bank, 2003c). Uganda, Kenya, Egypt, Nigeria and Mauritius were other strong performers in stock-exchange performance, with returns in US dollar terms exceeding 50 percent in 2003. According to Databank, the average return on African stocks last year reached 44 percent. This compares favorably with a 30 pecent return in the MSCI global index; 32 percent in Europe; 26 percent in the US (S&P); and 36 percent in Japan (Nikkei). (Corporate Council on Africa, 2004)

[16] A good example of a country that achieved structural transformation through a boost in FDI and manufactured exports is Mozambique. Since 1998 manufacturing's share of GDP in Mozambique has more than doubled from 10 percent to 24.8 percent (2002) while exports have almost trebled from $250 million to over $700 million (2001). At the end of the 1990s, the country's exports were dominated by fish products and agricultural produce, each accounting for approximately one-third of the total.

By 2001 aluminium exports from the Mozal Aluminium plant at the capital Maputo had reached $380 million or 55 percent of the total. Government projections suggest exports will double in value by 2007 when they are forecast to reach $1.6 billion. More than three quarters of these exports will be aluminium and gas from the SASOL gas pipeline currently under construction.

Between 2001 and 2004 FDI is estimated at over $1 billion, mostly to finance the gas and Mozal mega-projects, which have been developed by multinationals corporations in Australia and Japan and South Africa's SASOL. With a second-phase of the gas pipeline due to be constructed in 2007/08 along with two major titanium ore mining and processing projects, FDI inflows are forecast to remain in the region of $250 million annually over the next few years.

Subsequently, it is expected that by 2008, industry value added – in manufacturing and mining – will exceed one third of GDP. The country which in the early 1990s was dismissed as a basket case with a per capita income of little more than $100 and total exports of less than $150 million, is now one of SSA's fastest growing economies with annual GDP growth of more than seven percent since the early 1990s.

[17] For a more detailed analysis of the findings please refer to UNIDO Africa Foreign Investor Survey 2003 (2003b).

[18] Arguably, Anglo divested from Zambia not because of low copper prices, but because of lack of competitiveness of Zambia's copper

industry in terms of much higher operating costs than in Chile. It has been blamed on the absence of supportive clusters in the form of repair services, inputs that are available in Chile.

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CHAPTER 4

Industry, environment and the diffusion of Environmentally Sound Technologies

The relationship between poverty and environmental degradation is of particular importance in Sub-Saharan Africa (SSA). In the region's predominantly rural economies, solving environmental problems means ensuring better living conditions for millions of poor. About 40 percent of the total population in SSA – 258 million people – were living on fragile lands by the year 2000 (World Bank, 2003). These people are highly dependent on the available natural resources, which becomes a factor of further environmental resource degradation and poverty.

Economic growth needed for poverty reduction is often seen as competing with environmental goals.

Africa faces major environmental challenges virtually across the board. Climate variability and change, as well as ground-level air quality, are the principal challenges with respect to the atmosphere, while natural habitat loss and invasion by alien species are the main biodiversity issues. There are related threats to the coastal and marine environments from erosion, climate change, over-harvesting, and pollution, while eutrification (an artificial enrichment of the water which can be detrimental to aquatic life) in lakes and dams, loss of aquatic habitats and contamination of groundwater sources pose problems for the availability of fresh water (UNEP and AMCEN, 2002).

While longstanding environmental problems threaten livelihoods in rural areas, new environmental concerns are emerging in urban areas (where the population is growing at 3.5 percent a year) due to rapid expansion of unplanned settlements and the lack of adequate infrastructure for waste management. Economies dominated by small-scale and often informal establishments make it difficult to monitor and control non-domestic pollution in these environments. As Africa undergoes a demographic transition, high urbanization entails an increasing need to promote job and wealth creation in the urban economy.

As a response to these challenges, the international community has committed itself to Millennium Development Goal (MDG) number seven, which targets environmental sustainability, as well as having recommitted itself to Agenda 21 during the World Summit on Sustainable Development (WSSD) in Johannesburg. However, the trends in countries for which data is available – only half of the total – show that a mere ten countries are either on track or have achieved MDG number seven. Moreover, the need to start and sustain high economic growth to achieve the poverty reduction target is often seen as a counter-force to the reduction of environmental pressures. As SSA countries move towards a period of structural change to upgrade their low-productivity agricultural economies, additional measures have to be introduced to ensure that environmental degradation doesn't become the price of industrial development.

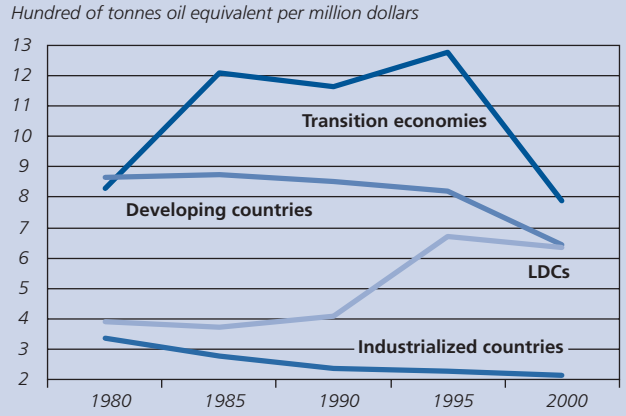
Environment and industry in Sub-Saharan Africa

Available data about industrial practices and environment in Sub-Saharan Africa, incomplete as it is, shows that while the aggregate volume of industrial pollution might be small, in line with the overall size of the industry, pollution intensity is among the highest when controlling for other factors such as the level of development or size of the economy.

However, with effective policy interventions, environmental degradation doesn't have to be the price of development.

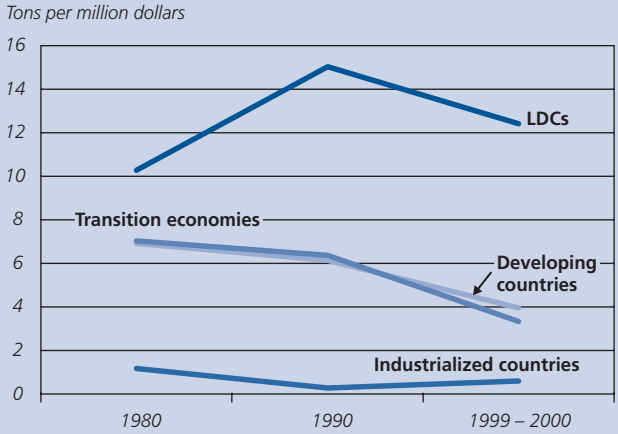
The least developed countries (LDCs) are the only country group where energy input intensity in manufacturing shows an increasing trend (figure 4.1, p. 94). Poverty impinges directly on pollution intensity. Pollution intensity was 17 percent higher for carbon dioxide (CO_2) and 15 percent higher for Biological Oxygen Demand (BOD) in countries with income per capita below $1 000, holding everything else constant[1] (figure 4.2, p. 94). Consider the example of textile manufacturing, important sector for future expansion due to

Figure 4.1 Comparison of energy input intensity in the manufacturing sector, 1980–2000



Source: International Energy Agency, 2002.

Figure 4.2 Comparison of BOD, 1980–2000



Source: World Bank, 2002.

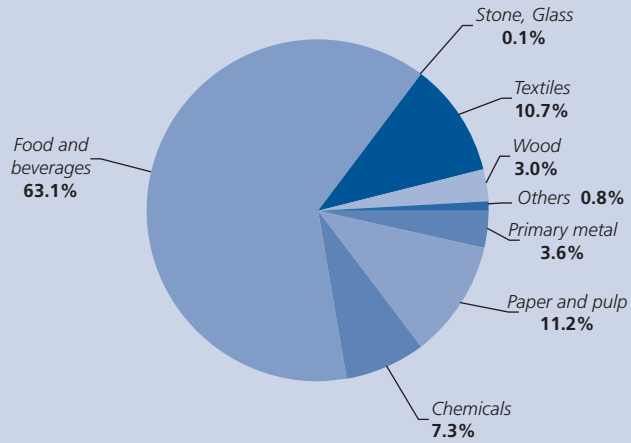
the incentives available through the African Growth and Opportunity Act (AGOA) and Everything But Arms (EBA) initiatives (see Chapter 2 Case Study).

Due to a number of factors, most notably the lack of access to external technological resources, pollution from the textile sector is considerably worse in SSA than elsewhere, on a per unit basis, as many operations do not practice any sort of waste treatment at all. As a 1996 study reports, 'most of Tanzania's textile mills release dyes, bleaching agents, alkalis and starch directly into Msimbazi Creek in Dar-es-Salaam, from where they can easily flow into the Indian Ocean' (Chenje and Johnson UNEP, 2002). Similarly, 90 percent of industrial operations in Nigeria are thought to lack any sort of pollution control technologies (UNEP, 1999). The textile sector accounts for approximately 11 percent of industrial organic water pollution in all of SSA; approximately 677.300 tonnes annually (figure 4.3). Kenya contributes an estimated 23.4 percent of SSA's total textile organic water pollutant load (World Bank, 2002).

One of the main difficulties is that local authorities, in their quest to provide jobs, often perceive the adverse environmental and public health consequences as a necessary price to pay for economic development. Sometimes, incentives are aligned in such a fashion that local authorities benefiting from the collection of water fees and wastewater charges are reluctant to enforce water-use reduction policies. There is also a widespread fear that correct pricing policies will drive companies away, due to a perceived loss of competitiveness, with subsequent increases in unemployment. Ill considered subsidies accentuate the problem, as there is no incentive to consider Cleaner Production options, which would have economic, public health and environmental benefits. Overall, it is clear that until the financial and economic benefits of environmentally sustainable business are made clear to all concerned, the misconceptions will persist.

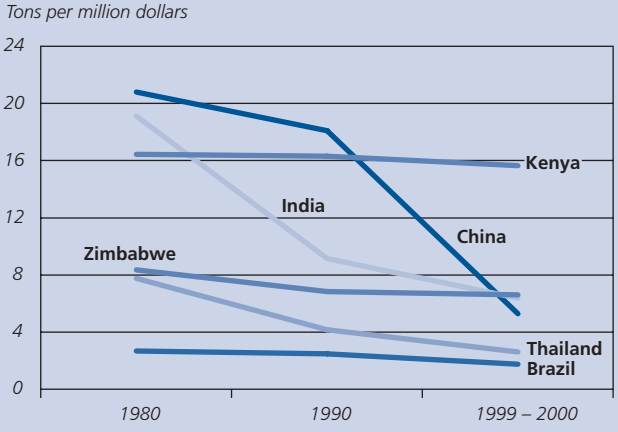
Is pollution indeed the price of industrial development? The variation of industrial pollution intensity across coun-

Figure 4.3 Distribution of organic pollutant effluent across industrial sectors in Sub-Saharan Africa in 1999



Source: World Bank, 2002.

Figure 4.4 Comparison of BOD intensity in manufacturing for six countries, 1980–2000



Source: UNIDO calculations based on World Bank, 2002.

tries that are at similar stages and levels of industrial development seems to suggest that the relationship is not so straightforward. One reason for this is, undeniably, the way pollution emissions are monitored and reported. Since much of the pollution data are on a national rather than sectoral level, monitored and recorded mainly in urban areas, the location of industry affects the data collected. For example, in China, where polluting industries are located in densely populated urban areas, pollution from factories accounts for over 70 percent of the national emission of particulates, sulphur dioxide and organic water pollution. Conversely, in Brazil, where industry is located outside urban areas, households and motor vehicles are the dominant sources of urban air and water pollution. In many SSA countries pollution problems are intensified by the small scale, often informal and un-integrated nature of production, which makes it difficult to gauge the true level of emissions. Other factors affecting the level of industrial pollution, such as firms' size, technological capabilities and ownership structure as well as the policy environment will be examined further below.

Box 4.1 Industrial water pollution in Lesotho

Since the AGOA was signed into law in the US in 2000, Lesotho has seen a significant increase in textile investment, to the point where its textile industry now accounts for one third of all apparel traded through the AGOA. The investments have centred on the capital, Maseru, with the establishment of factories mainly owned by Asian textile companies who concentrate on denim garment manufacture and the subsequent wet processing of the finished garments.

The fast pace of investment and lack of suitable environmental legislation has created critical problems. Most importantly, Lesotho, like many other SSA nations, suffers from water shortage. The textile factories collectively use approximately 12 million litres of water per day, of which approximately 15 percent is lost to evaporation and spillage within the factories themselves. The remaining water is used for processing and eventually released as effluent, which is reported to have created a deep blue river which high levels of chemical oxygen demand (COD). Of three different options for treating the textile wastewater in Lesotho, all fail to treat the effluence effectively. As a result, the Caledon has become one of the most turbid rivers in Southern Africa, and future growth of the textile industry is expected to increase the proportion of sediment and sludge in the river by about 20 percent.

As is also the case with similar textile clusters in the region, growing population has brought residential settlements into close proximity of the factories, to the point where their effluents pass, untreated, through the settlements. At the same time, these effluent streams periodically become blocked and flood nearby grazing land.

Lesotho has secured a World Bank loan to help deal with these water issues arising as a result of the textile factories, and to increase the available water supply. However, the planned projects, which include raising the height of a local dam and expanding existing oxidation tanks would be at best short-term solutions, doubts remaining about their economic viability (Salm e. a. 2002).

One of the main problems is a lack of motivation on the part of the factories or the municipality to solve the problem, and no one party is stepping forward to drive the process. The case of textile industry exemplifies the environmental downside of the recent economic boost and how without effective policy intervention even initiatives like AGOA might fail to provide an opportunity for sustainable investment and growth.

Source: Jacob, 1997a; World Bank, 2002; Salm, e. a., 2002.

Economic development and environmental degradation

Views on the relationship between environment and economic development stretch along the entire spectrum from negative to positive. There are those who have argued that economic and industrial development means use of increasingly larger inputs of energy and material, and generation of increasingly larger quantities of waste and pollution, leading to continuous degradation of the environment until its carrying capacity is completely overwhelmed and economic activity itself declines (Georgescu–Roegen, 1971; Meadows e.a., 1972; Daly, 1977).

At the other extreme are those who argue that economic and industrial development is the fastest road to environmental improvement. Their argument is that with higher incomes, generated by development, comes increased demand for goods and services that are less harmful to the environment. Furthermore, at higher income levels there is increased demand for improved environmental protection measures (Beckerman, 1992). Therefore, by slowing down economic development, environmental regulation would actually reduce environmental quality.

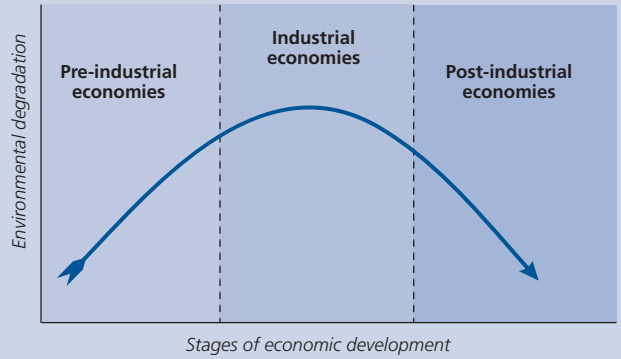
A third view is that the relationship between environmental quality and economic development, whether positive or negative, is not fixed along a country's development path. While the relationship is likely to be negative at earlier stages of economic development, when the country industrializes and incomes are too low to demand clean industrial technologies and practices, it is likely to turn positive when industry matures, the share of services rises and incomes grow to levels at which people demand and can afford more efficient infrastructure and a cleaner environment (Shafik and Bandyobadhyay, 1992; Panayotou, 1992, 1993, 1995; Grossman and Krueger, 1993; Selden and Song, 1994).

Different pollutants, due to the nature of their source or impact, might hold either one of these relationships during the course of economic development. A rich, often controversial, literature exists on these effects (Stern, 1998).

The relationship between environmental quality and economic development is not fixed along a country's development path.

The inverted U-type curve illustrating the relationship between environmental pollution and economic development implied by the third view has been stylized by means of the 'Environmental Kuznets Curve' (EKC), by analogy with the inverted U-shaped graph illustrating the relationship between inequality and development formulated by Kuznets (1965, 1966). The EKC hypothesis postulates that at low levels of development, as agriculture and resource extraction intensify and industrialization takes off, the emission and concentration of pollutants accelerate; while at higher levels

Figure 4.5 The Environmental Kuznets Curve: a development environmental relationship



Source: UNIDO based on Panayotou (2004)

of development, structural change towards a rising share of services, lighter and cleaner industries and more efficient technologies, as well as increased demand for environmental quality, result in pollution levels leveling off, then entering a steady decline (figure 4.5).

Smart environmental policies need to factor in the level of development.

Whether environmental degradation, (i) increases monotonically, (ii) decreases monotonically, or (iii) first increases and then declines along a country's development path, has critical implications for policy. A monotonic increase of environmental degradation with economic growth calls for strict environmental regulations and even limits on economic growth to ensure a sustainable scale of economic activity within the ecological life-support system (Arrow e.a., 1995). A monotonic decrease of environmental degradation along a country's development path suggests that policies that accelerate economic growth lead also to rapid environmental improvements and no explicit environmental policies are needed; indeed, they may be counterproductive if they slow down economic growth and thereby delay environmental improvement.

The key prescriptive implication of the EKC hypothesis is that smart environment-related interventions need to factor in the level of development.[2] In this case, several issues arise:

- At what level of per capita income is the turning point?
- How much damage would have taken place, and how could it be avoided?
- Would any ecological thresholds be violated and irreversible damages take place before environmental degradation begins to decrease, and how could that be avoided?
- Is environmental improvement at higher income levels automatic, or does it require deliberate institutional and policy reforms?
- How could the development process be accelerated so that poor countries might experience the same improved economic and environmental conditions enjoyed by developed countries?

The income-environment relationship specified and tested in much of the literature is a reduced-form function that aims to capture the 'net effect' of income on the environment. Income is used as an omnibus variable representing a variety of underlying influences whose separate effects are obscured. In order to understand why the observed relationship exists, and how it can be influenced, more progress is required in modelling the income-environment relationship.

Three distinct structural forces that affect the environment have been identified in the literature: (a) the scale of economic activity, (b) the composition of economic activity and (c) the effect of income on the demand and supply of pollution abatement efforts.

Scale

The scale effect on pollution, controlling for the other two effects, is expected to be a monotonically increasing function of income, since the larger the scale of economic activity per unit area, the higher the level of pollution, all else being equal.

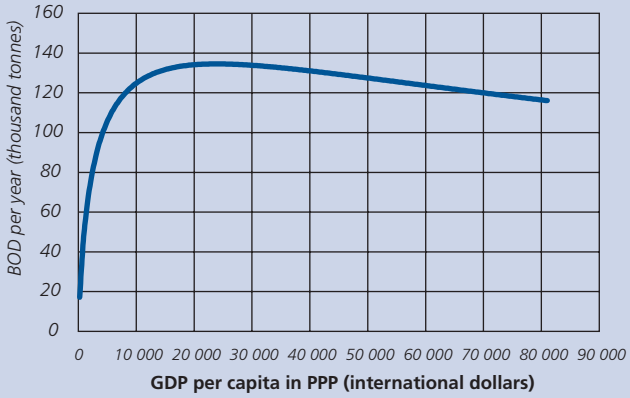
The scale of the economy may affect the environment-industry relationship through a variety of channels. Larger economies tend to be less specialized in their industrial production; because of their size they tend to be driven more by domestic demand than by comparative advantage. As a result, we expect them to have higher levels of pollution in the aggregate and higher levels of pollution per unit of land and of GDP, everything else being constant.

Both for water pollution and CO_2 emissions turning point after which further economic development doesn't cause extra environmental pressure is very high.

There are also reasons for an inverse effect of scale on pollution, as when there are economies of scale and of scope in production and pollution abatement. Larger economies, which may also mean a larger scale at the firm and industry levels, may justify pollution abatement systems that small firms, industries and economies cannot afford. In certain industries, (e.g. steel, pulp and paper, chemicals), scale economies may be so significant as to alter the relationship between industrial development and pollution not only quantitatively but also qualitatively.

To further analyse the interaction of the scale of economic development with environmental pollution, the relationship between income per capita and two environmental pollu-

Figure 4.6 Organic water pollutant (BOD) versus GDP per capita



Source: UNIDO calculations, see Chapter 4 Annex.

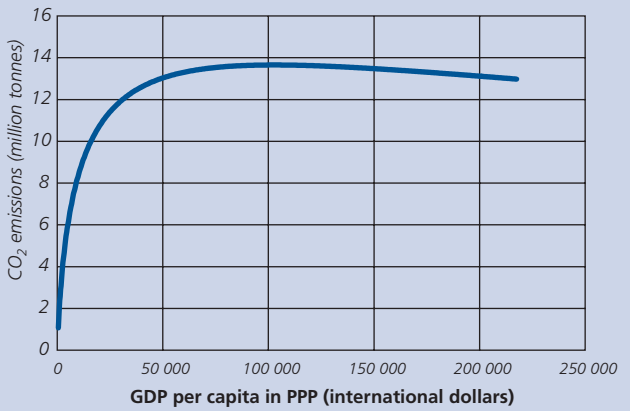
tants, namely BOD and CO_2, were studied, using data for 196 countries for the years 1960 and 2001[3] (figures 4.6 and 4.7). Taking into account different measures of sectoral composition and technological capabilities, it was found that the level of economic development has a significant and robust effect on environmental pollution:

- For total BOD, a turning point of about $24 000 (in purchasing power parity (PPP) terms) was found at which total BOD levels off and begins to decline.
- For CO_2, a global non-visible pollutant, the turning point is at a much higher level of income, more than $80 000, which is well above the currently observable income levels. This implies that, in the absence of deliberate policy intervention, incomes per capita in the developed countries must more than double from current levels to observe declining CO_2 emissions. By that time, the damages to health and ecosystems is likely to be too great to tolerate and to reverse.

Hence, deliberate policies are needed both in developed and developing countries to reduce pollution as well as increasing foreign assistance in clean technology transfer from developed to developing countries. This result highlights the importance of international cooperation and global convention agreements such as the Framework for Climate Change Control and the Kyoto Protocol.

It is clear that when the scale of the economy is considered, not just the scale of individual incomes, economic growth, by augmenting the size of national economies, brings about a pollution-reducing technological or efficiency effect that speeds up the arrival of the turning point and the subsequent decline of pollution levels as incomes grow. On the other hand, growing population density has an opposite effect by worsening pollution intensity.

Figure 4.7 Total CO_2 emissions versus GDP per capita



Source: UNIDO calculations, see Chapter 4 Annex.

By that time, the damages to health and ecosystems are likely to be too great to tolerate or reverse.

Sectoral composition

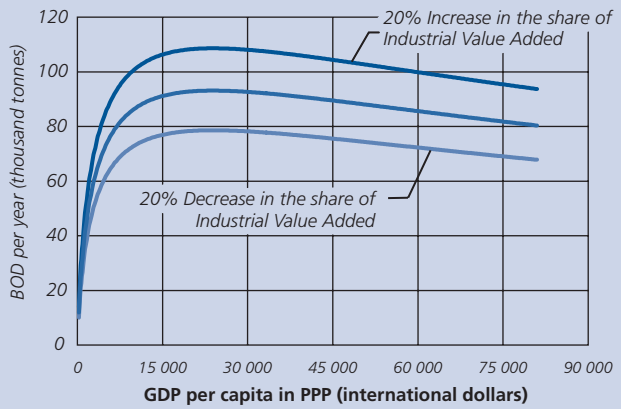
While structural change is an inevitable outcome of economic development and hence is captured by the income variable, the composition of output has its own independent effect on the levels of pollution, which must be separated from other income effects such as those of scale and demand (i.e. demand for cleaner production, pollution abatement, environmental amenities etc.) which are income-elastic.

The structural change that accompanies economic growth affects environmental quality by changing the composition of economic activity toward sectors of higher or lower pollution intensity. At lower levels of income, the dominant shift is from agriculture to industry, with a consequent increase of pollution intensity. At higher incomes, the dominant shift is from industry to services, with a consequent decrease in pollution intensity. The composition effect is then likely to be a non-monotonic (inverted-U) function of GDP: as the share of industry first rises and then falls, so environmental pollution will first rise and then fall with income growth, controlling for all other influences transmitted through income. Indeed this is the case found empirically in the cross-sectional sample.

At higher incomes, the dominant shift is from industry to services, with a consequent decrease in pollution intensity.

Both industry's share in national output and the manufacturing share in industrial output were found to have an important and statistically significant effect on industrial water pollution as measured by BOD. Accordingly, a 20 percent increase in the share of industrial output in total output is found to be correlated with a ten percent increase in water

Figure 4.8 Organic water pollutant (BOD) versus GDP per capita: effects of changes in the share of industrial value added



Source: UNIDO calculations, see Chapter 4 Annex.

pollution, holding everything else constant at the mean (figure 4.8).

Another type of sectoral shift can be observed *within* industry, from more polluting to less polluting activities as industrial development proceeds, entailing lower unit pollution loadings.

Sectoral shifts within industry or changes in the share of SMEs in output can also affect pollution.

Although not extensively discussed in the literature, changes in the share of small and medium-sized enterprises (SMEs) in output can also affect resource use and pollutant intensity. Production in small plants compared to large ones in the same sector is more pollutant-intensive per unit of output, and small plants are less compliant with environmental regulations than large ones (World Bank, 2000 and UNDP/UNIDO, 2000). Unfortunately there are no globally consistent data documenting changes in the share of industrial output accounted for by SMEs over the past 20 years, which limits the possibility of including this kind of scale and sectoral effects into the mainstream analysis. However, it should be noted that, as many SSA economies have significant proportion of their manufacturing in the SME sector and will increasingly rely on promoting their activities, there will be an important case for international cooperation to help diffuse environmentally sound technologies (ESTs) among them.

Abatement effects – policy and technology

There is no question that policy, industrial practices and technology are significant determinants of pollution levels, along with the scale of production and the composition of output. Plant-level data show that even factories in the same location, using the same inputs to produce the same output and subject to the same regulatory regime, vary widely in their pollution intensity, that is, pollution per unit of output. The main sources of the variation appear to be the technology and the industrial practices employed. The technology is largely a function of the age of the plant and the vintage of its capital equipment. The industrial practices, on the other hand depend, in addition to technology, on the type of ownership of the plant, its size, its export-orientation and the regulatory and community pressures exerted on the plant to implement pollution-control practices (Panayotou e. a. 1997). Widely varying pollution intensities between four urea plants surveyed in Bangladesh were found to be explained by their differences in technology and pollution-control practices; the latter resulting from differing technology or community pressures (Huq and Wheeler, 1992).

Although there is no specific measure for environmental policy and its effectiveness (due to the difficulty of devising a composite index of the strength of environmental regulation, either for industrialized or developing countries), the quality of environmental policies and institutions is widely thought to be an important factor in significantly reducing environmental degradation at low income levels and speeding up improvements at high income levels (Panayotou, 1997; de Bruyn, 1997).

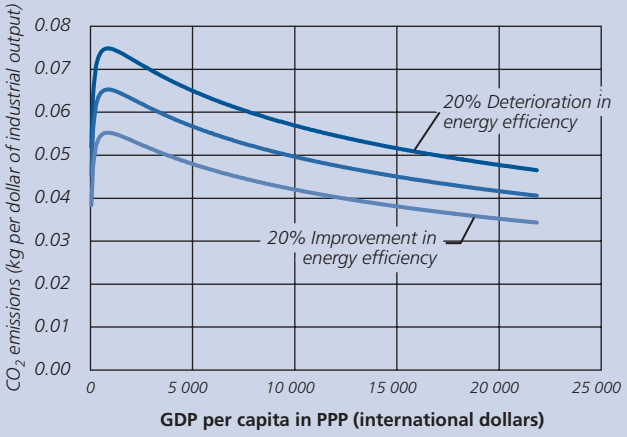
Alternatives to traditional environmental regulation have been found to reduce the pollutant intensity of the manufacturing sector in developing countries. There are many examples of developing countries that have adopted incentive systems for modifying the polluting behaviour of industrial firms. These systems include financial incentives (China, Colombia, Malaysia and the Philippines), targeted enforcement (Brazil) pollutant rating systems (Indonesia and the Philippines) and community pressure (Mexico and China) (World Bank, 2000).

A distinction needs to be drawn between production technology and pollution-abatement technology. Cleaner production technology yields double dividends because it saves on resource inputs and also reduces waste. Pollution-abatement technology is supplementary in that it deals with residual pollution and accumulated pollution from the past (figure 4.9).

Variation in technology, industrial practices and the regulatory environment explain much of the differences in pollution intensity.

A variety of skills and capabilities need to be in place in order to assimilate cleaner production technologies. There is, however, no readily available cross-country indicator on technological capabilities in adopting 'clean technologies' (CTs). Using the absolute value of high-technology exports as a proxy a strong correlation is found, as could be expected,

Figure 4.9 The importance of energy efficiency: CO_2 emissions per unit of industrial output



Source: UNIDO calculations, see Chapter 4 Annex.

between these and lower pollution, both in the aggregate and per unit of gross domestic product (GDP) (pollution intensity of output). For both BOD and CO_2, this relationship persists even after introducing GDP or population size as a scale factor. The policy implications are clear: international assistance to accelerate development while controlling its environmental impacts must focus on issues of technology adoption and development.

Another reason why developing countries should act early and acquire the technological capabilities to curb environmental degradation is the potential economies of scale in abatement. One means of achieving such economies of scale is learning by doing, which has been found to result in decreases in pollution intensity that go hand in hand with reductions in pollution-control costs (Anderson, 2001). Most abatement technologies have taken a long time to develop (50 years for air pollution, 150 years for water pollution) and hence represent considerable efforts at *innovation* and significant *learning-by-doing* before low costs can be achieved. Economies of scale in abatement or pollution prevention that entail marginal costs lower than those of environmental damage provide a clear case for policy intervention in this area.

Environmentally Sound Technologies: diffusion, enablers and constraints

The promise of Clean Technologies

The potential friction between the economic and industrial development agenda and the environment has been the concern of many international forums such as the 2002 WSSD, which tried to come up with recommendations to promote a pattern of industrial development that simultaneously satisfies the MDG targets of environmental sustainability and poverty reduction. The major policy interventions suggested

Box 4.2 Trade, FDI and EST diffusion

Direct effects of international trade on technology configurations include (a) easier access to imported capital equipment, material inputs and services in more open economies and (b) greater pressure for firms operating in exports markets to improve their environmental performance to meet buyer demands.

Global markets and environmentally and health-conscious consumers and corporations provide consistently growing demand for products produced in an environmentally sound manner. These are increasingly being reflected in the corporate codes of conduct of large companies, which then apply to their entire supply chain. Non-compliant suppliers, many of them in the developing world, are being forced to reconsider the environmental and social impacts of their activities. In a buyer-driven value chain, such as in textiles and clothing, conforming to environmental and social standards becomes a necessity, as it is a question of being able to sell products in international markets. A similar pull-factor is provided by eco-labelling requirements, which are becoming widespread, especially in Europe.

However, the increasing complexity of eco-labelling trends has made it increasingly difficult for developing countries to absorb the costs of compliance, and to adapt to the different requirements of various markets. As the 1995 Geneva Convention on Eco-Labelling notes: 'One of the main problems with existing eco-labelling schemes is their sheer number. The selected schemes do not take into account the particular environmental and labour conditions in individual developing countries' (Jacka, 2000). The quantity of eco-labelling schemes and the lack of the infrastructure for testing, auditing and verification are among the main problems.

Another hurdle is that developing countries seldom have access to sufficient information to adjust to the rapid proliferation of and changes in environmental standards which would allow them to adapt, or even take advantage of the economic opportunities offered by eco-labelling schemes.

There is some evidence that increased trade has stimulated the uptake of CTs. This comes particularly from three relatively recent studies: (1) Wheeler and Martin (1992) found that the pulp and paper subsector in more open economies tended to adopt relatively CTs faster than the same subsector in more closed economies; (2) Blackman and Boyd (1995) found much the same for the textile subsector; and (3) Reppelin-Hill (1999) found that the uptake of the electric arc furnace (relatively speaking, a CT) in 30 steel-producing countries was faster in those countries with more open trade regimes.

Foreign direct investment (FDI) also has the potential to bring about environmentally positive changes in developing countries' technological configurations (Johnstone, 1997 and Chua, 1999). It is often argued that FDI by transnational companies (TNCs) has resulted in increased standardization in production technologies and practices that tend to reduce the pollutant intensity of production. This position was initially challenged, but never rigorously refuted, by those who saw FDI as potentially creating 'pollution havens' in developing countries. At the more micro level, it seems that foreign investors are more often in compliance with national environmental norms than are domestic firms (Gentry Esty and Fernandez, 1998). In addition, the presence of multinational companies (MNCs) in developing countries has stimulated the development of technical and managerial skills, which have spread to domestic competitors. Clearly these spillover effects could have contributed to better resource management, thus reducing the potential to generate pollutants (Demurger, 2000).

Source: Johnstone, 1997.

are the promotion and preferential transfer of ESTs with special emphasis on cleaner production programs.

ESTs are defined in Agenda 21 as technologies that are less polluting, use resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies they replace. ESTs are often divided into two categories: treatment and preventive technologies (figure 4.10). Treatment/control technologies, traditionally called end-of-pipe technologies (EOP), have been used at the end of the production process to collect pollutants and then separate or neutralize them. Preventive technologies, often called cleaner technologies (CTs), on the other hand, are manufacturing processes or product technologies that reduce pollutants or waste, and production inputs (raw materials, water and energy). They often reduce the need for more costly treatment/control technologies.

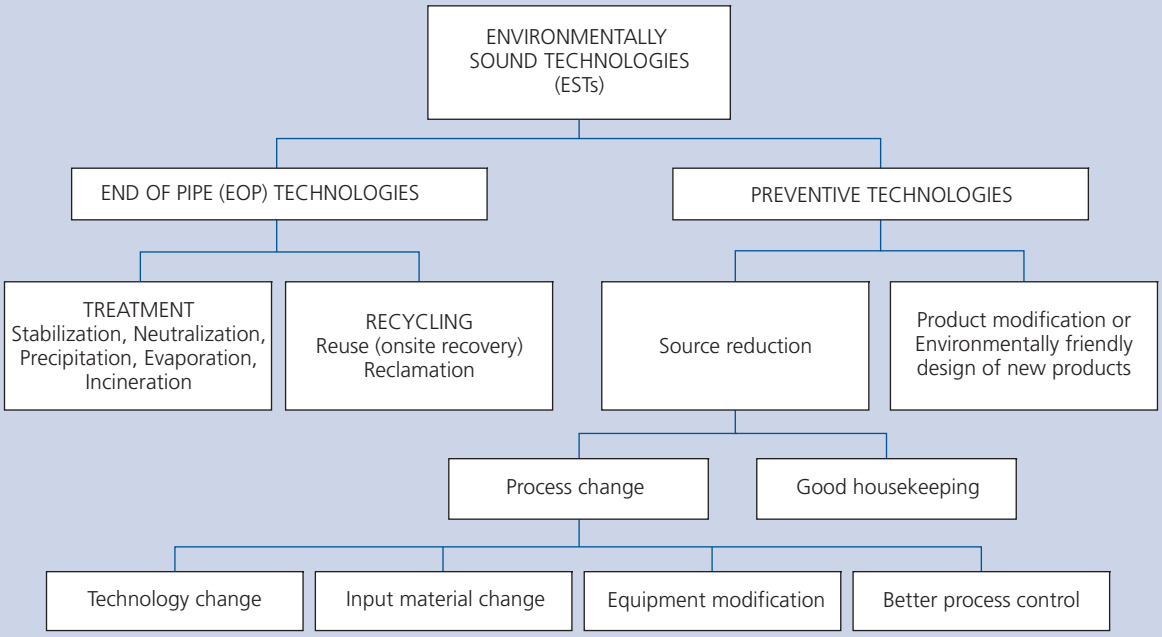
Treatment and even recycling are not long-run solutions.

There are no comprehensive estimates of the relative contribution of EOP and CTs to pollutant reduction. All that can be said is that treatment of conventional pollutants (EOP) has accounted for most of the reduction to date. However, treatment and even recycling are not long-run solutions. Natural systems have a limited assimilative capacity to dilute wastes. In areas where there is a heavy concentration of industry this capacity is easily exceeded. Wastes can impair human health, reduce the productivity of fisheries and agriculture and damage man-made materials. The level of treatment is often limited because only so much of production costs can be allocated for the treatment of wastes, which is a non-productive investment. Recycling often suffers from limited or unpredictable markets for its products. Both treatment and recycling generate further residues themselves, some of which may be more harmful than the original waste product. The Cleaner Production (CP) approach, on the other hand, is seen as a better alternative for avoiding and minimizing environmental problems by reducing pollutant generation while at the same time reducing production costs and sometimes even resulting in better-quality products.

Cleaner Production, not only results in better environmental performance, but also in direct financial benefits.

Cleaner Production not only results in better environmental performance, but in many cases has direct financial benefits to companies, as shown by the evidence from numerous demonstration projects and case studies from developing countries, such as the one presented here from a small galvanising company from Nigel, South Africa (box 4.3). These benefits include (1) cost-saving through reduced wastage of raw materials and energy; (2) improved operating efficiency of the plant; (3) better product quality and consistency, because plant operation is more predictable; and (4) recovery of some wasted materials.

Figure 4.10 Categories of Environmentally Sound Technologies



Source: UNIDO.

Box 4.3 Cleaner-production project at Lianru Galvanisers, South Africa

Lianru Galvanisers completed the implementation of a cleaner-production project at its new plant in Nigel, South Africa, in December 2002. Lianru Galvanisers CC. is a small sized hot-dip galvanizing company for different steel products. The majority of the plant's 60 workers are semi-skilled or unskilled.

The company wanted to build a plant that would be both efficient and more environmentally friendly, to expand production and capture new markets, especially in the mining industry. Being a member of the Hot Dip Galvanisers Association (HDGASA), Lianru Galvanisers was able to obtain the necessary information on laying out a more efficient operation. The HDGASA was influential in raising awareness about cleaner production. An Environmental Review carried out at the old plant revealed poor environmental performance, and the management decided to incorporate the suggested cleaner-production options at a new hot-dip galvanizing plant. The feasibility study concluded that the improvement of the production layout and the rinsing system, and installation of a flux filtration system would be viable cleaner-production options for the new plant and would yield significant economic and environmental benefits.

Lianru Galvanisers carried out the project with their own financial resources plus a subsidy of approximately $12 000 from the Cleaner Production Metal Finishing Industry (CPMFI) Project. The scheme, successfully implemented, increased production efficiency and reduced waste. As its output has trebled, Lianru Galvanisers has moved from being a small galvaniser to a medium-sized one with a potential to expand further.

The improved rinsing system has improved the pre-treatment process and the quality of the galvanized products. This has kept the amount of rejects to less than 0.02 percent. Significant improvement in the zinc-coating quality and appearance was achieved, while the gross consumption of zinc was reduced.

With the employees trained in cleaner-production techniques and good housekeeping rules, the water consumption has been reduced by 40 percent (144 cu m/yr). In addition to these, clear procedures for plant operation were established and a procedure manual has been put in place.

Implementation was not problem-free. Lack of awareness among the unskilled employees and the poor record-keeping of chemical consumption and waste generated, made it difficult to assess the savings from cleaner production in the feasibility study. Limited in-house maintenance facilities and skills meant that the plant was poorly kept. There were also disincentives: the local price for water was very cheap, at approximately $0.80 per kiloliter, and rules on pollution were not applied uniformly. Finally, the customers were not aware of the toxicity of materials traditionally used in the hot-dip galvanising industry, so there was little pressure on producers, especially the small ones, to change their operating procedures in the absence of adequate information, technical skills and financial assistance.

Despite these challenges, the project was successful in utilizing locally available technology to build one of the first hot-dip galvanizing plants in South Africa that uses clean production methods. The experience from this project shows that environmental technology equipment is available in South Africa but not readily used. The change in management style and attitude has greatly improved the image of the company in the industry, as well as generating substantial economic and environmental benefits.

Source: Koefoed, 2003.

Enablers versus constraints in EST uptake by firms

The uptake of ESTs in SSA countries is conditional on a number of pre-requisites, of which the most important are technological capabilities, availability of information and affordability.

Various studies confirm empirically that firms' decision-making on pollution control is not solely driven by regulation. A number of other factors affect firms' environmental behaviour. Results from studies in South and Southeast Asia, which tested the importance of plant characteristics, economic considerations and external pressures, consistently show that pollution intensity is negatively associated with scale, productive efficiency and the use of new process technology (Hettige *e. a.*, 1996). Ownership, community action and informal regulation also emerge as clear sources of differences between firms.

Other researchers have recognized the need to take into consideration market and institutional failures affecting firms' decisions in developing countries (Dasgupta e. a., 1995). Insufficient information on pollution abatement and cleaner technology is one factor. Another factor relates to technology adoption at the firm level.[4]

Only a few studies have examined, directly or indirectly, the determinants of EST adoption. Most of the studies have focused on the determinants of diffusion of EOP technologies. The examination of factors affecting the uptake in developing countries of ESTs, and particularly CTs, is largely uncharted terrain.

What has enabled some firms in developing countries to use CTs that often have improved their environmental performance beyond what is required by environmental regulation? A firm-level survey on the uptake of ESTs attempted to examine this question[5].

Most important factors for adopting CTs are the firm's capabilities to draw on technological resources, its environmental commitment and awareness of CTs.

The influence of regulatory pressure is particularly noticeable for EOP and for lower-order CTs. While the influence of a 'command & control' type regulatory approach is limited to EOP uptake, a more market-based regulatory approach clearly benefits process innovations. Some support was found for the influence of community pressure and advanced-country market pressure. As to firm characteristics, in addition to such features as foreign ownership and profitability, technologically capability and environmental commitment appear to be important determinants of EST adoption. Indeed, the most important factors for adopting CTs, as distinct from EOP technologies, are firms' environmental commitment (in the form of an environmental policy or an environmental management system) and its ability to draw on technological resources, both internally and through linkages with external sources.

SSA firms, as represented in the UNIDO survey by data from the leather tanneries from Kenya and Zimbabwe,

appear to rely to a larger degree on external resources to implement ESTs. This is partly explained by a comparatively lower level of in-house capabilities. The perceived quality of support from technology institutions differs in the two countries. In Kenya, firms generally expressed satisfaction with it, while remarking that local capacity of technological services is still low. Support is mainly provided by public-sector institutions and UNIDO, with scant activity initiated by the private sector. Foreign consultancy services are inaccessible for most firms. Hence, the development of local technological capabilities is perceived as a clear need. In Zimbabwe, firms generally indicate limited access to technological information, but they rely to a greater degree on private-sector sources.

Although the country-level findings show variations, perhaps not surprisingly the global and sectoral findings all reveal the high implementation costs of CTs as the most important barrier to their acquisition. In Kenya, uncertainty about performance was clearly the most important variable, illustrating the need for external technical assistance and availability of demonstration projects. However in the long term the most critical factors for the ESTs to become financially appealing and sustainable appear to be the local sourcing of complementary technologies and the building of capabilities at the firm level.

Apart from longer-term capability-building programs, short-term, demand-oriented measures are needed.

Apart from providing a case for longer-term capability-building programs for CT uptake, the above findings suggest that measures of a more short-term, demand-oriented nature are equally needed. These are essentially measures that reduce the cost of CTs relative to established competitors and programs that stimulate the dissemination of sector- and technology-specific information. The fact that high implementation costs were widely cited as the main barrier to CT adoption suggests that firms do not routinely consider CTs and are not aware of the economic benefits that many CTs can bring.

In sum, the findings reveal that EST-related technological decisions take place in a more complex situation than normally described by research into industrial environmental performance in developing countries, and that – most importantly – public interventions for environmental management should go beyond the traditional domain of environmental policy.

Policy choices

The relationship between poverty and environmental degradation is of particular importance in SSA. In the predominantly rural economies of the region, solving environmental problems means ensuring better living conditions for millions of poor. Arriving at the solutions is not a simple matter.

Due to a number of complex factors such as the age of technologies used, industrial practices employed and other characteristics of industrial establishments in SSA (size, ownership, embedded skills, etc.), industrial pollution is becoming highly concentrated, with rising pollution intensity, especially around growing urban centres.

The achievement and sustainability of the income poverty reduction MDG demands structural change consistent with high rates of economic growth. In this context, it is important for SSA countries to address, through informed policy interventions, the problems of environmental degradation associated with rapid increases in industrial activity. Increases in income per capita will not ensure, on their own, that environmental performance will improve over time. For most indicators of pollution, environmental degradation first increases with growing income and only after critical turning-point starts to decline. For BOD as a measure of water pollution, this turning-point takes place at a very advanced level of development (per capita income of $20 000). Similar is the case for global pollutants such as CO_2, for which the turning-point occurs beyond the observable income range of industrialized countries, suggesting that without intervention, the environmental degradation will get much worse before it gets any better, a delay SSA countries cannot afford.

These findings lend support to policy intervention in the earlier stages of development. The structural change implicit in attaining the growth rates required to achieve the MDGs creates a need to find paths of sustainable industrial development that will allow SSA countries to prevent the harmful relationship between industrial development and pollution. In order to undertake an environmentally sound industrial development strategy, countries need to advance especially in two areas: better integration and cohesion between industrial and environmental policies, and diffusion of ESTs with international assistance.

As SSA countries undergo economic transformation, the danger is that in the absence of intervention environmental degradation will get much worse before (and if) it gets any better.

There is a need for a more coherent approach to influencing how changes in scale, composition of output and technology configuration can reduce environmental pressure. Countries tend to pursue independent policies in each of these three domains. They have yet to take advantage of the potential synergies for reducing environmental impacts that exist among the policies.

More effective integration of industrial, environmental and technological policies requires improved coordination, cooperation and consistency. The first and most basic type of integration calls for coordination among policy domains, often spec-

ified in legislation, in regard to such matters as subsector promotion, location of industry, and technology choice. The second type of integration is cooperative projects and programs among industrial support institutions in such matters as industrial extension services providing advice on environmental compliance. The third and most advanced type of integration is consistency among policies towards a common goal.

There is a need for effective integration of industrial, environmental and technological upgrading policies.

More efforts are needed to strengthen the industrial environmental management programs in light of the continuing increase in pollutant loadings in developing countries. Because of the absence of environmental data about the manufacturing sector and the low capacity to enforce command-and-control environmental regulation while keeping policy cohesion with other areas, much needs to be done to redesign government policies for environmental protection, introducing alternative measures. Among these are the economic instruments that modify behaviour by using incentives and disincentives, such as financial incentives for EST uptake, as well as charges and taxes and non-mandatory instruments aimed at improving environmental performance at the firm level, including assistance for planning and designing environmental management systems.[6] In addition to these, as shown by the case of the Cradle-to-Cradle strategy for industrial design and technology (box 4.4), there is a need to consider and flesh out this potentially revolutionary new approach to the relationship between environment and industry. Indeed, there is much to be done in terms of designing appropriate policy measures and incentive structures that will gradually help preventing 'degenerative' patterns of industrialization.

Creating sectorally and regionally focused technology upgrading programs is an important step towards enabling EST diffusion, as building capabilities is a long-term effort.

There is a need for sectorally and regionally focused technology upgrading programs with the support of the relevant technological institutions. These would align factors that are both internal and external to the firm to address the more serious environmental pollution problems and reduce the use of energy, water and material resources per unit of output. To be successful, however, these programs need to be inscribed within the broader challenge of enhancing the tech-

Box 4.4 Cradle-to-Cradle design and industrial development

Adoption of cleaner-production methods and the associated paradigm of eco-efficiency clearly have significant potential to reduce the environmental impact of industry in developing countries, as well as to yield economic and social benefits. But is *reduction* of pollution an appropriate long-term goal? Output reduction, recycling and regulations dilute pollution and slow down natural-resource loss, but ultimately result in an unappealing compromise that takes for granted and even institutionalises the antagonism between nature and industry. Eco-efficiency is undoubtedly a necessary first step, but not a suitable *vision* for regenerative industry.

A more suitable long-term vision for industry in developing countries is provided by the paradigm of *eco-effectiveness* and *Cradle-to-Cradle design*. Essentially, this approach seeks to eliminate the very concept of waste by developing and optimising cyclical flows of industrial material. The aim is that all the products and outputs of industry should be designed ultimately to serve as nutrients for technical and biological metabolisms.

Eco-effectiveness inherently demands a great emphasis upon design – of products, production processes, distribution mechanisms, sales and marketing mechanisms, and product take-back and recycling infrastructures. Such redesign involves rethinking and rebuilding industrial processes and infrastructure, which in the best of cases is a long-term undertaking. In developing countries, this implies building both the necessary design capacity and the capability to tap into global technology and information support networks.

Responding to the pressures arising from stricter regulations on toxic chemicals, growing consumer awareness, and required health and safety standards to export to the industrialized countries, most notably to the European Union, SSA countries will need to build the technological capabilities for environmentally sound industrial development. Considering the potential scope of future regulation, assessing the assistance needs of individual countries emerges as an important challenge to the policy community.

Turning the vision of a regenerative industry into a reality is a demanding and complex endeavour, which calls for effective cooperation at different levels. Recognizing that firms are the main agents of technological change with the necessary innovative capacity to redesign products and business systems, it is essential that they be supported and encouraged by governments and international organizations to act in ways that are beneficial to natural and social systems. In this context, it is important to explore the concept of *global public goods* or the *commons,* since they provide the rationale for the public institutions, both domestic and international, to create a framework of incentives for the private enterprises to incorporate environmental and social criteria into their business objectives.

The UN Secretary-General's Global Compact initiative is an important step forward in this respect, hopefully leading to creative solutions in the quest to redefine industrial development along the lines proposed by the eco-efficiency vision. This requires a thorough change in the way we perceive industrial organization and firm-level environmental and business management, almost to the order of a new industrial revolution – but the experience of the companies that have already adopted the Cradle-to-Cradle strategy shows that effective design not only generates positive externalities but can also make good business sense. With the right tools and incentives, and with support from international institutions, governments and business leaders, enough momentum can be created globally to design a regenerative industry rather than remaining in constant fear of the negative consequences of overpopulation and economic growth.

Source: Braungart and McDonough, 2002; ibid. 2004.

nological capabilities of firms to compete in domestic and international markets.

Enhancing environmental capabilities within firms needs to go hand-in-hand with general capability enhancement, taking into account the resource intensity of new technologies. Building these capabilities within firms requires sizable investments in engineering skills, incentives to reward firms that upgrade their practices and assistance to local firms when they face difficulties getting their first world joint venture partners to invest in their technical upgrading (Angel and Rock, 2001).

Using technical extension institutions to build firm-level capabilities that enhance not only general capabilities but also environmental ones is a long-term effort. Existing technical institutions themselves need to build up subsector-specific environmental expertise. In the shorter term, other measures are also needed, possibly including subsidy programs supported by international resources for those willing to be early CT adopters. Without these measures, many firms, particularly SMEs, would hesitate to use technically proven CTs. Another, less costly measure is enhanced information dissemination about the financial and environmental benefits of ESTs, as well as the importance of addressing environmental issues. This would demand financial and technical support from the international community to facilitate the diffusion of ESTs to the African LDCs.

Table 4A.1 Data Summary for panel of 196 countries, 1960–2001.

Variable	*Variable abbreviation*	*Number of Observations*	*Minimum*
CO_2 emissions per international dollar of PPP GDP (kg per international dollar)	CO2GDP	3 510	0.0009
Total CO_2 emissions (kt)	CO2TOT	7 054	3.6640
CO_2 emissions per unit of land (kg per sq km)	CO2AREA	6 812	0.0000
CO_2 emissions per international dollar of industrial output (kg per international dollar)	CO2INDO	3 362	0.0035
Total BOD emissions (tons)	BODTOT	2 042	10.595
BOD emissions per unit of land (kg per sq km)	BODAREA	1 935	0.0162
BOD emissions per international dollar of PPP GDP (kg per international dollar)	BODGDP	1 842	0.0026
Capital expenditure (percent of total expenditure)	CAPEXP	2 938	0.57
Chemicals (percent of MVA)	CHEMSH	3 030	0.01
Machinery and transport equipment (percent of MVA)	MACHSH	3 004	0.08
Food and Beverages (percent of MVA)	FBTSH	3 230	0.41
Textiles and clothing (percent of MVA)	TEXTSH	3 214	0.03
Chemicals value added (million international dollar.)	CHEMVA	1 613	0.059819
Machinery and transport equipment value added (million international dollars)	MACHVA	1 591	0.160846
Food and Beverages value added (million international dollars)	FBTVA	1 715	12.030
Textiles and clothing value added (million international dollars)	TEXTVA	1 709	0.107870
Share of Industry value added in GDP (percent)	INDUSTSH	4 980	2.23
Industry value added (million international dollars.)	INDUSTVA	3 549	11.091
Share of MVA in GDP (percent)	MVASH	4 242	0.10
Energy per international dollar of PPP GDP (tons of oil equivalent per international dollar)	ENERGY	2 666	0.0505
PPP GDP per capita (current international dollar)	GDPPC	3 944	210
Personal computers (per 1 000 people)	COMP	1 442	0
Population density (people per sq km)	POPDEN	7 007	0
Fixed line and mobile phones (per 1 000 people)	TELEPHON	1 880	1

Source: World Bank, 2003.

Chapter 4 annex: Data and methodology

Organic water pollutant discharges are estimated by the World Bank. They are measured in terms of BOD; the amount of oxygen that bacteria will consume in breaking down waste. The measure of BOD effluent comes from an international study of manufacturing effluents from 13 countries (Hettige, Mani and Wheeler, 1998). Unless otherwise specified, data refers to the effluents at the national level between the years 1960–2001. However, the panel used is unbalanced, since there are many missing observations, especially for developing countries in the earlier years.

In focusing on BOD originating from industry, the World Bank data were used in conjunction with UNIDO statistics on subsector employment. An econometric analysis of the plant- and subsector-level data from the 13 countries found that the ratio of BOD to employee for each industrial subsector is almost the same across countries. The estimated BOD loading per employee was multiplied by UNIDO subsectoral employment estimates to generate figures for *subsectoral* effluent discharge by country.

Energy use consumption data for the manufacturing sector come from national data on consumption of fuels by fuel product type submitted to the International Energy Agency (IEA), which publishes an annual report on energy statistics.

The underlying data on commercial energy production and use are from electronic files of the IEA, which are reported in World Bank development indicators. CO_2 emissions are estimated by the IEA by applying carbon emission factors to total consumption of fuels by fuel product. IEA uses the carbon

	Maximum	*Standard Deviation*	*Mean*
	245.4880	17.8727	2.4372
	5 495	395 572 436	84 985
	117.4030	5.8623	1.1566
	33.8095	1.9767	2.0899
	3 099 527	248 950	78 717
	148 899	11 683	1 876
	2.9710	0.3527	0.4656
	68.01	12.28	18.31
	63.11	5.51	8.37
	61.54	10.79	13.33
	124.41	17.60	29.54
	84.59	10.56	13.39
	215 594	17 836	5 238
	521 848	46 470	12 472
	280 779	19 899	6 686
	207 164	13 883	4 328
	88.03	12.57	29.38
	2 614 368	188 882	57 310
	377.13	10.93	15.08
	2.297	0.271	0.376
	53 780	6 626	6 089
	625	108	72
	20 900	1 170	221
	1 701	305	294

Table 4A.2 Explaining total BOD emissions dependent variable: natural logarithm of total BOD emissions (BODTOT)

	Coefficients for		
Explanatory Variables	*Regression 1*	*Regression 2*	*Regression 3*
LN (GDPPC)	1.912	1.996	1.724
	(11.72)	(12.34)	(4.34)
LN ($GDPPC^2$)	–0.094	–0.099	0.087
	(–9.55)	(–10.25)	(–4.08)
LN (INDUSTVA)	0.386	0.342	0.647
	(7.64)	(7.45)	(8.59)
LN (MVASH)	0.496	0.464	0.529
	(12.41)	(12.48)	(6.97)
LN (TEXTVA)	0.099	0.098	0.155
	(5.89)	(5.84)	(5.23)
LN (MACHVA)	0.089	0.095	0.076
	(5.00)	(5.66)	(2.61)
LN (CHEMVA)	0.028	–	–
	(1.69)	–	–
LN (FTBVA)	0.045	–	–
	(1.40)	–	–
LN (TELEPHON)	–	–	0.553
	–	–	(2.28)
Summary statistics			
R^2 (within-units regression)	0.440	0.430	0.490
Gaussian Wald χ^2-statistics	775	776	396
Number of observations	1 088	1 117	592
Number of countries	91	96	75
Average observations per group	12.0	11.6	7.9

Notes: All variables are in natural logarithms (LN).
All results reported refer to the random effects model.
Figures in brackets refer to z-statistics.

Table 4A.3 Explaining variations in CO_2 emissions dependent variable: natural logarithm of total CO_2 emissions (CO2TOT)

	Coefficients for		
Explanatory Variables	*Regression 1*	*Regression 2*	*Regression 3*
LN (GDPPC)	2.077	2.868	2.835
	(15.04)	(19.71)	(20.34)
LN ($GDPPC^2$)	0.090	–0.110	–0.107
	(–10.61)	(–12.96)	(13.35)
LN (INDUSTVA)	0.279	0.265	0.228
	(5.60)	(5.51)	(4.77)
LN (MVASH)	0.224	0.185	0.106
	(5.68)	(5.01)	(2.81)
LN (TEXTVA)	–0.483	–0.028	–
	(–2.76)	(–1.61)	–
LN (MACHVA)	0.068	–	–
	(4.45)	–	–
LN (CHEMVA)	–	–	–0.032
	–	–	(–2.04)
LN (ENERGY)	–	0.696	0.697
	–	(16.26)	(16.42)
Constant	–2.069	–8.647	–8.330
	(–3.72)	(–13.90)	(–13.80)
Summary statistics			
R^2 (within-units regression)	0.615	0.673	0.694
Gaussian Wald χ^2-statistics	2 080	2 655	2 793
Number of observations	1 440	1 373	1 301
Number of countries	103	91	86
Average observations per group	14.0	15.1	15.1

Notes: All variables are in natural logarithms (LN).
All results reported refer to the random effects model.
Figures in brackets refer to z-statistics.

Table 4A.4 GDP and population size as aggregate scale factors and high technology exports as Technology Index in CO_2 regressions

	Dependent variables					
Explanatory Variables	*LN (CO2TOT)*	*LN (CO2TOT)*	*LN (CO2GDP)*	*LN (CO2INDO)*	*LN (CO2AREA)*	*LN (CO2AREA)*
LN (GDP)	0.820	–	–	–	0.255	–
	(9.05)	–	–	–	(3.80)	–
LN (POP)	–	0.813	–0.160	0.463	–	0.249
	–	(9.03)	(–1.80)	(8.02)	–	(3.72)
LN (GDPPC)	2.630	3.430	2.742	0.483	0.623	0.874
	(6.72)	(8.21)	(6.49)	(3.13)	(3.78)	(5.58)
LN (GDPPC²)	–0.161	–0.160	–0.174	–0.028	–0.045	–0.045
	(–7.23)	(–7.20)	(–7.70)	(–3.43)	(–5.57)	(–5.56)
LN (INDUSTVA)	0.180	0.187	0.171	(–0.610)	0.328	0.331
	(2.16)	(2.16)	(2.09)	(–13.29)	(7.14)	(7.21)
LN (MVASH)	0.162	0.162	0.147	0.110	0.164	0.164
	(2.08)	(2.08)	(1.85)	(2.98)	(4.39)	(4.40)
LN (MACHVA)	0.024	0.024	–0.026	0.096	0.617	0.616
	(1.59)	(1.58)	(–1.80)	(7.32)	(4.72)	(4.72)
LN (HTEXP)	–0.020	–0.020	–0.227	–	–	–
	(–1.77)	(–1.77)	(–2.00)	–	–	–
Summary statistics						
R^2 (within-units regression)	0.552	0.552	0.183	0.664	0.646	0.646
Gaussian Wald χ^2-statistics	1 540	1 540	109	2.439	2 540	2 538
Number of observations	563	563	535	1551	1546	1546
Number of countries	90	90	88	105	105	105
Average observations per group	6.3	6.3	6.1	14.8	14.7	14.7

Notes: GDP ... Total PPP GDP (million dollars), POP ... Total population size (million people), HTEXP ... High technology exports (million dollars).
All variables are in natural logarithms (LN).
All results reported refer to the random effects model.
Figures in brackets refer to z-statistics.

Table 4A.5 Poverty and pollution: effects of poverty on BOD and CO_2 levels

	Dependent variables							
Explanatory Variables	*LN(BODTOT)*	*LN(BODAREA)*	*LN(BODGDP)*	*LN(BODIND)*	*LN(CO2TOT)*	*LN(CO2AREA)*	*LN(CO2GDP)*	*LN(CO2IND)*
LN (POOR)	0.154	0.149	0.154	0.155	0.187	0.173	0.167	0.127
	(2.17)	(2.11)	(2.17)	(2.17)	(3.95)	(3.71)	(3.41)	(1.80)
LN (GDPPC)	2.724	2.389	1.745	2.724	1.875	1.574	1.325	2.035
	(6.18)	(4.88)	(3.96)	(6.18)	(5.04)	(4.09)	(4.08)	(4.49)
LN (GDPPC²)	–0.151	–0.136	–0.152	–0.150	–0.074	–0.06	–0.099	–0.082
	(–6.60)	(–5.45)	(–6.93)	(–6.60)	(–3.80)	(–3.23)	(–5.83)	(–3.49)
LN (INDUSTVA)	0.392	0.305	0.387	–0.608	0.179	0.140	0.210	–0.732
	(5.3)	(4.01)	(5.25)	(–8.25)	(3.26)	(2.52)	(4.35)	(–10.17)
LN (MVASH)	0.701	0.518	0.699	0.701	0.069	0.091	–	–
	(8.89)	(5.27)	(8.85)	(8.89)	(1.40)	(1.76)	–	–
LN (COMP)	–0.885	–0.332	–0.0887	–0.89	–0.031	0.020	–0.434	–0.584
	(–7.64)	(–2.48)	(–7.65)	(–7.64)	(–3.69)	(2.22)	(–5.70)	(–5.39)
LN (POP)	0.466	–0.249	–0.528	0.466	0.832	0.215	–0.164	0.771
	(5.51)	(–2.04)	(–6.24)	(5.51)	(12.05)	(2.31)	(–3.41)	(9.73)
Summary statistics								
R^2 (within-units regression)	0.165	0.129	0.637	0.637	0.412	0.399	0.277	0.233
Gaussian Wald χ^2-statistics	785	103	958	983	1 522	637	319	235
Number of observations	655	645	655	655	1 048	1 039	1 141	1 352
Number of countries	91	90	91	91	135	133	154	156
Average observations per group	7.2	7.2	7.2	7.2	7.8	7.8	7.4	8.7

Notes: POOR ... Poor (people living with less than 1 000 dollar), POP ... Total population size (million people), BODIND ... BOD emissions per unit of industrial output (kg per dollar).
All variables are in natural logarithms (LN).
All results reported refer to the random effects model.
Figures in brackets refer to z-statistics.

emission factors for energy consumption and industrial processes recommended by the Intergovernmental Panel on Climate Change (UNEP, 1995).

The description and general characteristics of the data used are presented in table 4A.1 below.

All variables were converted into natural logarithms and both random-effects and fixed-effects models were estimated, but since the former performed best and were not rejected by the Hausman test we report only the results of the random-effect models.

Once a 'best fit' with the standard variables was attained, additional variables representing technology, aggregate scale, population density and poverty and policy, as well as a number of conditioning variables such as indicators of open-

ness of the economy and economic freedom, were included. The limited series of data on these variables for a limited number of countries (which varied from variable to variable) resulted in a drastic reduction in the number of observations (from over three thousand and to under one hundred) and the degrees of freedom, with corresponding reduction in the quality and statistical significance of the results. Concerns about possible collinearity were dealt with by constructing the covariance matrix of the independent variables and checking for relatively high correlation coefficients between explanatory variables. Collinear variables are redefined to reduce collinearity or dropped altogether.

Source: Panayotou, 2004.

Notes:

This chapter is based on a background paper by T. Panayotou (2004). However, the views expressed here are of UNIDO and do not necessarily reflect those of the author.

1 The data is from the World Bank database, covering 196 countries for the period 1960–2001. It should be noted that, as information was missing on some of the countries for certain years, the data set used is an unbalanced panel. The BOD, CO_2 and energy efficiency refer to national levels (the whole economy). For details of the analysis please refer to annex to this chapter, table 4A.5.

2 For a brief overview of the literature on the EKC and its findings please refer to Panayotou, 1995. For a skeptical view, see Stern, 1998, 2003.

3 For details of the methodology and data used please refer to annex to this chapter.

4 Adeoti (2002) and Montalvo (2002) examine the determinants of EST adoption in developing countries, finding that technological and organizational capabilities are among the most important determinants of firms' decisions to employ ESTs.

5 The survey was conducted in nine countries for four highly-polluting industrial subsectors, namely textile dyeing and finishing (Thailand and Tunisia), leather tanning (Kenya and Zimbabwe), pulp and paper (Brazil, China, India, Viet Nam) and iron and steel (Mexico) (UNIDO, 2002).

6 For a survey of use of innovative environmental instruments in developing countries, see World Bank, 2000.

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CHAPTER 5

Advanced technologies: from elusive promise to reality in Sub-Saharan Africa

Diffusion of advanced technologies: a compound challenge for Sub-Saharan Africa

Building technological capabilities is a critical element of structural change in SSA countries (Chapters 1 and 3). This entails not only the capacity to adopt conventional technologies which play a significant role in the earlier stages of industrial development, but also the building of capabilities to respond to the challenges and opportunities presented by emerging technologies. This submits to the SSA countries a compound challenge – to assimilate and adapt the well-tried technologies required to diversify their productive structure while upgrading their ability to benefit from emerging technologies, and thus be able to compete in international markets.

The revolution in life sciences and information and communication technologies (ICTs) during the last decade has brought about new opportunities for wealth creation and hopes for novel development solutions. New technologies – such as ICTs, Biotechnology and Spatial Information Technologies (GIS) – all represent a bundle of diverse new applications in agriculture, manufacturing, health, and environmental management that can be of significant value to poverty reduction in SSA, once certain prerequisites, such as infrastructure and human capacity, are fulfilled.

The ability to tap into advanced technologies can improve productivity dramatically in all sectors as well as enhancing governance.

Access to ICTs and biotechnology products for the poor at large, especially in disadvantaged regions and rural areas, has been widely perceived as a humanitarian cause, as advanced-technology applications are important tools in alleviating the worse forms of poverty and consequently achieving the MDGs (UNDP, 2001). For instance, they can help provide solutions to basic needs by providing cheaper diagnostic kits and drought-resistant seeds through the different applications of biotechnology. The first meeting of the World Summit on Information Society (WSIS; Geneva, 2003) and the UN Commission on Science and Technology for Development (CSTD) have recently highlighted the importance of promoting universal Internet access at affordable costs for the achievement of internationally agreed development goals.

There is a common misconception that R&D and technological foresight activities are luxuries that SSA cannot afford.

At the same time, the ability to tap into advanced technologies can improve productivity dramatically in all sectors as well as enhancing governance via more effective use of data and transparency of public information. For example, the state of Andhra Pradesh in India has pioneered the use of GIS and ICT applications to provide public Internet access to geographic information maps of regional planning zones including data on natural resources, infrastructure and designated investment zones, which has enabled both policymakers and investors to access valuable information for decision making (box 5.1, p.110). The diffusion of advanced technologies and the subsequent reduction in costs can be an important opportunity for SSA countries to achieve productivity increases in the service industries matching or even surpassing those in manufacturing, which was not the case when the East Asian economies took off.

The ability to utilize advanced technologies at the enterprise level requires building capabilities and networks between public institutions such as universities and vocational training centers, industry support organizations and R&D, and other sectors such as banking. As enterprises play a key role in bringing new products, processes and organizational methods into economic use, and as markets are often ridden with pervasive risks and information asymmetries, they require significant support to build up the technological capabilities necessary to overcome the hurdles in deploying advance technologies.

Box 5.1 Hyderabad and the State of Andhra Pradesh: successful application of IT and GIS needs

Hyderabad is the fifth-largest city in India, with a large population of poor slum dwellers, which is being transformed into one of the most prominent ICT centres in India. In the last few years, Andhra Pradesh, under the leadership of its visionary chief minister Chandrababu Naidu, has followed a global strategy for the use of IT and modern technology as a lever to transform the state and make it competitive nationally and internationally.

As part of the effort to use ICTs and spatial information technologies more effectively towards development goals, the state has initiated a district-mapping effort to be implemented by a local private spinoff of the National Remote Sensing Agency (NRSA). A repository of spatial and attribute data has been created, and a centralized database has been developed to serve for the information needs of multiple users at a low cost and with minimum data redundancy.

The first stage of the project provided all the ministers, members of the Legislative Assembly, and the key departments in the state administrative machinery, full user access to this database, which is now being extended to the general public. When the project is completed, it will allow entrepreneurs wishing to invest in Andhra Pradesh to access all the necessary facts over the Internet, including information on permissible investment zones and surrounding infrastructure.

The Suitability Map, as the end-product is called, is a combination of 31 layers of maps, including air and surface water sensitivity, which allows a strategic environmental analysis of proposed plans. The database also helps planners and policymakers take informed decisions on applications in agriculture, irrigation, public health, urban development, forestry and crisis management.

Although there are many doubts about the merits of this modernization plan in the face of outstanding basic human needs such as water, sanitation, and primary education in the state, Hyderabad's strategy can provide interesting lessons for policymakers in SSA. Apart from being used to manage Andhra Pradesh's resources, GIS and IT in general have also changed the way in which the region is perceived, and this is attracting business and investment. Hyderabad is now recognized for its IT activities, and competes successfully with nearby Bangalore, one of the most successful IT centers in India. Also, the creation of HITEC City, a technological park with high-quality telecommunications links, office space and recreational facilities for software companies, has generated more opportunities for advanced-technology companies to flourish. Hyderabad now boasts a prestigious new business school, the Indian School of Business, founded in cooperation with Northwestern Kellogg and Wharton business schools in the USA, and the International Institute of Information Technology.

Andhra Pradesh is a good example of how GIS and broader IT applications can be used to increase productivity and investment, benefiting from clustering, concentration of financing resources and favorable regulatory environment. Clearly, the leadership of Andhra Pradesh played a pivotal role in this by embarking on partnerships with the private sector and providing the necessary impetus for advanced technology to flourish.

Source: Rom e. a., 2002.

Take the recent proliferation of e-commerce, which is now also being experimented in some SSA countries, most significantly in South Africa. Potentially, e-commerce can be an important tool for the online exchange of information and products, and services such as tourism, which would help SSA countries promote their offers more widely. In Kenya, a well-known high-street leather producer and retailer, Adelphi, has recently started to make its products available through the Internet both domestically and abroad, using online credit transactions and international couriers to deliver orders (The Nation, 2003). However, experiences elsewhere show that simply having a website doesn't deliver customers: firms still need the resources and know-how to market. In addition to this, the financial transactions using the Internet are very costly for African enterprises, due to both the perception of financial risk on the continent and the weak banking structure.[1]

A strategy to build capabilities and deploy advanced technologies in SSA requires addressing constraints on both demand and supply sides.

There is a common misconception that R&D and technological foresight activities are luxuries that SSA countries cannot afford (Chapter 3). However, R&D is critical to adopting existing technologies as well as to keep abreast of new technologies as they emerge.[2] Building new capabilities enables better and faster diffusion of new technologies, lowers the cost of technology transfer and captures more of the spillover benefits created by the operation of foreign firms (CSTD, 2004).

In the last decades, there has been little progress in furthering technology institutions in SSA. Many countries have experienced a recess since the earlier days of independence; a decline which has coincided with the decline in manufacturing growth in parts of SSA, and the premature de-industrialization of the economy due to pervasive structural impediments (Chapter 2).

Clearly, a strategy to build capabilities and deploy advanced technologies in SSA requires policies to address constraints on both the demand and supply sides. For advanced-technology markets in SSA to grow, a sizable user base must be established; the recruitment of scientists and engineers and the demand of services of the private sector that facilitate the diffusion of these technologies will not suffice, in and of themselves, to generate a market response. Conversely, without a substantial increase in technological capabilities in the form of secondary and higher education, relevant technology infrastructure and support institutions, there cannot be a critical mass of users. In addition, the mix of different applications of ICT and biotechnology needs to be adapted in the design of the relevant policies according to the intended users, comprising at least two levels: low-capacity applications for the use by the public at large and high-capacity applications for private firms, research institutions and universities.

What Sub-Saharan Africa needs in order to reap the benefits

The contrast between the expense and complexity of advanced technologies and the available physical, financial

and human resources in the LDCs, casts some doubt on how far, if left to the market and without substantial public overhead investment, these technologies can actually take root in these often difficult settings.

On one level, the cost of accessing modern ICTs such as the Internet or mobile telephones is still inhibitory for a large portion of the population in SSA countries. For instance, 30 hours of Internet use (including internet service provision and telephone charges) costs on average $50 in SSA countries, representing 207 percent of average per capita income *per month* (table 5.1). For businesses, connection charges are on average 17.5 percent higher, and monthly subscriptions are also 15 percent higher than residential rates. (ITU, 2002) Although the success of mobile phones in Nigeria has illustrated that there is enough buying power and market demand, especially in the larger SSA economies, problems with infrastructure, such as the unreliable energy supply, undermine the ability to provide a cost-effective service. The proliferation of cyber-cafés and community telecenters has expanded access, helping to increase the number of Internet users in SSA from an average of approximately 30 000 people in 1996 to more than 2 million in 2001 (excluding South Africa), while the number of personal computer users only went up from 6 to 15 per thousand people in the same period (ITU, 2002). These averages obscure the disparity between countries; for example, while Cape Verde has low access charges that are comparable, overall, to those of more developed countries, Central African Republic charges are among the highest in the world.

Many SSA countries lack the scientific and administrative expertise to establish the necessary regulatory regimes.

At the other end of the spectrum, the fixed startup costs of biotechnology laboratories, Spatial Data Infrastructures used for GIS, or computer networks for use in the productive sectors of the economy, are also disproportionate to available resources in the absence of external financial and technical help. For example, a recent partnership between the Canadian International Development Agency (CIDA) and NEPAD aiming to strengthen biosciences in Africa included a project costing approximately $ 20 million to establish a regional biosciences center for East and Central Africa located on the International Livestock Research Institute campus in Nairobi. While most of the financial resources are initially needed to upgrade the physical facilities, recurring costs can reach more than 10 percent of the initial capital costs annually for such projects.

The adoption, adaptation and eventually innovation related to technological upgrading require the ready availability of a certain skill pool. Apart from technical skills, managerial capabilities are also an important factor in the success of advanced technologies. In this regard, in the SSA countries, where average gross secondary and tertiary school enrollment are 27 percent and 4 percent respectively, that achievement of the MDGs will provide an important impetus to the provision of the necessary skill pool. Achieving universal primary schooling and ensuring gender equality in secondary education will help to create the base for improving tertiary education. In this respect, it is advisable that SSA governments devise a strategy in stages for the medium- to long-term, starting with improving basic skills and gradually building up more capacity in advanced education and training. While trying to upgrade capabilities in emerging technologies, countries like the Republic of Korea have long depended on a step-by-step strategy that reformed education and technical skills from the bottom up[3]. This strategy allowed them to gradually build a critical mass of scientists, engineers and innovative firms.

A viable strategy requires, along with the strengthening of the educational base, substantial investments to improve the existing capabilities of the scientists, public and private research personnel and entrepreneurial firms in SSA and improve the links between them. There are already numer-

Table 5.1 Internet access charges in SSA, 2001

	Internet service provider access charges (dollars per 30 off-peak hours)	*Internet telephone access charges (dollars per 30 off-peak hours)*	*Share of the cost of 30 hours off-peak internet use in GDP per capita per month (percent)*
Angola	20.00	0.57	47
Benin	128.94	0.93	368
Botswana	14.71	0.14	4
Burkina Faso	28.79	0.84	142
Cameroon	77.25	0.56	134
Cape Verde	0.21	0.27	..
Central African Rep.	165.73	1.40	592
Comoros	93.64	1.40	263
Congo, Dem. Rep.	95.00	..	1 339
Côte d'Ivoire	183.29	0.25	308
Eritrea	22.53	0.21	175
Ethiopia	94.00	0.24	938
Gabon	35.11	1.26	10
Gambia, The	17.98	2.70	65
Ghana	36.00	0.38	104
Guinea	58.47	0.86	116
Kenya	65.56	0.46	244
Lesotho	12.20	0.17	26
Madagascar	66.49	0.44	317
Mali	70.23	0.72	292
Mauritania	29.30	0.76	72
Mauritius	22.86	0.38	6
Niger	63.20	0.53	368
Nigeria	44.20	0.57	209
Rwanda	38.49	0.36	184
Senegal	14.05	0.53	28
Seychelles	8.50	1.40	2
South Africa	29.60	0.33	9
Sudan	2.50	2.33	18
Swaziland	11.53	0.24	9
Tanzania	69.00	0.79	425
Togo	8.00	0.75	33
Uganda	30.00	0.82	104
Zambia	19.00	0.31	57
Zimbabwe	45.53	0.34	98
Average	49.20	0.71	203

Source: ITU, 2002 and UNIDO calculations based on WDI, 2003.

ous initiatives promoted by regional or international public and private partnerships precisely to address these needs.

One good example is the establishment of University of Science, Humanities and Engineering Partnerships in Africa (USHEPiA), a program involving eight universities across SSA to provide postgraduate fellowships, lecturing exchanges, short courses, and joint research projects.[4] Another regional effort to raise scientific capabilities is the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), which brings together the National Agricultural Research Institutes (NARIs) of ten African countries (CSTD, 2004).[5]

Similarly, in an effort to train university students and workers on how to design, build, and maintain computer networks, Cisco Systems Inc., UNDP, the US Agency for International Development (Leland Initiative/EDDI), United Nations Volunteers (UNITeS) and International Telecommunication Union joined forces in 2000 to establish Cisco Networking Academies in 31 African countries, of which 25 are LDCs (CISCO, 2003). This effort, combined with other similar projects to raise the capacity of African scientists, engineers and enterprises, is an important step forward – though in the absence of complementary reforms to encourage the private sector to make use of these skills, training on its own might not be enough.

There are problems regarding the specific technological infrastructure to enable the widespread use of advanced technologies.

Another vital dimension of advanced technologies is the need to manage effectively the risks associated with them. Many SSA countries lack the scientific and administrative expertise to establish the necessary regulatory regimes. The evolution and growth of biotechnology, for example, has been characterized by numerous uncertainties in the scientific, ecological, socio-economic spheres. Consequently, public debate and anxiety have intensified over the potential negative environmental, economic and human health impacts of some of the products and processes of biotechnology.

Unfortunately, while scientific knowledge of how to develop and apply biotechnology products has grown internationally, risk factors are much less understood. These include economic risks for potential investors in SSA associated with proposed regulatory regimes, such as strict labeling and traceability requirements, that put an extra burden on SSA producers. Not only do they find it difficult to segregate transgenic crops from other produce, but SSA countries have little capacity in the MSTQ institutions (Chapter 3) to monitor, test and regulate these crops cost-effectively before they are granted access to developed-country markets.

Another constraint is the scant capacity of most SSA governments to deal with the demands posed by the regulation of intellectual property rights. In the application of biotechnology in SSA, there are important lessons to be learned from the experience of the Green Revolution in South Asia, especially as regards its impact on vulnerable small farmers who are dependent on imported inputs (box 2.1).

Finally, the basic infrastructure is often lacking or at best unreliable in most of SSA. Not only is the provision of basic infrastructure such as paved roads and telephones low, especially compared to other developing regions, but the prerequisites for economic takeoff, with regard to the quality and quantity of these services, might be higher today than in the past (Chapter 1 Annex and Chapter 2). In particular, reliable access to energy and transport are critical factors in bringing to market the benefits of information technologies, geographical information systems (based in the digital medium) and biotechnology products. For example, providing cost-effective Internet or telephone service in marginalized areas depends on the availability and reliability of the power supply, without which isolated projects cannot be scaled up (box 5.2).

Here it is significantly the government's role to decide on the appropriate infrastructure by either expanding national grids or alternative small-scale power generation units especially in the most remote areas, and partner with private sector to build and upgrade basic necessities. It is also important to notice that investments in basic infrastructure foreseen in the implementation of MDG-based targets and PRSs will not only provide economy-wide gains, but will also fulfill some of the basic prerequisites to enable the uptake of advanced technologies.

Beyond the basic infrastructure, there are further problems regarding the specific technological infrastructure to enable the widespread and cost-effective use of advanced technolo-

Box 5.2 Interfacing renewable energy and ICTs in rural communities

Lack of access to modern energy services in the rural and marginalized areas is a significant hindrance for the diffusion of advanced technology applications in SSA. While the technological options for bringing reliable energy services to disadvantaged regions are relatively well explored, domestic resources are often lacking to implement an appropriate combination of capacity-building, technology-transfer, training, financing, and maintenance activities to make these plans reality. They require international partnerships.

In an effort to promote technical-cooperation activities that help income-generation and productive uses in the LDCs, UNIDO initiated a project to connect off-grid communities in Zambia and Malawi to the Internet using renewable energy sources.

Although the initial proposal envisaged establishing independent franchised telecenters powered by renewable energy, an investigation of the rural environment showed that their low population density and poverty would affect the prospects of financial sustainability of a large-scale commercial project.

Consequently, the scheme was redesigned as a public/private partnership, focusing on delivering services through Zambia's Zonal Teacher Resource Centres and Malawi's Teacher Development Centres in rural areas. In this way, the centers can fulfill their educational requirements by supplying the necessary services to teachers from surrounding communities, while also functioning as commercial businesses in their own right by offering tailored services. As a result, this project is expected to provide cost-effective and appropriately scaled services that will both benefit local entrepreneurs and provide important social services to the host communities.

Source: UNIDO.

gies. For example, there is no continental infrastructure to carry local and regional cyber-traffic across Africa, so African countries have had to use costly infrastructure in the EU and US. The proposed African Internet Exchange initiative, among others, is trying to address this problem, but as is the case with mobile telephones there have been numerous regulatory hurdles (Southwood, 2003). Once again, in order for the LDCs to benefit from widespread use of advanced technologies, further investments in technological infrastructure will be needed along with the institutional framework for technology transfer.

Looking forward: policy dimensions

Investing in new technologies demands important policy choices and trade-offs, from the kind of infrastructure to support new technologies to the ethical considerations relating to bio-safety. SSA governments, civil society and the private sector need to be informed of the benefits and costs of adopting and adapting new technologies to their circumstances.

As community telecommunication centers and prepaid mobile telephones have illustrated, it is possible to bring advanced technologies profitably to poor regions using the right mix of services and a basic level of infrastructure. However, in order to scale up such initiatives so they can bring pronounced social and economic benefits, the fundamental structural impediments have to be overcome and the supportive institutional framework has to be put in place.

Countries need push-and-pull strategies to build capabilities while encouraging enterprises to adopt advanced technologies.

Furthermore, a mix of less regulation, pump-priming funding for initiatives and the transfer of technical skills does not necessarily guarantee success in developing private-sector initiatives in this area (Chapter 3). As advanced technology markets are intrinsically risky and relatively small in SSA, countries need to use push-and-pull strategies to build capabilities while giving incentives for enterprises to adopt advanced technologies. This also requires building effective networks between universities, technical schools, R&D agencies, financial institutions and the private sector. Hitherto in Africa the links between the research community – scientists and laboratories – and commercial markets have been extremely weak.

As government agencies and international organizations are important customers for the services provided by advanced technologies in LDCs, they have an important role to play in promoting the diffusion and adoption of ICTs and other technologies. Governments can promote the production of local content by using e-government services more widely (WEF, 2003): in countries like South Africa and Tanzania, e-government applications are already being used with some encouraging results. On the whole, the policy framework needed to regulate and encourage the development of these markets should address issues covering market structure, pricing, universal/service access, security, quality and the supporting infrastructure.

In the long run private investment will be crucial to the uptake of advanced technologies in SSA is.

While there are good examples of international efforts to create a regulatory framework for biotechnology products – by CODEX, UNIDO, and the EU, among others – implementing safety regimes may encounter difficulties due to the absence of technical capacity in SSA. Similar is the case of identification, evaluation and monitoring of risks associated with ICTs. The WSIS Plan of Action mentions security among the 'main pillars of the Information Society', and calls on national governments to develop guidelines, in collaboration with the private sector, in order to prevent, detect and respond to cyber-crime and misuse of ICTs, introducing legislation that allows for effective investigation and prosecution in the case of misuse. However, such security measures have potentially tremendous cost implications for SSA, in terms of both financial and human resources. One possible way forward is to build regional scientific and administrative capabilities to implement and oversee safety regimes.

Some initiatives along these lines have already been launched in SSA at the regional level in the past few years. As mentioned earlier, NEPAD has recently granted high priority to biosciences as one of the means to generate economic and social development. NEPAD has outlined plans for an Africa-wide network on biosciences, driven by regional centers of excellence located in East, West and Southern Africa, supported by international donors such as CIDA. One important advantage of NEPAD-promoted cooperation and research networks would be their ability to orchestrate an optimal use of the complementarities and economies of scale at the regional level.

These regional efforts are being augmented by international technical and financial assistance to SSA. The WSIS, in its second phase, is expected to launch new capacity-building initiatives, especially in the LDCs, complementing the work done by infoDev, a global multi-donor program under the auspices of the World Bank to promote ICTs for social and economic development.

In the long run private investment will be crucial to the uptake of advanced technologies in SSA in these fields. While public initiatives such as those mentioned above have illustration value in most cases, demonstration projects often don't take properly into account entrepreneurial attitudes or financial sustainability. More work needs to be done for

private sector development. Given the current low level of development of advanced technology markets in SSA, this will require creative policy interventions to ensure that the constraints binding private sector development in this field are gradually removed (Chapter 3).

The well-educated, technically and managerially experienced diaspora of SSA nationals is an important font of skills and resources.

In this vein, the extension approach successfully employed in other developing countries, creating explicit links between public and private institutions such as universities, state R&D laboratories, and firms, should be encouraged in SSA countries. Similarly, science & technology parks and incubators have played an important role elsewhere in the creation of business ventures that focus on technology commercialization and diffusion. These need to be considered and planned paying close attention to the unique characteristics and opportunities presented within the region, particularly regarding private sector development. Ultimately, the best gauge of the success of this kind of initiatives is the extent to which they can effectively mobilize private risk-capital.

The well-educated, technically and managerially experienced diaspora of SSA nationals, who are already forming vibrant online communities, is an important source of skills and resources. Overall, reforms in the fields of education, infrastructure, financial markets and technology institutions need to complement each other to create the necessary conditions for advanced technologies to build up a critical mass of users and create a sustainable market base from which the private sector can further develop.

Notes:

[1] For example, SSA firms that have a merchant Visa account in a developed country, are charged 2–2.5percent per transaction, PayPal, a registered service, charges 3.2percent. While currently 99 percent of the electronic transactions in SSA are carried out in South Africa, in other parts of SSA banks charge even higher rates – as much as 7percent per transaction. (Southwood, 2003)

[2] Even in Ireland, which has emerged as the number one exporter of software in the world, the 'low' R&D spending of less than 1.5 percent of GDP in 2002 is becoming an important concern for the sustainability of its ICT sector's success in the long term (Irish Times, 26 March 2004).

[3] For example, the Republic of Korea's Biotech 2000 Plan of Action has three main phases: the acquisition and adaptation of bio-processing techniques and improvement in performance of R&D investment (1994–1997); consolidation of the scientific foundation for development of novel products (1998–2002); and biotechnology market expansion locally and internationally (2003–2007). To meet these goals, the Korean authorities initiated training programmes in universities, established specialized R&D centres and private sector participation. (CSTD, 2004)

[4] http://web.uct.ac.za/misc/iapo/ush.htm

[5] http://www.asareca.org/

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CHAPTER 6

Promoting industrial development in Africa: Policy needs

Introduction

Any prescriptive discussion about Sub-Saharan Africa (SSA) needs to heed some basic realities.

There is no single, unique path out of poverty. The predicament of SSA countries differs depending on whether they are rich in natural resources, or coastal, or land-locked and on the way they draw on these and a host of other attributes, including their policies and institutions.

The greatest shortfall in MDGs will be in the countries where poverty is already the worst, and where it has been spreading fastest.

Achieving the Millennium Development Goals (MDGs) means reaching certain basic thresholds, such as those relating to health, nutrition, education, gender, infrastructure and the environment. Doing so is essential for the poorest countries to take-off.[1] For example, poorer *non-economic* initial conditions in SSA induce a loss of between 0.6 and 1.6 percentage points in growth rates relative to the average of a sample of high-performing developing economies. Unfavourable *economic* initial conditions detract a further 0.4 to 1.0 percentage points (Chapter 1 annex).

At the same time, there will be little hope of sustaining progress towards the MDGs if decisive steps are not taken towards growth-inducing capability building and structural transformation within the timeframe specified.

Unless economic performance improves dramatically over the next decade, the goal of halving income poverty by 2015 will not be achieved in most SSA countries. On current trends, only eight countries, representing less than 10 percent of total SSA population, with required per capita income growth rates of less than two percent, are likely to reach their income poverty MDG by 2015. As a result, poverty will not be halved in some 35 SSA countries containing 80 percent of the region's population unless they attain growth rates far higher than in the past. The most frequent per capita income rate required is around four percent per year. In addition, MDG-required growth rates cannot be attained instantly. As the experience of successful recent industrializing countries shows, it takes around a decade of 'warming up' before sustained high rates of growth can be achieved. For this very reason, steps in that direction need to start being taken as soon as possible (Chapter 2).

Calculating the growth rates that are necessary to halve absolute income poverty by a certain date relying on poverty headcounts and an assumption on income distribution is a rather straightforward exercise. Specifying where all that growth is to come from is quite another matter.[2]

Three transitions are at stake in this respect. First, the *demographic* transition involving substantial falls in fertility rates. This helps reduce the denominator in the income per capita indicator while releasing resources to increase human capital per head.[3] Second, structural change in agriculture (or the *productivity* transition) via the introduction of better cultivation practices. And third, the *technological* transition, that is, compositional change within manufacturing to absorb surplus labour from the agricultural sector while shifting upmarket from low income elasticity subsectors to more capital and skill intensive activities. This transformation requires capacities to exploit advanced technologies, access to infrastructure services and an environment conducive to entrepreneurial risk-taking and innovation (Chapter 5).[4]

Successful industrialization has long been, and remains, the most powerful engine of structural change and modernization.

The sum total of these transitions translates into economy-wide productivity growth, which is the ultimate growth engine. This entails important reductions in unit labour costs, the main way to gain sustainable competitive standing. Producing cost-competitive goods and services is, however, a necessary but not a sufficient condition particularly when it comes to compete in international markets. Tapping into world markets as growth engine requires a lot more in terms of the ability to conform to quality, safety, environmental and sanitary standards and technical regulations.

Other specific, complementary growth engines are as follows.

Some coastal economies – South Africa in motor vehicles and clothing and textiles, Mozambique in aluminium and gas, and Mauritius and Madagascar in clothing – can continue to grow by enhancing their ability to move up market by adding greater value added to output and exports.

All SSA economies have the chance to exploit preferential trading arrangements either with African partners or on a North-South basis, by taking advantage of preferential entry to the rich markets of North America and the EU (Lesotho and Swaziland).

Mauritius – a country written off 40 years ago as a hopeless case – has demonstrated that Export Processing Zones (EPZs) do offer a viable growth path in SSA, provided basic conditions are satisfied and appropriate policies implemented.

A handful of countries with reasonably good infrastructure may manage to penetrate global value-added production chains, most likely in clothing, but also in auto components, timber products, horticulture, beverages and foodstuffs.

Foreign direct investment (FDI) is still a further potential growth engine to be tapped, particularly in connection with the diversification of the economies to exploit foreign market opportunities.

Ultimately maximizing, growth entails paying enough attention to the microeconomic foundations of development rather than grandiose macroeconomic plans and strategies. It is this critical mass of multi-dimensional policies and measures, some of them minor, that will create the underpinnings of wealth creation and sustainable growth. Corporate strategists distinguish between designing effective policies ('doing the right things') and implementing them efficiently ('doing things right'). The challenge for SSA is to move beyond the design of appropriate macroeconomic policies to the implementation of effective microeconomic measures that foster productivity growth.

Whatever its source productivity growth will not be the automatic result of progress towards attaining the MDGs. Increased public sector spending and investment to achieve the MDGs as envisaged in the Poverty Reduction Strategy Papers (PRSPs) will help to create a platform for take-off. But take-off will only occur if private enterprise is 'crowded in' (Chapter 3).

While the relationship between environmental degradation and industrial development is not constant along countries' development path, the gains from abatement scale economies for key pollutants come at a very late stage of development. For these reasons, environmental interventions become critical at a very early stage of development, especially because the decisive detrimental impact of poverty on the environment, in turn largely owed to slash and burn exploitation of agricultural and forestry resources (Chapter 4).

Industrial development and the Millennium Development Goals

The MDGs are more than goals and targets set by the international community for minimum levels of human and social well-being in poor countries. They are also basic preconditions for sustained economic development. Most analysts now accept that social and economic development must go hand-in-hand and complement each other. The improvements that the MDGs envisage in health, education, gender, environment and infrastructure are essential if productive sectors are to grow and create employment. Only such improvements can provide the high-quality inputs needed for the productivity increase that growth requires, and only the greater equity and opportunities implied in the MDGs can provide the social stability without which growth cannot succeed.

The MDGs are basic preconditions for sustained economic development.

Achieving the MDGs also requires faster economic growth. This is particularly relevant to Africa, where the recent record of growth is so poor that there is no hope of meeting the goals unless it accelerates. As shown earlier, even if its highest recent growth rates are sustained, resource-rich countries in Africa would reach the MDGs only in 2057, land-locked countries in 2066, and coastal countries in 2055 (see Chapter 2). The greatest shortfall in MDGs will be in the countries where poverty is already the worst, and where it has been spreading fastest. National and international development agencies must direct their efforts towards the barriers to growth in these economies and to ensuring that human, social and economic progress reaches minimum acceptable levels.

Industrialization has a critical role to play in helping Africa to raise growth rates. Productive development is the motive force for applying new technologies to production and the most important source and carrier of technological innovation. It creates new skills and work attitudes, catalyses institutional change and fosters modern entrepreneurship. It is the best means of modernizing the export structure and creating the base for sustained export increase, along with higher wages. Successful industrialization helps create the employment that poor economies need as they release labour from agriculture, both directly and by stimulating the development of modern services. For this reason, it has long been, and remains, the most powerful engine of structural change and modernization. Indeed, all developed countries have undergone a long period of industrialization before they reached levels of income and structural complexity where they could shift into high-value services.

Overcoming pessimism

Recent African industrial performance has been dismal. Africa's share of world MVA has fallen from a tiny 1 percent in 1980 to 0.8 percent in 2000 (excluding South Africa, these figures are 0.43 and 0.41 percent). Its share of global manu-

factured exports has decreased from 0.7 to 0.6 percent over 1981–2000 (0.3 to 0.2 percent without South Africa). Twenty-eight countries have suffered declining or stagnant MVA (that is, below 1 percent annual growth) over the past 20 years.

The persistent failure of African manufacturing to grow and compete has engendered deep pessimism about its prospects, particularly as the context for industrialization is changing. International competition is intensifying with liberalization and shrinking economic distance. Competition is taking new forms, driven by rapid technical change and the emergence of international production networks, forms that require more advanced skills and capabilities – and entry levels, even for simple manufacturing activities, are rising rapidly. Not only is much of Africa becoming marginal to the dynamics of the global economy, it shows little signs of a dynamic technological response to the new challenges. This is despite the fact that access to international technology flows is now easier: productive knowledge, accompanied by capital, skills and marketing expertise are flowing across national boundaries more readily to tap local markets and to set up sites for global production.

It is not that African economies are not open to FDI and technology inflows: many countries have liberalized considerably in recent years. While the process is still incomplete, the real problem appears to be that liberalization has not stimulated a competitive response because of a lack of receptive capabilities. Few industries have upgraded their technologies or invested in advanced activities. There are few signs of technological activity in African industry, even of absorbing new technology. Manufactured exports are conspicuous by their absence and the structure of exports remains dominated by low value-added primary products. Global production networks have largely bypassed Africa. Other regions, particularly Asia, have done much better in the same setting and with less liberalization.

Africa needs to show stronger signs of a dynamic technological response to the new challenges.

Africa's weak industrial performance appears to reflect deep problems in economic structure and governance. If this is so, policymakers must address the underlying structural problems. Other developing regions have faced such problems in the recent past and overcome them to different degrees, some with dramatic success. There is no reason why Africa should not attempt to do the same; even modest success would be better than its current marginalization. The region must shed the growing pessimism regarding its ability to industrialize at all, and improve its investment climate, but it must simultaneously strive to overcome its structural problems, which are largely related to factor markets as discussed below.

Structural problems in industrial development have a variety of causes. Some arise from past government policies that misdirected resource allocation, for instance into inefficient parastatal enterprises or highly protected private enterprises. Others arise from the market and institutional failures that characterize developing countries, like lack of skills or technical knowledge, entrepreneurial weaknesses, risky and costly learning and widespread externalities. The institutions that help enterprises overcome these problems in advanced countries are absent in poor ones; even when they exist in name, they are often ineffective, with low capabilities, poor motivation and very weak links with enterprises.

There cannot be simple, universal solutions to problems of African industrial development, and it is wasteful to look for them.

Many problems are specific to certain industries and locations: the difficulties faced by a toolmaker in Tanzania are very different from those facing a clothing exporter in Lesotho. This means that there cannot be simple, universal solutions to the problems of African industrial development, and that it is wasteful to look for such solutions. Some generic measures like trade or FDI liberalization, lowering business costs or infrastructure improvement are of course desirable (at least if carefully managed). However, by themselves they cannot suffice. Industrially advanced developing regions like Latin America that have liberalized significantly and lowered business costs have not been able to dynamize industrial competitiveness. One reason is that they have not addressed the structural issues that hold back a competitive supply response. Indeed, by liberalizing rapidly and without preparation, they have damaged the structural base of accumulated capabilities.

Any strategy to revive industrial growth in Africa must focus on these structural issues, prominent amongst which are those relating to domestic capability building and the strengthening of domestic factor markets and the supply of public goods. This is where its largest gaps with other regions lie. To succeed, any strategy must be highly context-specific: sensitive to local needs, environments and resources, and integrated across the factor markets and institutions. Challenging? Yes. Impossible? No.

However, the international community's efforts to help African enterprises build competitive capacities have proven inadequate. The reason lies in the way it has chosen to address Africa's development needs. At the same time, given the regional track record, overcoming pessimism will not be an easy task. African governments and business people must themselves participate in the process by taking greater responsibility, as indeed envisaged in the New Partnership for Africa's Development (NEPAD), for the region's destiny.

The need to enrich the Poverty Reduction Strategy Papers

The PRSPs are the main tool used nowadays by the international community to address development needs. Their primary focus is on macro issues and on health, education, infrastructure and social welfare. While they often stress the importance of promoting private enterprise as the main agent of productive activity, they focus on creating a healthy investment climate. Apart from having good macro policies, this involves lowering business costs, opening up to trade and FDI, improving contract enforcement and ensuring level playing fields, and it assumes a robust private sector response to more open markets, lower business costs and better private-property rights.

This assumption is often unwarranted. While improving the investment climate may be an important precondition for private sector development (PSD), as noted above it is not sufficient to ensure an adequate supply response if there are structural problems present. In fact, very rapid liberalization, if not accompanied by capacity building measures, may damage the ability of the private sector to respond to the new competitive incentives. Much depends on policies to improve and build capabilities: these capabilities are the lifeblood of successful enterprise development. These policies have to address the specific needs of industry in each country at a given point in time, addressing specific institutions and factors. PRSPs do not reach this level of specificity. There is a general tendency to ignore such things as the development of indigenous entrepreneurship, upgrading of technology and skills, protection of the environment, attraction of desirable forms of investment, funding of activities that will constitute future comparative advantage, or the promotion of exports. Yet unless African governments address such issues, they will not see the sustained (and environmentally sustainable) growth in the productive base that MDGs demand.

Much depends on policies to improve and build capabilities; there is a general tendency for PRSPs to ignore these.

The PRSPs do appear to be gradually becoming more responsive to industrial needs. More must be done, however, to accelerate this process and to get to the level of detail that can make a real difference to industrialization in Africa.

Recommended measures:

- Conduct more research on and benchmarking of African manufacturing to strengthen existing activities. Industry support measures can only come out of a better understanding of productivity levels and competitive constraints in African industry, benchmarked against developing countries that compete directly with Africa.
- Develop a strategy for entering new areas. Strengthening existing industrial activities is only the first step of the industrialization process. It is equally important to support the emergence of dynamic new activities, particularly those that create significant employment and exports.
- Involve the private sector directly and continuously in preparing PRSPs. Lead agencies must become better aware of private-sector needs and interact with it intimately and continuously during the preparation process. Consultation is not enough; policymakers must ensure that PRSPs adequately reflect private-sector views and concerns.
- Strengthen private-sector inputs. The private sector, for its part, must conduct better analyses and propose solutions. It should use business associations, thinktanks and other agencies to formulate realistic programs to overcome its competitive deficiencies. It should also suggest how it could best help in providing assistance to its members as part of the PRSP strategy.
- Provide specific targets and deadlines, but be flexible. PRSPs must have yardsticks to promote industrial development and to establish effective institutions that can provide a permanent framework for competitive industrial activity. These goals and targets should be monitored and adapted by stakeholders as necessary. Flexibility is an essential part of any strategy, as technological, market and competitive conditions change constantly.
- Enhance public-private partnership in the implementation of PRSP strategies.
- Make shock-coping mechanisms for the private sector an inherent part of PRSP design.
- Integrate trade capacity building better into the PRSP strategy. The pace and sequencing of trade reforms have to be geared to structural reform measures and achievements (see below).

Globalization and local capabilities

Do domestic capabilities still matter with globalization?[5] Productive factors are moving around the world more readily and rapidly, and transnational corporations (TNCs) are constantly searching for new markets and lower-cost production or service sites. SSA now has wages among the lowest in the developing world; so could it not industrialize by simply opening up to international trade and investment? Unfortunately, no. Attracting FDI, particularly in export-oriented activities, also requires strong local capabilities. Increasingly it also needs efficient local suppliers and support institutions. Mobile factors, in other words, need capable local factors to complement them; with liberalization and the spread of global manufacturing networks, local capabilities matter more than ever.[6] Low wages for unskilled or semi-skilled labour is not a major competitive advantage today: the real advantage lies in low-cost but proficient labour and competent local suppliers and institutions.

Labour-intensive manufacturing for export is only one part (though often the most dynamic part) of industrial development. Large segments of industry also serve domestic markets and, in resource-rich economies, add value to primary products. There are large numbers of small enterprises that

generate significant employment. All these have to be competitive and so must build new capabilities. Resource processing can be highly capital-intensive and demanding of skills; possessing the primary resources does not mean that a country can be a competitive processor unless it builds a range of new capabilities. Making competitive metal products from raw minerals requires large, complex facilities; making processed foods for world markets also needs chemical, sanitary and packaging skills. Adding value to local resources is in fact often more demanding than processing imported inputs. Some of these segments can be served by TNCs, while others remain in local hands. In most medium-sized to large countries, local enterprises continue to handle two-thirds or more of industrial activity, and they need constant capability creation to survive.

Attracting FDI to export-oriented activities requires strong local capabilities, as well as efficient local suppliers and support institutions.

SSA thus needs to do more than open up to international markets and improve the investment climate if it is to build strong industrial capabilities. Liberalization can indeed spur efficiency by introducing import competition, but where local capabilities are too weak to cope with such competition, liberalization might simply lead to the destruction of capacity and the dispersal of existing capabilities. In these conditions, local firms will not set up new facilities in areas where they face full international competition; nor will foreign investors enter. This is precisely the experience of much of Africa. A vigorous supply response can arise only if governments help develop new productive capabilities. In the absence of such policies, the investment response of the private sector (local and foreign) is bound to be hesitant and inadequate.

Globalization *is* benefiting some African least developed countries (LDCs). Lesotho, a small, land-locked and resource-poor country in Southern Africa, has emerged recently as the largest and fastest growing exporter of apparel from Africa to the US (box 1.3). Foreign investors have driven its exports, using its cheap labour to penetrate foreign markets. However, the main motive force behind its growth has not been its investment climate (which is good by almost all PRSP standards) but the quota system under the MFA and trade preferences offered by the US under the African Growth and Opportunity Act (AGOA). Such infant-industry protection is not generally countenanced under PRSPs. Moreover, the good investment climate will not suffice to sustain Lesotho's industrial growth once the trade privileges end unless the government undertakes measures to raise productivity to competitive levels.

The case of Lesotho (see Chapter 1) highlights another important feature of globalization in SSA. The only industry that has so far used SSA for the global sourcing of 'pure manufactured' products (i.e. excluding the processing of local resources) is apparel. Though SSA has some of the lowest wages in the world, none of the other labour-intensive assembly operations that have moved to poor countries and dynamized their export prospects – toys, footwear, sports goods, electronics and so on – have shown much interest in SSA. This was so earlier under the Lomé Convention, and continues to be so today despite the advantages Africa enjoys under AGOA in the enormous US market. Apparel manufacturers set up in Africa mainly because of its quota privileges rather than its low costs. The value of African textile and apparel exports remains minuscule by world standards: SSA's world market share in this sector was only 0.78 percent in 2000, down from 0.86 percent in 1990. Mauritius accounted for a large part of apparel exports, but it is something of an outlier in the African scene; without it, performance would be even more dismal.

This evidence strongly suggests that, on the whole, SSA cannot benefit from globalization at its current low levels of productivity; they are too low for its wages to offset in activities that face full foreign competition. It is even more worrying that productivity remains so low in simple entry-level manufacturing activities with relatively undemanding skill and organizational requirements. After all, if Africa cannot compete here the prospects for the development of more complex activities are rather bleak. Progress in resource-based manufacturing appears an option for countries that have the relevant resources, but having the raw material does not guarantee a competitive edge in processing it. The leading resource-based exporters in the developing world are countries like Singapore and the Republic of Korea that do not have their own resources but are able to efficiently process imported primary materials. In the industrial world, countries with large resource bases (Canada, Australia or Finland) do export processed resources, but their success rests on having strong technological capabilities in these activities. Many processing activities need advanced capital- and skill-intensive technologies to meet the rigorous standards of export markets. Food products are particularly demanding because of sanitary requirements. SSA cannot industrialize using its ample resources unless it develops the capabilities to handle such complex technologies efficiently.

On the whole, SSA benefits little from globalization at its current low levels of productivity.

In sum, SSA must strengthen industrial capabilities, regardless of its ownership, resource base or technology levels, within feasible patterns of competitive specialization. This will need policy action beyond the normal bounds set by the PRSPs, addressing not just the investment climate but also the ability to respond competitively to this climate. We turn to such policies next.

Policy needs for capability-building

Building capabilities is essentially a process internal to enterprises. However, the nature and success of this process depends critically on three sets of external factors that impinge on enterprise activities in any setting. These factors are resources, incentives, and public goods. Resources are the inputs enterprises need to feed into their internal efforts: finance, inputs, labour, information, technology and infrastructure. Incentives are the signals arising from the market and the policy and regulatory frameworks that induce enterprises to invest in both physical capacity and capabilities. Public goods are the lifeblood of capability development in the LDCs (Magariños and Sercovich, 2003, Chapters 1 and 12).

The global context is generally helpful to building industrial capabilities. It provides massive markets, technologies, capital and other resources, and allows for specialization according to comparative advantage. However, it may also impinge on national policies in less positive ways, imposing formal and informal constraints on what governments can do to build local capabilities. For instance, many policies traditionally used to develop national capabilities are no longer permissible. This is in some ways beneficial: many industrial policies have proved to be inefficient and costly. But other industrial policies, where properly handled, have catalysed rapid industrial development. Some such policies are still permissible and the LDCs that this Report focuses on have greater leeway to deploy policies forbidden to other countries. A necessary part of industrial strategy thus has to deal with exploiting these degrees of policy freedom.

Framework conditions

The economic, political and social environment in which enterprises build capabilities, and in which institutions and factor markets respond to their needs, is critical. Like any long-term investment, capability-building works best when the setting is stable, predictable and transparent. This allows actors to assess commercial and economic risk on their own merits and so direct resources to where the payoffs are greatest, unclouded by risks, costs and disruptions that arise from other factors. Good framework conditions mean that the political and social environment is stable, the macro-economy well managed, the legal system able to enforce contracts and property rights efficiently and the government broadly supportive of private enterprise. Good governance, in other words, is a basic precondition for sustained growth in any economy.

Many deficiencies still deter enterprises from undertaking the slow and uncertain process of building complex capabilities.

Governance has been poor in much of Africa, though it is improving. Many deficiencies still deter enterprises from undertaking the slow and uncertain process of building complex capabilities. The macroeconomic situation is unstable in many countries; nearly all PRSPs cite improving macroeconomic stability as a priority area. Political and social instability compound macro instability in many countries, threatening the very fabric of economic life. The need to improve the basic framework conditions is so fundamental and well accepted that there is little need to argue the case further here.

Incentive regime, investment climate and business costs

The strongest incentives for enterprises to develop capabilities come from competition. No other incentives can match vigorous market competition in stimulating efforts to improve products, skills, technologies and management. Competition in domestic markets is a good stimulus, but in world markets it is generally the most effective catalyst for building world-class capabilities. The removal of interventions in trade – quota and tariff protection – is a very effective way to stimulate domestic capabilities: this is certainly a basic premise of the PRSPs, which define a good investment climate by how liberal the trade regime is.

The essence of structural change lies in moving from simple activities to more advanced ones that offer greater productivity, skill and technological rewards.

We have noted earlier that international competition can be a double-edged sword for developing countries. As capability building is a slow, costly and uncertain process, rife with externalities and market failures, abruptly exposing late-comers with weak capabilities and learning systems to rapid and intense international competition can have two deleterious effects. It can damage enterprises that are potentially efficient but are currently still learning and so more costly than those that have undergone the process (the classic argument for transitory infant-industry protection). It can also prevent enterprises from entering activities with difficult learning processes, confining the industrial development process to simple, low value-added activities that often have poor prospects for long-term productivity increase. The essence of structural change lies in moving from simple activities to more advanced ones that offer greater productivity, skill and technological rewards.

The competitive environment in SSA during much of its recent history has been inimical to healthy capability-building in manufacturing. Early on, as in many developing regions, there was heavy protection for industry, with few incentives to export. Because of a lack of indigenous entrepreneurship, many governments gave a prominent role to state-owned

and parastatal enterprises. The result, as in similar regimes elsewhere, was a slow and inadequate development of capabilities – but Africa differed from other developing regions in some respects. Due to its weaker industrial tradition and smaller base of skills, it often failed to build competitive capabilities even in simple manufacturing activities. Domestic competition was constrained by preferences given to parastatals; small and medium-sized enterprises (SMEs) were often held back by rules and corrupt practices that favored large enterprises; the hostile business environment deterred foreign investment. Given the weak capability base and the distorted industrial structure, it is not surprising that liberalization took such a heavy toll on exposed activities.

The incentive climate in Africa has improved in recent years. On the domestic front, many state-owned or parastatal enterprises have been, or are being, privatised. Restrictions on private enterprises are being removed and regulatory barriers to SMEs have fallen. Most governments now avow support for private enterprise in all segments of industry, and are open to FDI inflows with few ownership or other requirements. Several countries have lowered tax rates. On paper, at least, Africa is moving towards international norms on private industrial activity.

What exists on paper, though, is not necessarily what exists in practice. There remain many constraints to private industrial activity in much of Africa. Privatisation has a long way to go in many countries and, amid allegations of malfeasance, its progress has slowed down in recent years. The regulatory system needed for privatised utilities is not yet in place, and in its absence accelerated privatisation can lead to further inefficiencies.

The competitive environment in SSA during much of its recent history has been inimical to healthy capability-building in manufacturing.

Competition policies are generally weak. Business law in many countries lags behind international standards and the legal skills needed to enforce modern business law are lacking. Intellectual property protection exists on paper in most African countries, but its enforcement is weak. Penalties are low and do not deter transgressions effectively. In particular, the sale of counterfeit goods is widespread, while imitation or reverse engineering of foreign products is relatively rare. The judicial system tends to be slow and legal provisions obsolete; legal processes are costly and slow, and allegations of rent-seeking abound. In some countries, there are traditional restrictions to private land ownership, particularly by foreigners, that constrain the growth of private industry. Complex legal and regulatory procedures for setting up business continue to penalize new entrants, particularly the smaller ones. There is widespread corruption and bureaucratic inefficiency in the regulatory process. Policies are often unpredictable, subject to sudden reversals. There is little or no consultation with the private sector in the policy process, which remains very opaque. As a result Africa is, as the International Finance Corporation (IFC) says, 'A risky and expensive place to do business.'

Small reforms can reduce business costs dramatically. Many regulatory procedures are unnecessary.

This said, small reforms can reduce business costs dramatically. Many regulatory procedures are unnecessary for the social and economic ends to which they are directed. After all, the industrialized countries also seek to preserve competition, enforce property rights and ensure compliance with labour, environmental and other regulations – and do this more effectively with far less burdensome procedures. Since business costs are a major factor in competitiveness, it is vital for African governments to rationalize them, minimize their cost, and reduce the 'hassle factor' to the extent possible. Some relevant recommendations:

- Review the structure of rules and regulations to ensure that they can meet the necessary social and economic objectives at the least possible cost. Base the rules and procedures on best practice in relevant countries (this depends, for instance, on the legal system in force, e.g. English, French or German).
- Bring corporate and intellectual property law to current best-practice levels, ensuring that the legal system has the right skills and capacities to implement it effectively. Restructure the legal system, where necessary, to ensure fairness, speed and transparency.
- Improve the system of corporate governance and bring it into line with emerging international norms by raising accounting standards, enforcing transparency and accountability and ensuring minority shareholder rights.

On the external front, many countries have liberalized their trade regimes significantly. Some, however, remain relatively highly protected and their liberalization process often seems hesitant and unpredictable, sending mixed signals to the private sector. What is the way forward? We have argued that 'big-bang' liberalization is not necessarily a good thing, and that gradual liberalization, if well managed, can allow enterprises to prepare more thoroughly for international competition (see Chapter 1). The protection remaining in SSA can be used to good effect – moreover, WTO rules give LDCs more time to adjust.

Slowing the pace of liberalization cannot help unless the government puts policies in place to raise productivity during the transition; otherwise, it simply puts off the day of reckoning and prolongs the economic cost to society. Few governments in Africa have used their 'grace period' in this way, to devise and implement productivity raising strategies for industry. South Africa probably is a major exception.

Recommendations:

- Ensure a gradual and orderly move towards trade liberalization. Retain a measure of infant-industry protection, particularly in the least industrialized economies, while facilitating resource reallocation across activities.
- Support the move towards freer trade with coherent measures to raise capabilities and build strong institutions, which will ensure that capabilities continue to develop in the future.
- Interact with external agencies and donors to seek policy coherence, clarify the strategy and pursue their support for gradual liberalization accompanied by supply-side measures.

Attracting FDI and reaping the benefits

FDI is playing a steadily larger and more important role in industrial development. Its role is particularly important in Africa because of the entrepreneurial lags in the region. SSA lacks both the skill and capability base and the political economy to mount the highly interventionist strategies that the Republic of Korea and Taiwan Province of China adopted to built competitive industrial bases largely with local enterprises. Moreover, times have changed. When these countries built up industrial capabilities, technological change was not as rapid as today, economic distance was greater and global production networks had not developed. In the industrial setting of today, their type of strategies would be far more difficult to implement.

Effective FDI promotion can help overcome the perception of risk and improve the investment climate by getting rid of the biggest irritants.

Africa is failing to attract significant amounts of FDI into manufacturing. Moreover, within manufacturing FDI, inflows are highly concentrated in resource-based activities and in a few economies with ample natural resources and reasonable investment regimes. 'Pure' manufacturing, and particularly export-oriented pure manufacturing, gets relatively little (AGOA-based FDI is relatively low in value). This is as true of coastal economies that can attract export-oriented FDI as of land-locked ones that have to focus more on regional markets (though note that location is not always a good predictor of FDI export potential: Lesotho, a land-locked economy, has the most export-oriented FDI in Africa in apparel).

Part of the reason lies in weak capabilities examined below. Part lies in the poor investment climate and inadequate FDI promotion. As noted, the international investment community considers Africa a risky and costly place to invest. Its risk rating is worse than its economic fundamentals warrant, suggesting that there is a perception gap about the region (Chapter 1). Foreign investors are particularly sensitive to the investment climate, as they have the world to choose from; the poor climate in Africa thus deters all those who do not aim to extract its natural resources or serve its local markets.

Effective FDI promotion can help overcome this perception gap. It can do much more: for instance, it can improve the investment climate by getting rid of the biggest irritants to foreign investors and create some factors that export-oriented investors seek. FDI geared to global production networks, in particular, needs highly skilled and disciplined labour, world-class transport and communications infrastructure and efficient customs and tax procedures. The investment promotion agencies (IPAs) that usually get the highest accolades worldwide – those of Singapore and Ireland – were able to manage in such a way that they achieved just this. They went beyond the conventional tasks of selling the virtues of their countries and offering fiscal incentives, and got into coordinating domestic factor markets with the needs of the high-technology activities they were targeting.

Most IPAs in Africa are not capable of providing this range of services. Most are so small and poorly funded that they cannot even muster the minimum critical mass for effective basic image-building, investment prospecting and lead-generation. Hardly any provide after-care services, overlooking the fact that a satisfied investor is the best way to promote new FDI. Most IPAs are public-sector agencies at a low position in the government hierarchy, with few analytical and research capabilities and without the clout needed to reorient policies to attract investors. Private enterprises rarely play a role in investment promotion, and some IPAs are charged with extraneous functions, like managing industrial estates. The Lesotho Investment Promotion Centre (LIPC), for instance, is a small unit in the Lesotho National Development Corporation, whose main function is to provide factory space and shells to investors. Moreover, the Ministry of Tourism handles the attraction of FDI in tourism, diluting the meager resources available to the LIPC. While LIPC has been quite effective in helping the foreign investors that approach it, its approach has been in the main passive: the engines of FDI in Lesotho have been AGOA and the existing community of East Asian investors. This appears to be symptomatic of FDI promotion in much of Africa: the FDI that comes does so on its own initiative rather than because of effective IPA activity.

Most African IPAs lack clear focus and fail to target the right sectors or sources of potential FDI. Promotion is not, in other words, based on any analysis of national competitive advantage or 'selling points'. Nor is it geared to any national efforts to improve location determinants so that new areas of competitive advantage can be developed. The promotion agency is generally unable to offer true 'one-stop' facilitation. In many countries, investors still have to go to various agencies on their own, jumping through numerous bureaucratic hoops and smoothing the way with backhand payments. Since African IPAs generally lack the authority or ability to overcome these layers of bureaucracy, transaction costs tend to be higher than in many countries in Latin America or Asia.

Some recommendations on improving the FDI climate:

- Remove unnecessary barriers to entry, such as ownership stipulations and cumbersome registration and permit procedures.
- Minimize the scope for arbitrary decisions and rent-seeking in FDI approval.
- Conduct an 'investor roadmap' exercise in each country to determine exactly where the costs and barriers arise and benchmark procedures against international best practice.
- Put in place a monitoring system to ensure that regulations and procedures are properly implemented, with feedback from the private sector.
- Revive and improve the privatisation process to attract FDI into utilities and other state-owned activities. This requires adequate competition policy and regulatory institutions to ensure the proper management and operation of privatised enterprises.
- Modernize taxes and incentives. While some African countries, like Ghana and Lesotho, are moving towards modern systems of taxation (with low uniform rates and few or no tax holidays), others retain traditional systems with high rates, obsolete methods and discretionary incentives. Many countries do not grant tax exemptions for training and R&D spending. Tax administration is often inefficient and subject to corruption – this has to be addressed as a matter of priority. There is also a need to harmonize rates and incentives across the region (at least within major trading blocs). Incentives may be retained if they are moderate and geared to development objectives but their administration should be transparent and non-discretionary, and access to them rapid and honest.
- The rules applied to the use of expatriate personnel by foreign investors must be simplified and rationalized.
- The legal and judicial system needs urgent reform. The most pressing needs for foreign investors are in corporate law, contract law, bankruptcy, labour law and property rights. Foreign investors prefer international arbitration provisions, and governments should consider how best to accommodate this preference. Intellectual property legislation and implementation, particularly for trademarks, has to be strengthened.
- Some of the most cumbersome and costly impediments arise in import and export procedures. Some governments have improved customs systems but others are lagging behind in the use of computerized systems and simplified processes. This is again a matter of urgency if Africa is to participate in global production networks.

Recommendations on FDI promotion:

- Strengthen the funding and staffing of investment promotion agencies. Ensure that they are oriented to FDI attraction and facilitation rather than to regulation or registration.
- Raise their position in the government hierarchy to enable them to deliver effective facilitation and coordination services to investors.
- Encourage them to develop effective strategies for targeting and attracting promising investors by area and activity.
- Involve the private sector more directly in promotion activities. Over time, involve TNC affiliates also – existing investors are the best ambassadors for investment promotion.
- Monitor the effectiveness of investment promotion by using standard benchmarks from Asia or Latin America, relating to the amount of FDI generated per dollar of promotion effort or employee, time taken to process applications, number of investors contacted, and so on.
- Strengthen contacts with and knowledge of local enterprise: their investment needs to be promoted just as much as FDI and they need to establish business relations with TNCs.
- Coordinate investment promotion activities with counterparts in the region. Over the longer term, work towards joint promotion.
- Finally, set performance targets for attracting FDI. If the current share of IPA-generated FDI is only 10 percent of total inflows, a target of at least 25 percent would seem to be reasonable over ten years.

Strengthening local factor markets and public goods supply

The most complex and demanding aspect of capability building lies in strengthening the factors markets and institutions that enterprises draw upon to build internal capabilities. There are several markets involved, those of human capital, technology support infrastructure, broader infrastructure, and industry and environment.

Human capital

SSA has low wages but also low productivity, low skills and weak capabilities. The stock of formally educated workers is small relative to other regions. For instance, the average enrolment rate in secondary education in SSA in the late 1990s was 23 percent of the relevant age group, and in tertiary education 2.9 percent, compared to 53 percent and 18 percent in Latin America and the Caribbean (LAC), 59 percent and 14 percent in the Middle East and North Africa (MENA) and 82 percent and 36 percent in the mature Asian Tigers. Vocational training is held in low esteem in much of Africa and the provision of such training tends to be weak, obsolete and dissociated from industrial needs (Middleton and Demsky, 1989).

Vocational training is held in low esteem in much of Africa and its provision tends to be weak.

The shortage of technical skills is particularly severe at higher levels. For instance, enrolments in technical subjects came to only 2.7 per 1 000 population in Africa (excluding South Africa) in the late 1990s, compared to 21.9 in East Asia excluding China, and 17.3 in LAC. Even South Asia, with a

large incidence of poverty and illiteracy, had 5.4, exactly double the number in Africa. It must be noted that enrolment figures *per se* can heavily understate formal skill creation, since they do not take account of completion rates, quality, relevance or flexibility. It is likely that if these were taken into account, Africa's lag would be even larger.

Formal education is only a part, often a small part, of building human capital for industry. The other part is the use by enterprises of trained workers, and further skill creation through on-the-job and formal training. Many enterprises in Africa are reluctant to employ trained technicians and engineers. For instance, Zimbabwe in the mid-1990s had the most advanced industrial sector in SSA apart from South Africa – but a large survey of manufacturing firms found that, of a total workforce of 56 400, the proportion of scientists was 0.19 percent, that of engineers 0.17 percent and that of technicians 1.43 percent, yielding a total of 1.79 percent (Biggs *e. a.,* 1995). More than 98 percent of the scientists were employed in food-processing firms because of its particular quality-control and testing needs. Other activities like textiles and metalworking employed hardly any scientists. Engineers and technicians were more widely spread over woodworking, metalworking and food. Large firms accounted for most of these employees; small ones had a particularly deficient formal skill base. These numbers are far below those for Asia: the proportion of engineers alone in total employment ranges from a low of 3 percent in Sri Lanka to a high of 12 percent in the Republic of Korea in samples of firms on which data are available (Lall *e. a.,* 1994).

Formal education is only a part of building human capital; the other part is the use of trained workers, and skill creation through on-the-job and formal training.

Most African-owned enterprises depend on traditional apprenticeship systems that transmit skills often unsuited to the demands of modern technology. Data on enterprise training are by their nature difficult to get, but anecdotal evidence suggests that SSA lags here too. Training institutions in the public sector are often dissociated from private enterprises and tend to offer rigid, narrow and obsolete courses. Private training institutions are few and industry associations (that often took the lead in setting up training facilities in the Southeast Asia) are not very active in this area. Many governments impose training levies on industrial enterprises but the private sector generally finds that these yield them little tangible benefit. Few African governments offer fiscal incentives for employee training, in contrast to, say, Malaysia and Thailand, where enterprises receive a 200 percent tax benefit for training, or Singapore, where training is not only fully tax-deductible but the government also pays the wages of employees sent on approved training courses.

Recommendations on building human capital:

- Raise the quantity and improve the quality of *formal education,* especially at the secondary and tertiary levels, increasing the focus on technical entrepreneurial, and managerial skills. In technical education, ensure that the curriculum is up-to-date and relevant to the specific skill needs of the industrial sector in the country. Where possible involve the private sector in the design and content of the curriculum and in monitoring quality and delivery of skills.
- At the industrial level, conduct a comprehensive audit of skill needs, and continue such surveys on a regular basis. Such an audit – now standard in many industrialized countries – can serve as the basis for prioritising training needs at all levels; the government should target new skills that are likely to be critical for new technologies that will provide the foundations of future competitiveness.
- Ensure effective interaction between employers and training institutions, possibly by setting up a coordination unit to sponsor and implement such interaction continuously.
- Improve the functioning of skill levy systems and make their operations credible and relevant to industry.
- Launch training institutions directly linked with, and in some cases managed by, industry. Encourage industry associations by incentives and risk sharing to set up training centres. Involve private training providers in all schemes where their product meets the relevant standards and, where necessary, establish standard-setting bodies.
- Promote enterprise training by information and persuasion and, where desirable, by incentives and the establishment of institutions and programs.
- Support SMEs by providing special information and incentive programs to recruit better-trained labour and to invest in formal training.

Technology support infrastructure

African countries have generally lagged behind other regions in developing explicit science and technology (S&T) strategies and in providing technological support to industrial enterprises. The available evidence suggests that most African enterprises invest little in technological effort or productivity raising, whether formal (R&D) or informal (engineering, product improvement and so on) (Muchie *e. a.,* 2003).

Technological institutions in SSA have been largely disconnected from the industrial sector, without much effort to raise its productivity or competitiveness.

Technological institutions do exist, mostly inherited from the colonial period, but they tend to be poorly staffed, under-funded and badly managed (along public-sector lines). Industrial enterprises know little about them and have

little confidence in their abilities. As a result, the institutions – apart from those providing essential testing and quality certification services – are largely disconnected from the industrial sector and do nothing to raise its productivity or competitiveness (for details about the technology support infrastructure see 3.1).

Recommendations on the technology infrastructure:

- Promote a 'technology culture' in private enterprises, not so much in terms of formal R&D (though this *is* relevant to large firms) as of raising technological effort to improve productivity and quality and develop more competitive products. This involves a range of measures like fiscal incentives, subsidized credit, and venture-capital provision – but this is not sufficient. It also involves an effort to persuade enterprises of the need for greater technological effort, and for many a change in management outlook, work practices and resource allocation.
- Raise awareness of quality needs, systems and techniques. Base this on detailed analysis of enterprise practices and gaps, benchmarked against international standards. Fund a significant campaign of quality improvement, including prizes, visits to facilities and institutions overseas.
- Improve the infrastructure for metrology, standards, testing and quality (MSTQ), ensuring that industries have access to accredited facilities for testing, certification and calibration. A useful target would be for national MSTQ agencies to meet at least 60–75 percent of industry's needs in these areas.
- Strengthen the R&D base in the public sector and universities, improving their equipment, skills, access to information and interactions with similar bodies abroad. Train research personnel in current research techniques used in more advanced countries. Improve the salary and incentive structure to attract and retain good researchers.
- Associate R&D institutions and universities more closely with industry by using catalytic programs to fund enterprise research contracts and induce institutions to earn more by selling services to industry. Set a 'hard budget' constraint on R&D institutes: 40 percent of their revenues should be earned by the sale of services within five years.
- Improve SME extension services and set up productivity centres. Encourage services to be proactive, reaching out to enterprises and providing a package of financial, technical, management and marketing assistance with the minimum of bureaucratic procedures. Tie incentives to results achieved, particularly for productivity and exports.

Infrastructure

SSA's notoriously deficient infrastructure exacts a heavy toll on competitive industrial development. Its quantity is inadequate, its costs high, its quality poor and its reliability deteriorating. Not only does this hobble the growth of enterprises able to compete in world markets, but also prevents global production networks from setting up facilities in Africa. Landlocked countries are particularly handicapped in this respect, but even those on the coast suffer from significantly higher costs than their counterparts in Asia and Latin America. Yet, as the UN Millennium Project Taskforce on Science, Technology and Innovation says, 'Infrastructure serves as a strategic foundation for economic transformation in general and the application of technology to development in particular. It is an essential element of the long-term development efforts and should include direct links with human resource development, enterprise creation and R&D' (MP TF10 Interim Report, 2004, p. 79).

All kinds of infrastructure are important, but the balance between transport, communications, power, water and waste disposal must differ according to the industrial structure in each country. With the growing sophistication of technology, and the widespread use of information technology, the infrastructure of information and communications technology (ICT) becomes particularly vital for export-oriented industries. As the Millennium Taskforce emphasizes, it is vital to promote the infrastructure needed for technology upgrading and innovation.

EPZs are often a good way to provide the industrial infrastructure for export activity.

EPZs are often a good way to provide the industrial infrastructure for export activity: concentrating facilities in a relatively small area make it possible to economize on costs and to ensure good quality delivery. Many SSA countries have set up EPZs, but most have failed to attract significant investments in comparison to similar facilities in East Asia. Part of the reason lies in their poor management and bureaucratic procedures, part in the lack of local skills and capabilities. The former can be remedied, partly by privatising EPZs and by inviting foreign investors to own and operate them.

Recommendations:

- Analyse infrastructure deficiencies faced by industry and develop a prioritised program to meet the most pressing ones. Involve the private sector intimately in this analysis and implementation.
- Pool resources with other countries wherever this would lead to the development of an efficient infrastructure serving common needs.
- Involve private-sector providers (ensuring that the regulatory structure for managing utilities is adequate; privatised utilities that are not well regulated can be very costly).
- Pay particular attention to the infrastructure needed for technologically progressive industries and to ICT needs of exporters.
- Develop efficient EPZs, run on private sector lines (perhaps even by foreign investors). Ensure that their procedures and facilities match those offered by competitors.

Industry and environment

It is important for Africa to tackle the problems of environmental degradation associated with increasing industrial activity. Relying on rising income alone will not ensure that environmental performance improves over time. Environmental degradation actually tends to increase at first with growing income, and only starts to decline after reaching a critical turning-point. This tends to happen at very high levels of per capita income (see 3.2). Without intervention, environmental degradation will get much worse before it gets any better, a prospect SSA cannot afford.

Environmentally sound industrial development relies on progress in two areas: integration and cohesion between industrial and environmental policies, and the diffusion of environmentally sustainable technologies (ESTs) with international assistance. There are three needs to satisfy:

- First, there is a need for a strategic approach to influencing how environmental pressure can be reduced by changes in scale, composition and technology configuration. For the most part, countries pursue independent policies in each of these three domains. They have yet to take advantage of the potential synergies for reducing environmental impacts that exist between the policies.
  Integrating industrial, environmental and technology policies requires improved coordination, cooperation and coherence. The first and most basic type of integration calls for coordination between policy domains, often mandated by legislation, in regard to such matters as subsector promotion, location of industry, and technology choice. The second type of integration is achieved by involving industrial support institutions in cooperative projects and programs on such matters as industrial extension services that provide advice on environmental compliance. The third and most advanced type of integration is achieving coherence between policies – a national vision for a common goal. This would bring together the value added by the various policy communities that is crucial for achieving sustainable production.
- Second, there is a need for more efforts to strengthen the industrial environmental management programs in light of the continuing increase in pollutant loadings in SSA countries. Because of the absence of environmental data about industrial activities, as well as the low capacity to enforce environmental regulation while keeping policy cohesion with other areas, much needs to be done to redesign government policies for environmental protection, incorporating alternative measures. These alternative policies include economic instruments that modify behaviour via fiscal incentives and disincentives (such as financial incentives for EST uptake as well as charges and taxes), as well as non-mandatory instruments aimed at improving environmental performance at the enterprise level, including assistance for planning and designing environmental management systems. In addition to these, as shown by the case of regenerative approach to advance industrial design and technology, there is a need to consider and flesh out this potentially revolutionary approach to the relationship between environment and industry. Indeed, there is a lot to be done in terms of designing appropriate policy measures and incentive structures that will gradually overcome what can be described as degenerative industrialization (box 4.4).

Policy measures need to be introduced to prevent degenerative industrialisation.

- Third, there is a need to create, where needed, and adequately support sectoral and regionally focused technology upgrading programs. These programs would align all the factors, both internal and external to a firm, to mitigate the more serious environmental pollution problems and reduce utilization of energy, water and material resources. To be successful, however, these programs should be undertaken within the challenging task of enhancing the technological capabilities of firms to compete in domestic and international markets.
  These technology-upgrading programs would enhance the capability of firms to obtain and adapt increasingly sophisticated technology developed elsewhere, not only from abroad but also by other firms within the same country. Enhancing environmental capabilities within firms would go hand-in-hand with general capability enhancement, because the selection and use of increasingly sophisticated technologies requires taking into account the resource intensity of new technologies.
  Using technical extension institutions to build firm-level capabilities that enhance not only general capabilities but also environmental ones is a long-term proposition. This is partially so because the existing technical institutions themselves need to build up subsector-specific environmental expertise. In the shorter term, other measures are clearly needed. One such measure could be subsidized programs supported by international sources for those willing to be early adopters of CTs (Clean Technologies). Without that kind of support, many firms, particularly SMEs, would hesitate to use technically-proven CT measures. Another, less costly measure would be enhanced dissemination of information about the financial (as well as environmental) benefits of ESTs, and about the importance of addressing environmental issues. In this context, financial and technical support from the international community is called for to facilitate the diffusion of ESTs to the low-income developing countries.

The diffusion of advanced technologies

As this report argues, building of technological capabilities is a critical element of structural change in SSA countries. This entails not only the capacity to adapt traditional technologies which play a significant role in the earlier stages of industrial development, but also the building of capabilities to respond to the challenges and opportunities presented by advanced and emerging technologies. From this perspective, SSA is faced with a compounded challenge – to catch-up with the

necessary requirements for structural change and upgrade its capabilities to reap the benefits of emerging technologies in order to be able to compete in international markets.

Recognizing that investing in new technologies represent important policy choices and trade-offs, from the kind of infrastructure to support new technologies to the ethical considerations relating to bio-safety for example, SSA governments together with private sector and civil society should formulate a strategy to increase the capacity of all stakeholders to manage the opportunities and risks presented by these technologies. On the whole, the policy framework needed to regulate and incentivize the development of these markets should address issues covering market structure, pricing, universal/service access, security, quality and the supporting infrastructure. Since advanced technology markets are intrinsically risky and relatively small in SSA, countries need to use push and pull strategies to build capabilities on one hand and give incentives for the enterprises to initiate adopting advanced technologies on the other. A viable strategy should take notice that:

- The reforms in the fields of education, infrastructure, financial markets and technology institutions need to complement each other to create the necessary conditions whereby advanced technologies can reach a critical mass of users and create a sustainable market base from which private sector can further develop.
- Building effective more networks among universities, technical schools, R&D, financial institutions and private sector is critical to diffusion of advanced technologies as traditionally the link between the scientists and labs in Africa and commercial markets have been extremely weak.
- As the government agencies and international organizations remain to be the most important customer for the services provided by advanced technologies in developing countries, they have an important role to play in promoting the diffusion and adoption of these technologies. For example, governments can promote the production of local content for the Internet by using e-government services more widely.
- A possible way forward is to promote regional networks to tap into complementarities and economies of scale to develop regional scientific and administrative capabilities especially with regards to implementing a security framework and creating linkages between technology institutions.
- Along these lines some initiatives, such as NEPAD's biosciences program, have already been launched at the regional level in SSA in the past few years in order to help realize the benefits of the technological improvements. That said, while in most cases public initiatives have had significant value especially for illustration purposes in the past, they have often overlooked entrepreneurial attitudes or the financial sustainability of plans.
- In order to scale up such initiatives to make sure there are pronounced social and economic benefits, the fundamental structural impediments have to be overcome and the supportive institutional framework has to be put in place.
- In the long run a crucial aspect for the uptake of advanced technologies in SSA is eventually the private sector investment in these fields. However, a simple mixture of less regulation, pump priming funding for initiatives and transfer of technical skills do not necessarily guarantee success in developing private sector initiatives in this area. As the previous sections covered, developing capacity in private sector, especially in intrinsically risky technology markets, require a creative mix of policies covering human resources, infrastructure, supporting institutions etc.
- This said, extension approach creating explicit links between the public and private institutions such as universities, state R&D laboratories, and firms that have been successfully employed in other developing countries can be also encouraged in SSA countries. Similarly, science and technology parks and incubators can be an useful tool in the creation of business ventures that focus on technology commercialisation and diffusion, but need to be considered and planed paying close attention to the unique characteristics and opportunities presented within the region.
- Finally, SSA governments should devise policies to tap into the technical and managerial capacity of African diaspora, especially in establishing links with foreign universities and businesses.

Policy capability

It is relatively easy to recommend policies for industrial development, but very difficult to knit them into a coherent strategy and implement them effectively. A strategy embodies a vision of where the economy should be heading; the vision should be agreed upon within the government and between the government, the private sector and civil society. The time for top-down planning is past; in the current setting, with the pre-eminence of market forces and private enterprise, openness to international flows of products and factors, and rapid technical change, strategy has to be collaborative and transparent. There is, of course, a key role for the government. If no policy interventions were required, there would be no need for a strategy, which is geared to overcoming deficiencies in markets and institutions with the objective of making markets work better, not of replacing them.

The time for top-down planning is past; in the current setting, strategy has to be collaborative and transparent.

The development of a strategy for industrial development involves the following steps:

- Defining a clear national vision of an overall development strategy.
- The development of a consensus around an overall development vision, in a manner similar to that of Technology Foresight exercises, with the involvement of all major stake-

holders and an iterative process of SWOT (strengths, weaknesses, opportunities and threats) analysis. Building a consensus within the government is difficult in itself, since a development strategy cuts across traditional ministerial and departmental lines, but without close coordination between them it is impossible to carry forward any strategy. One useful step in that direction is to establish cross-cutting Technology Diffusion and Productivity Monitoring Councils, or their equivalent, composed of the mainline ministries and the private sector, to oversee the process.

- Assessing the productive sectors (while the consensus-building process goes on), evaluating their performance in domestic and export markets and the main determinants of performance (the framework conditions, human resources, technology, FDI, finance, physical infrastructure and supporting institutions). This is essentially a benchmarking exercise, with quantitative or qualitative comparisons benchmarked against selected counterparts (within the region, in other developing regions and in more advanced countries) that serve as role models.
- Evaluating the support needs of each sector. There are three categories of industrial activities: those that do not need additional policy support (they are already able to compete with existing capabilities and institutions, or are 'white elephants' that should be allowed to die); those that can become competitive with additional support; and new activities that will conform the economy's dynamic comparative advantage. The second and third categories need the greatest policy attention, albeit in different ways.
- Designing policies and programs. Since resources are limited, the government has to assign priorities to activities, measures and institutions.
- Implementing policies and programs, with the full knowledge and cooperation of the productive sector, workers and other stakeholders.
- Monitoring the progress of the strategy, making constant adjustments and improving policies as circumstances change. Good strategy builds flexibility and policy learning into the process, with constant feedback from the stakeholders.

Strengthening government capabilities is a matter of enabling it to intervene efficiently and with the full cooperation of national and international stakeholders.

Building strategic capabilities is perhaps the most challenging task in mounting development strategy. As countries come to converge in terms of framework conditions – good macro management, open trade and investment regimes, lower business costs and good investment climates – the *real* competitive edge will lie in the ability of governments to design and implement strategies to support capability-building and productivity improvement. Framework conditions provide the foundations for wealth creation, but they do not create wealth in and of themselves.

Strengthening government capabilities is not just giving it more discretionary power over economic matters: this may be necessary in some cases, but in others, on the contrary, the need may be to rein in excessive or inefficient interventions. It is more a matter of enabling the government to intervene efficiently and with the full cooperation of national and international stakeholders. This capacity has eroded in recent years, though the perceived need for smarter policy intervention has been growing. It is important, then, to restore faith in the ability of government and to provide it the necessary information, skills and independence it needs. But this must be accompanied by safeguards to ensure that policies are implemented flexibly, honestly and effectively, without allowing them to be 'hijacked' by sectional interests or rent-seeking officials.

Conclusions

The international community – the full array of development institutions, donors, trading partners, lenders, investors and so on – exercises an enormous influence on national policies. No industrial development strategy can hope to succeed unless it receives this community's active support. The consensus-building process must include major international stakeholders along with national ones. The international community, for its part, must be willing to understand the development needs of SSA countries and support them, not just with financial resources but also with advice, information, skills and assistance.

Some policies for raising productivity, like giving infant-industry protection, remain controversial.

Most policies for raising productivity are not at odds with the current 'rules of the game'. However, there are some, like giving infant-industry protection, which remain controversial. SSA needs to take advantage of all the degrees of policy freedom it can muster to enable itself to overcome its growing gap with the rest of the developing world. It also needs greater and extended trade preferences to supplement national measures to build capabilities (AGOA does just this and, for this reason, its timeframe needs to be lengthened).

It is probably time for the international community to launch a special initiative to industrialize SSA as a necessary complement, on the supply side, to the announced steps towards further trade liberalization of advanced-country markets in the context of the Doha Development Agenda. Other regions have disproved the perception, now unfortunately focused on Africa, that they could not industrialize beyond adding a modicum of value to their natural resources. Africa *can* succeed in 'pure' manufacturing and *can* develop com-

petitive industrial capabilities, provided that genuine industrial development policies along the lines discussed in this report are put in place.

Such an initiative need not involve large sums of money – but it does demand a great deal of creativity and expertise to fully realize the potential for international technology diffusion that is still largely untapped. Building capabilities, not capacities, is the essence of industrial success. The main need, therefore, is for skills, information and technology, brought together in forms that allow SSA to fully exploit its late-latecomer advantages in competitive markets.

A special initiative to industrialize SSA should be launched to complement trade liberalization in the context of Doha Development Agenda.

There have been many grand initiatives on SSA development. Most have failed conspicuously. The reasons are complex, including bad luck (shocks like droughts, famines, political and social instability, or sharply declining prices for primary exports), poor governance, wrong strategy design and weak implementation. The 'luck factor' is more propitious now: many SSA countries are over the worst of internal and external conflicts, macroeconomic management is improving and there are signs of better governance. It is the design and implementation of development initiatives that remains most problematic. One problem is that past initiatives have not properly integrated social and economic objectives. The MDGs provide a way forward. They integrate social, health, education, environmental and infrastructure issues into economic development, in an interacting, seamless whole. Social development feeds into capability development, and capability development provides the economic base for investments in social improvement.

This Report has emphasized that attaining the MDGs in SSA entails renewed industrialization – and vice-versa. A healthy and competitive real sector of the economy is necessary to drive income, export and employment growth. It is also necessary to move SSA economies out of their reliance on a squalid economic structure that promises nothing in terms of sustained development. Only this way SSA can integrate productively into the international economy.

A new strategy is needed to catalyse development in SSA. Current policies do not deal adequately with the structural problems that bedevil SSA. They do not appropriately factor in the need to endow African productive sector with the capacity to respond to the challenges of technical change, liberalization and shrinking economic distance. There is, however, no universal or 'quick fix' way to develop productive activities: the process is slow and highly differentiated by industry and by country. At its heart is the building of industrial capabilities, which calls for much more than the obviously essential triad of better macro management, improved governance and a healthy investment climate. The first step in revitalizing SSA industry is to focus on supply-side policies such as the NEPAD-sponsored Productive Capacity Initiative now under way. The approach must not be implicit: it must spell out policies and measures for strengthening capabilities, based on an understanding of the competitive weaknesses and the institutional needs in each country.

The outcomes related to development can be derived from the MDGs, and be fully consistent with them. In order to cut income poverty by half in SSA, the growth rates required for IVA (industrial value added) are at 9 percent and 6 percent per annum in land-locked and natural resource-rich countries, respectively (see chapter 2, footnote 20). This needs additions to physical capacity; new factories, equipment and so on. But just building capacity is not the answer to SSA real sector problems. More important is to build *capabilities* – to operate plants at competitive levels, raise quality, introduce new products, upgrade practices and diversify into higher value-added activities. This also requires investment, but it needs a set of resources more precious than money: skills, organization, knowledge, effort and institutions.

The first step in revitalizing SSA industry is to focus on supply-side policies such as the NEPAD-sponsored Productive Capacity Initiative.

Quantifying capability development is not easy, since there is no 'production function' relating inputs of factors to the output of capabilities. One way to go about it is to undertake needs assessments akin to those applied by the Millennium Project in such diverse field as health, education and infrastructure. Scenarios for institutional and capability development ought to be drawn up as a necessary supplement to the MDGs and in line with MDG-required growth rates. Institutional and capability development can, in turn, be expressed in terms of specific indicative yardsticks, in the same manner as with the MDGs, since, in the last resort, what underpins such development is the availability of skills and services that are essentially quantifiable. There is no doubt that to aspire to such benchmarks in the absence of genuine improvements in the capacity to create wealth would be futile, because in and of themselves they are devoid of any meaning and may turn into a straight-jacket. Bearing this in mind, incorporating variegated economic and social objectives into a common operational platform, to which all bodies of the multilateral system contribute, is probably the only way to respond to the urgent need to integrate them in development practice.

Here, by way of illustration, are some possible yardsticks:

- **Exports:** Total exports remain extremely low in SSA, whose share of world markets over the past three decades has been shrinking. Given the size of the domestic markets and

the potential for diversification of export trade, the overall growth required to achieve the MDGs is associated with indicative non-primary export objectives that can be quantified and sought. Based on past performance and on the important changes in the global trade environment due to take place within the next few years (such as the phasing out of the MFA) increasing the share of manufactures in total African exports from 33 percent to 50 percent within the next decade should be called for.

- **FDI:** It is imperative to raise FDI in SSA, both in the industries that add value to local resources and in those that expand 'pure manufacturing' exports. This requires better and more efficiently administered, transparent and predictable investment regimes. It also requires better and more focused investment promotion. Resources are needed to achieve minimum critical mass in investment promotion activities in each country (or groups of countries) and to raise the quality of their information, skills, outreach and post-investment services. The share of FDI attracted to SSA by IPAs could be sought to rise from the current 10 percent to 25 percent over the next 10 years.

- **Skills:** The MDGs have targets for education. Industrial development needs more and better general education, but it also needs specific skills geared to the capability needs of manufacturing activities, both those already existing and new ones that could be introduced. In particular, the percentage of scientific and technical personnel employed in African industry (including technical support institutions) is substantially below that in other regions and largely concentrated in quality-control activities in the food industry. The same is the case for enterprise training. These quantitative indicators call for a schedule of improvements to narrow the gap with more advanced developing countries, which may consist of tripling the share of scientific and technical personnel in enterprises within the next 10 years.

- **Technological effort:** Enterprise-financed R&D, the most advanced form of technological effort in industry, is negligible in much of SSA apart from South Africa. Government-financed R&D for the manufacturing sector is also relatively low; much of the modest spending on R&D goes into agriculture. Because technological effort in poor countries is largely informal, it is impossible to measure or benchmark. At SSA's level of industrial development, formal R&D should be quite low – but some should take place and it should grow over time, particularly in complex industries. One target would be to take enterprise-financed R&D to an average of around 30 percent of total R&D spending in 10 years and to raise total R&D to 0.6 percent of GDP. Government technology institutions should aim to earn 40 percent of their budgets from selling research and other services to industry in five years. The MSTQ infrastructure should aim to meet 60–75 percent of industrial testing and metrology needs in 10 years (though this target may not be feasible for small countries and may have to be set on a regional basis).

A similar approach can be applied to other fields, such as the diffusion of ICTs, the use of environmentally cleaner technologies in productive applications and private sector development.

Clearly, no development strategy can rely on the mere addition of individual targets such as those discussed above, even if they are pursued through a consistent set of market-based incentives and the necessary supply of public goods. More is needed.

In particular, the SSA countries (as well as LDCs elsewhere) need to articulate coherent packages of policies able to meet two standards: first, to effectively tap available sources of growth as discussed further above; and, second, to comply with international agreements currently in place in order to prevent unnecessary trade frictions – even though there may be some blurred areas subject to controversy. This approach should render what, mutatis mutandis, would amount to today's equivalent of the policy interventions that led to the recent successful industrialization experience in Southeast Asia. This, with the necessary equity considerations, would appear to be the road forward.

Notes:

This chapter is based on a background paper by S. Lall (2004). However, the views expressed here are of UNIDO and do not necessarily reflect those of the author.

1 It would make little sense to set ambitious development objectives when there are no roads or energy or when freight costs are so high as to effectively block participation in foreign trade. For instance, freight costs as percentage of import value in land-locked countries are over four times higher than those in industrialized countries (box 3.4).

2 A distinction needs to be made between *igniting* economic growth and *sustaining* it. The second is the focus of this report since it entails extensive institutional reform while growth spurts are associated with a narrow range of policy reforms (see Rodrik, forthcoming).

3 Demographic transition in Southern Africa is strikingly different from that in other parts of the continent. In a number of Southern African countries – especially Botswana, South Africa, Lesotho, Swaziland, Zimbabwe and Mozambique – HIV/AIDS prevalence rates amongst adults exceed 15 percent of the adult population and are estimated to be as high as 35 per cent in Botswana. As a result, Southern African economies are undergoing an extraordinarily rapid demographic transition with the population growth rate in Zimbabwe, for example, slowing from 3 per cent a year in the early 1990s to less than 0.5 per cent today. Numerous studies are unanimous that so sudden a transition will result in slower (if not declining) per capita income growth. Moreover, the greatest impact will be felt within 10–15 years, with a consequential diversion of funding from the achievement of other MDGs to tackling the pandemic.

4 Sachs,2003 distinguishes three transitions, relating to human capital, productivity and the environment, respectively.

5 On building domestic capabilities see Chapter 1, Box 1.1.

6 Minimum entry levels have risen greatly in recent years. Things were different some four decades ago when countries like Malaysia and Thailand launched on export-oriented industrialization via assembly in low-technology (clothing and footwear) and high-technology (electronics) activities despite having relatively weak domestic capabilities. Today, entering these activities, especially hi-tech ones, demands higher skill levels, better organisation and stronger institutions.

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Second Part

Review of Industrial Trends

CHAPTER 7

Global industrial activity

The main trends in 1980–2000

The global growth rate of manufacturing in 1980–2000 was slightly lower than that of GDP, due to the growing weight of services in the mature industrial economies that still dominate industry worldwide.[1] In the developing world, manufacturing continued to increase its share of GDP. Manufacturing value added (MVA) in developing countries outperformed that of industrialized and transition economies. The developing world's share of global MVA rose from 14 percent in 1980 to 24 percent in 2000. Transition economies suffered a large decline in industrial activity in the early 1990s, a result of the shock of rapid liberalization. The 45 least developed countries (LDCs) with data improved their industrial growth rates since the mid 1980s, albeit from a small base.[2] However, they did not perform as well as other developing countries.

The structure of manufacturing shifted steadily from resource-based (RB) and low-technology (LT) activities to medium- and high-technology (MHT) ones in both industrialized and developing economies, while transition economies had (in the midst of their industrial decline) a growing share of RB activities. LT activities grew slowest in both industrial and developing countries.

Manufacturing industry is becoming less unequal in the world as a whole and in the developing world – in the latter at a considerably faster pace than in the former. This growing equality, however, has taken place mainly in a few large successful economies, with China in the lead. The bottom half of the developing world's population continues to account for a tiny share of global MVA. The gap between the industrially richest and poorest countries has widened, for the world as a whole in the second half of the 1990s, and for developing countries over the last two decades. National concentration in MVA has also risen in the developing world.

East Asia excluding China (EA2) is now the most industrialized region in the developing world in terms of MVA per capita, though with China included it still lags behind the Latin American countries (LAC). East Asia has been the engine of recent industrial growth, doubling its share of the developing world's MVA from 29 percent in 1980 to 54 percent in 2000. LAC has been the largest loser: from being the leading region in 1980, with a 47 percent share, it ended the period a poor second with a 22 percent share. Sub-Saharan Africa (SSA) also lost share, from the already low level of 1.0 to that of 0.8 percent. South Asia and the Middle East and North Africa (MENA) increased their shares slightly.

The technological structure of manufacturing in developing countries is upgrading in line with mature industrial countries. The share of MHT activities in MVA in the developing world has risen from 41 percent in 1980 to 53 percent in 2000, while that of RB has fallen from 37 to 31 percent and of LT from 23 to 16 percent. These figures are strongly influenced by the evolution of East Asia, and the structure differs greatly from one region to another. The least advanced structure is that of SSA excluding South Africa.

The structure of manufacturing shifted from resource-based and low-technology activities to medium- and high-technology ones.

In terms of world shares of MVA, the largest 'winner' overall is China, with most of its gains in RB and least of them in LT activities. In the runner-up region, EA2, MHT leads, with LT and RB following. Latin America without Mexico (LAC2) has lost shares in each category, with the largest loss (3.1 percentage points) in LT.

Internationalization

Manufacturing everywhere is becoming more internationalised. Exports have grown consistently faster than MVA, save in the early 1980s when both slowed down. As exporters of manufactures, developing economies gained compared to the industrialized economies throughout the period, while transition economies lost in the 1980s and gained in the 1990s. The developing world market share doubled (from 13 to 27 percent) in 1980–2000. The industrialized world still accounts for over two-thirds of world manufactured exports, but if current growth rates are sustained the developing world should equal it in less than two decades.

Medium-technology products dominate world exports of manufactures. Their share is, however, shrinking steadily, as is that of RB products. LT products expanded their share

slightly between 1981 and 1990 but then saw it diminish. The only consistent 'winners' were high-technology (HT) products, which started the period as the smallest category and ended it as the second-largest (with a 28 percent share). They are the fastest-growing category for both industrialized and developing countries in all sub-periods. RB and LT product exports have slowed down significantly over time for the rich countries.

Exports by developing countries have grown faster than those of industrial ones in all technological categories and periods except for RB products in the early '80s. The developing countries' lead in growth is greatest in HT products, followed by MT ones. The more complex the technologies the better developing countries have performed relative to industrialized countries. The largest share of developing-world exports is in LT products, but its HT share is not far behind and shows the greatest increase (23 points) over the period. Developing countries now account for nearly one-third of world HT exports. The value of developing-world HT exports in 2000 was $113 billion larger than that of its LT exports. In 1981 it was $41 billion smaller.

China, which was not even in the top ten in 1980, is now the world's fourth-largest industrial power.

This unexpected competitive stance of developing countries in HT products, however, reflects the growth of capabilities in only a few industrialising economies; for the majority, it arises from insertion at the assembly end into global value chains of multinational companies.

Export performance is highly uneven in the developing world, more so than MVA. East Asia including China accounts for nearly 70 percent of the developing world's manufactured exports in 2000, up from 52 percent in 1981. LAC has been a relatively poor performer. Without Mexico, the region has lost market shares in all technological categories apart from MT. Since 1995 Mexico has resembled an Asian Tiger in its explosive export growth, spread over all product categories. But its productive base has remained shallow, and in products with high value-to-weight ratios, like electronics, it has been losing ground to China. South Asia is the only other region to have increased its world share of manufactured exports (but only by a modest half of a percentage point). MENA and SSA have stagnated; in the former, gains in LT and MT products were offset by a loss in RB.

In terms of market positioning, East Asia appears the best placed, having gained market share in dynamic products (with most winners being HT products). LAC has also had many HT winners, but this mainly reflects Mexican performance. At the other end, SSA has relatively few champions, and the leading two are RB products – a category that moves sluggishly in world trade and spreads few technological benefits.

The technology structure of MVA should match that of exports, but in the developing world it often does not. In East Asia the export structure has become more technology-intensive than the MVA structure over time. South Asia has the largest difference between the two structures, with MVA far more technology-intensive than exports. LAC2 displays a similar pattern, but the difference between MVA and export structures is far smaller, with exports going up the technology scale rather than down. Mexico differs from the rest of LAC: its MVA structure is less complex and has downgraded over time while its export structure has upgraded sharply. MENA and South Africa show a pattern similar to LAC2, but at lower levels of technology intensity.

Manufacturing performance

MVA grew worldwide by 2.6 percent yearly in 1980–2000, slightly more slowly than the 2.8 percent rate recorded for GDP. This growth was cyclical: it was fastest in the late 1980s and late 1990s and slowest in the early 1990s (figure 7.1). Developing countries (including the least developed ones) were the fastest-growing of the three major groups in each sub-period, but they followed a different cycle. In 1990–95, when the industrialized countries slowed down and the transition economies suffered the massive after-shock of their sudden liberalization, developing countries enjoyed their fastest period of growth. In the second half of the 1990s, as the other groups improved, developing economies decelerated (largely as a result of the Asian financial crisis), though they still had the highest growth rates.

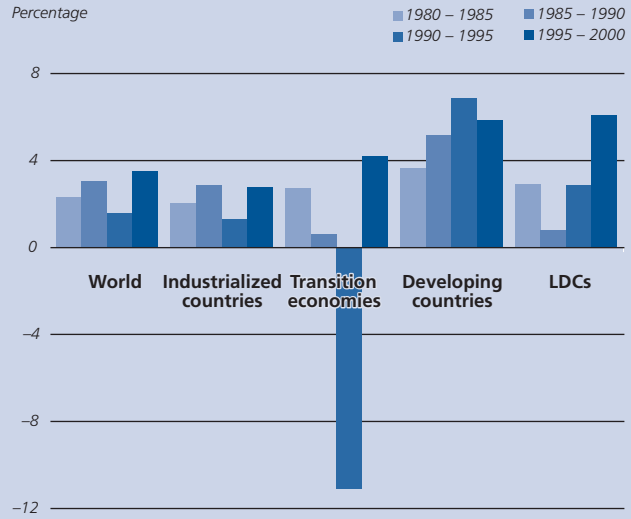
The 45 LDCs for which there are comparable data performed less well than developing countries as a whole. In 1995–2000, their MVA grew marginally faster, the result of a revival of resource processing in parts of Africa. The small base overstates their growth in relation to other groups but the improvement since 1985 is encouraging.[3]

Industrialized countries continue to dominate global manufacturing but are losing ground steadily.

Industrialized countries continue to dominate global manufacturing but are losing ground steadily (figure 7.2). By 2000 they accounted for 72 percent of world MVA; 5 percentage points less than in 1980. This erosion is likely to continue – what is surprising perhaps is how slowly it has been occurring. The gainers are the developing countries, with their share growing by 10 points (from 14 to 24 percent). The transition economies lost 5 percentage points of global MVA share. The share of LDCs (too small to show in the chart) increased marginally from 0.38 percent to 0.42 percent – though excluding Bangladesh, the LDC share remains stagnant at 0.3 percent.

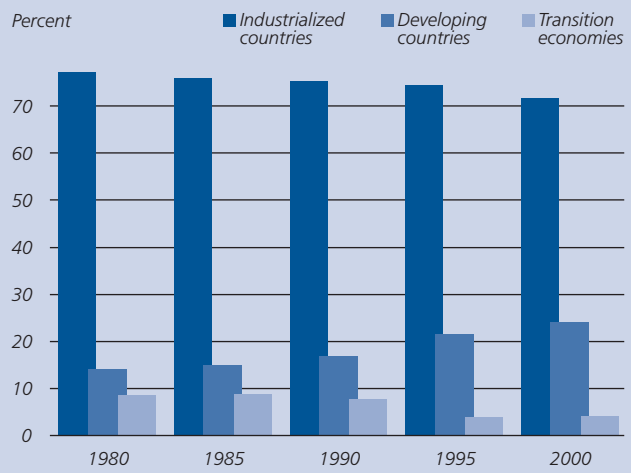
The contribution of MVA to global GDP declined slightly over time, yielding to the service sector in rich countries. Most of this decline occurred in the 1980s, after which the MVA share remained constant at 22 percent – though this reflects

Figure 7.1 Annual growth of MVA, 1980–2000



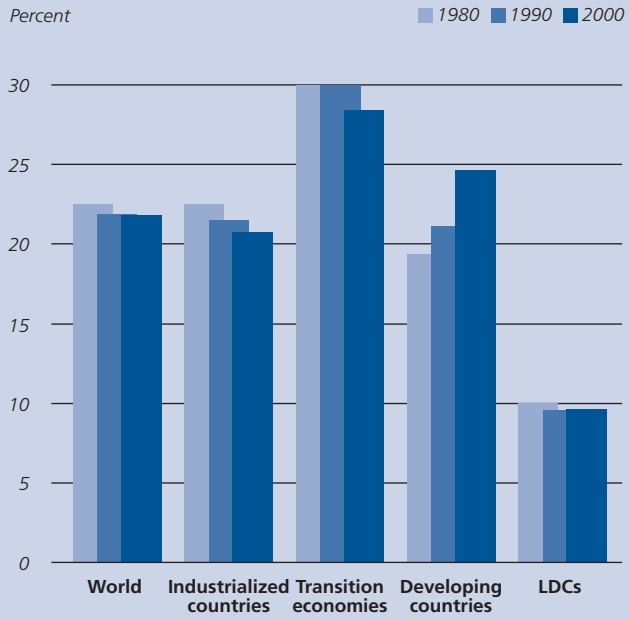
Source: UNIDO Scoreboard database.

Figure 7.2 Shares of global MVA



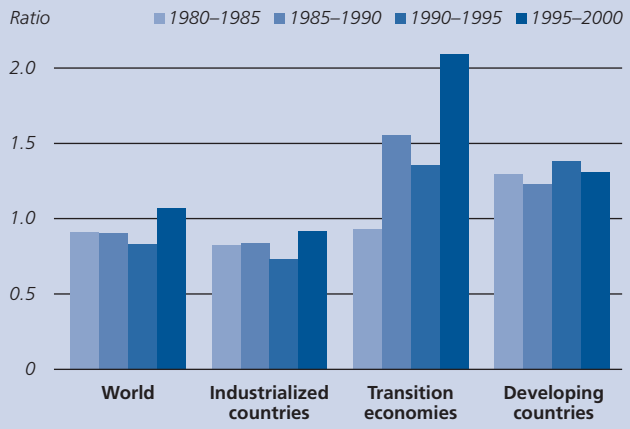
Source: UNIDO Scoreboard database.

Figure 7.3 Share of MVA in GDP, 1980–2000



Source: UNIDO Scoreboard database.

Figure 7.4 Growth of MVA relative to growth of GDP, 1980–2000



Source: UNIDO Scoreboard database.

two opposing trends: shrinkage in industrialized countries and rapid growth in developing ones (figure 7.3). The highest contribution of MVA to GDP was in the transition economies, a legacy of the heavy-industry emphasis of the earlier era. With the change of regime, this share is falling. In LDCs the share stagnated at around 10 percent throughout the period: by this indicator, they have not been harnessing manufacturing as a vital engine of growth and structural transformation.

The elasticity of MVA growth with respect to GDP was highest in the transition economies, followed by developing countries (figure 7.4).

Moving up the technology ladder

Rapid technical change is shifting the structure of manufacturing towards more complex technology- and skill-intensive activities. It is also increasing technological and skill requirements *within* activities. All industries, even 'simple' ones like clothing, food processing or textiles, have to upgrade: use more advanced machines and more skilled workers, produce better-quality products, deploy more information technology, and interact more closely with other agents in the value chain. There are, of course, other forces apart from technical change that drive upgrading. Globalization and liberalization make it vital for enterprises to reach global 'best practice' standards to survive in a more competitive world. These 'bottom line' needs of competitiveness apply with equal force to poor and rich countries. As noted in last year's *Industrial Development Report,* they raise a range of challenges for learning and innovation in all locations and at all levels of development.

Table 7.1 Technology composition of MVA, 1980 and 2000

	Shares (percent) 1980			*Shares (percent) 2000*			*Average growth rates (percent) 1980–2000*		
	RB	*LT*	*MHT*	*RB*	*LT*	*MHT*	*RB*	*LT*	*MHT*
World	26.6	17.9	55.4	24.8	14.8	60.3	2.3	1.7	3.1
Industrialized countries	25.3	17.1	57.6	23.4	14.5	62.1	1.8	1.4	2.6
Transition economies	27.3	26.0	46.6	34.3	23.5	42.2	0.1	–1.6	–1.6
Developing countries	36.5	22.7	40.8	31.1	16.0	52.9	4.5	3.5	6.8

Source: UNIDO database.

It is difficult to measure changing technology levels within activities, but it is possible to capture, albeit imperfectly, shifts across them. Like the previous *Report,* the present one distinguishes three categories of MVA: RB, LT, and MHT. It uses these categories to trace their evolution over 1980– 2000.[4]

The data show a steady shift up the technology ladder: MHT activities gain in MVA shares at the expense of RB and LT (table 7.1). Industrialized countries, as expected, concentrate most in MHT activities and least in RB and LT ones. Developing countries start with a relatively high share of RB and low share of MHT; they end with higher MHT and lower RB and LT than transition economies. Transition economies shift significantly into RB, a result of rapid liberalization that exposed technical, managerial and other weaknesses in industrial enterprises (RB activities did relatively better because they enjoyed some shelter from their base in local resources).

While the MVA data do not allow HT activities to be separated from MT, data from the US National Science Board show that HT activities are growing much faster than the rest

Box 7.1 National Science Board: high-technology, high growth

The US National Science Board (formerly the National Science Foundation) regularly publishes technological and engineering data in its *Science and Engineering Indicators*. The 2002 report gives data on R&D, education, production and trade for 1980–1998, for the US, other selected countries and for 68 countries that account for over 95 percent of global industrial activity. The total can thus be taken to represent world trends fairly accurately.

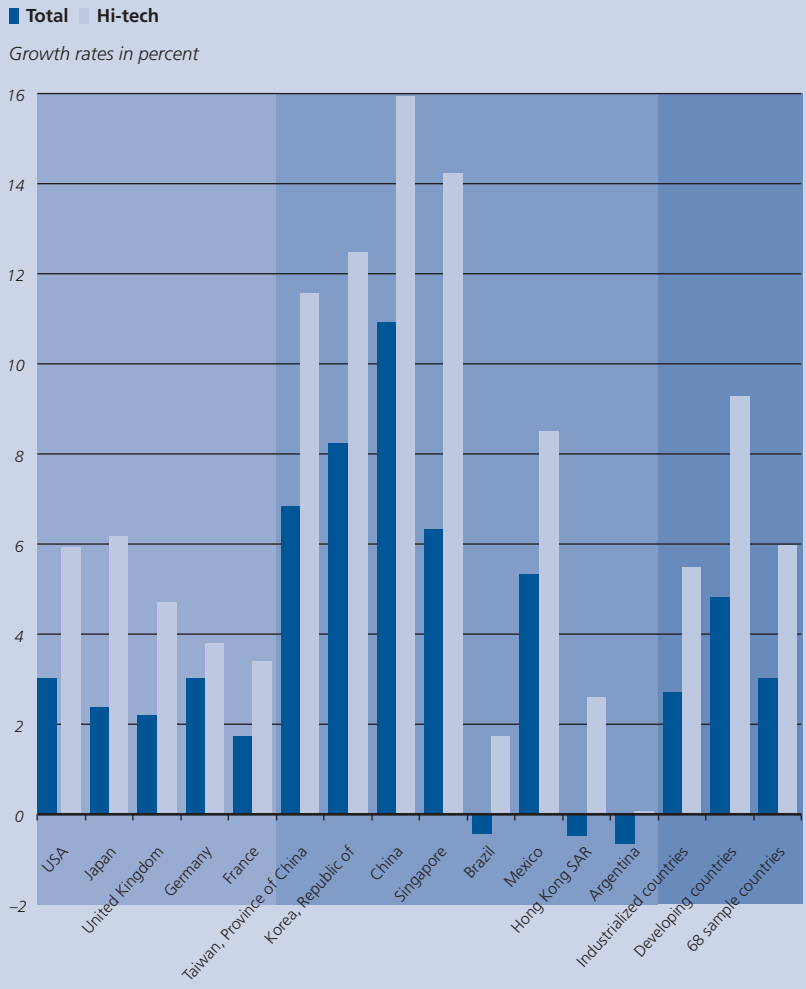
Hi-tech production in the 68 countries grew twice as fast as total manufacturing. The chart below shows both rates for 13 major countries in the industrialized and developing worlds, ranked by the value of HT production in 1998.

In the major industrialized countries, total manufacturing grew at 2.7 percent annually and HT at 5.5 percent; in developing countries they grew at 4.8 and 9.3 percent, respectively. The HT sector performed exceptionally strongly in the fastest growing economies (all in East Asia); as shown later, it also led the growth of their manufactured exports.

There were, however, several Latin American economies (not shown in the chart) where HT production lagged behind total manufacturing: Chile, Colombia, Ecuador, Honduras, Panama, Peru, Uruguay and Venezuela. This is in line with findings that manufacturing in Latin America has shifted into greater specialization in RB activities (Katz, 2002, traces this to the impact of liberalization).

HT industries are more export-oriented than manufacturing as a whole, though there are exceptions (mainly in Latin America, like Argentina, Brazil and Chile). For the 68 countries taken together, exports accounted for 30 percent of production in 1998 as compared to 45 percent for HT. Manufacturing as a whole had become more export-oriented since 1980, but the export/production share rose by only 7 percentage points for total manufacturing as compared to 17 points for HT manufacturing.

Figure B 7.1 Growth rates of total and HT manufacturing production, 1980–1998



Source: Science and Engineering Indicators – 2002, Washington DC: National Science Board.

of manufacturing (box 7.1). Since MT activities are a major part of manufacturing in most countries with mature industrial sectors, this suggests that the main driver of the growth of MHT is high rather than medium technology. This is strongly supported by data on manufactured export growth by technology, as will be seen further on.

How evenly is industry spreading?

While the developing world has narrowed its manufacturing gap with the industrialized world, there remains widespread concern that industrialization has not spread evenly across developing countries. There are several ways to analyse equality in industrialization. One is to calculate *Gini coefficients of MVA distribution,* for the world as a whole and for different country groups. This is the standard way of measuring inequality in incomes, and can be applied here using the relationship between the number of people (in a country or country group) and the aggregate value of manufacturing value added.[5]

Take Gini coefficients at the broad level for four groups of countries: industrialized countries, transition economies, LDCs and other developing countries. Between 1980 and 2000, industrial inequality among these groups declined: the Gini coefficient fell from over 0.65 to around 0.60. This sits well with the finding that developing countries are catching up with the industrialized world.

Now take Gini coefficients at a finer level, for nearly 200 countries in 1980, 1990 and 2000. On a global scale – and 'global' is the right term, since the sample includes most countries – manufacturing inequality is high. It remained stable in the 1980s and declined slightly in the 1990s, though less than for the four groups considered above. This finding would be compatible with rising inequality in MVA within the developing world. Whether the latter was the case can be investigated by examining inequality *within* groups of countries.

At this level there are large variations in levels and trends in intra-group inequality (table 7.2). In the industrialized countries, for instance, there is a small rise in inequality during 1980–2000 but the level of inequality remains relatively low. Transition economies were fairly equal till 1990 but inequality rose rapidly thereafter as economies coped differently with rapid liberalization. In the developing world, contrary to common perception, there has been a steady and significant reduction in industrial inequality over the 20-year period, with the Gini coefficient falling from 0.66 to 0.56.

Contrary to common perception, there has been a steady and significant reduction in industrial inequality.

The graphic representation of the Gini coefficient (the Lorenz curve in figure 7.5, p. 140)[6] is revealing. The share in MVA of the bottom half of the developing world population remained more or less constant between 1980 and 2000, at about one-tenth. There was, in other words, no reduction in inequality at the bottom. By contrast, the next 30–40 percent of the population, a segment in which China weighs heavily, made significant industrial progress. This development largely explains the overall reduction in manufacturing inequality within the developing world[7].

Now take each developing region. SSA (including South Africa) has an highly unequal distribution of MVA. While inequality in SSA fell in the 1980s, the trend was reversed in the 1990s. Excluding South Africa, the Gini coefficient falls significantly – the less industrialized countries are far more equal – but inequality grew continuously over the past two decades. In East and South-East Asia, there was relatively high industrial inequality in the 1980s followed by a sharp reduction in the 1990s. This was due almost entirely to the spectacular rise of China; without China the Gini coefficient remains almost constant. In Latin America and the Middle East (including North Africa), there is a relatively low degree of inequality and little change over time; the exclusion of the large advanced economies (Mexico and Turkey, respectively) does not change trends significantly.

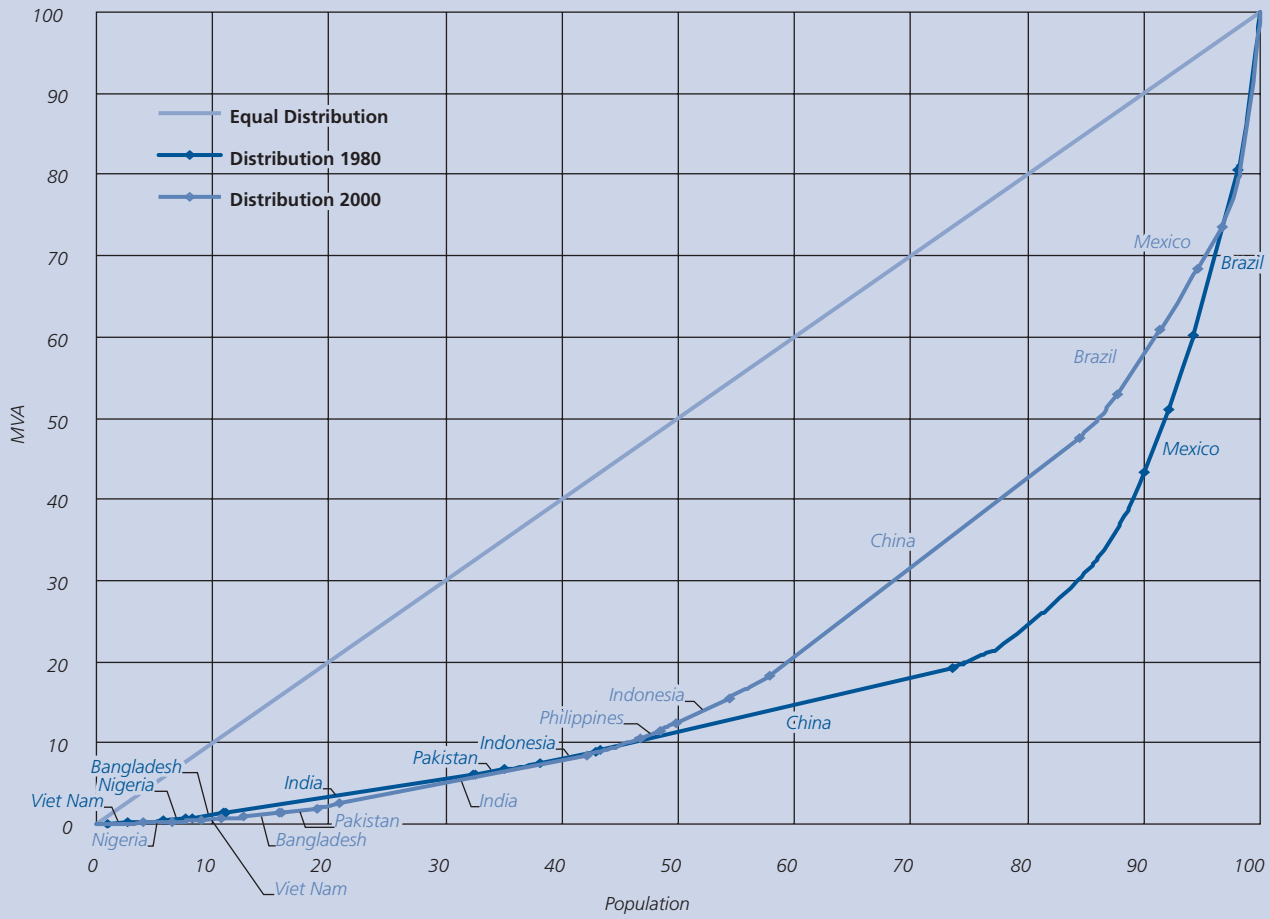
Table 7.2 Manufacturing inequality, 1980–2000

	Gini coefficient				
Development grouping	*1980*	*1985*	*1990*	*1995*	*2000*
Industrialized Countries (18)	15.5	17.1	18.5	16.8	16.1
Transition economies	20.0	19.1	20.8	27.3	33.9
Europe (19)	12.2	11.1	12.4	19.3	26.3
Central Asia (8)	35.8	37.9	35.6	64.8	69.0
Developing countries	65.9	61.6	59.4	55.6	55.9
Sub-Saharan Africa (47)	79.7	68.6	67.9	69.1	68.6
Sub-Saharan Africa excl. South Africa	48.9	52.1	50.2	52.0	54.3
Latin America and Caribbean (40)	34.5	31.9	30.2	32.1	32.6
Latin America and Caribbean excl. Mexico	37.6	35.6	34.6	36.9	37.7
Middle East and North Africa (19)	34.3	33.8	33.6	38.3	37.4
Middle East and North Africa excl. Turkey	36.9	35.0	30.4	35.5	34.9
South Asia (7)	5.7	7.3	9.3	9.8	11.1
East and South-East Asia (15)	51.5	47.7	50.0	41.7	41.3
East and South-East Asia excl. China	67.4	67.2	68.0	66.8	69.1
World	74.6	74.7	75.0	73.3	72.5

Source: UNIDO Scoreboard database.

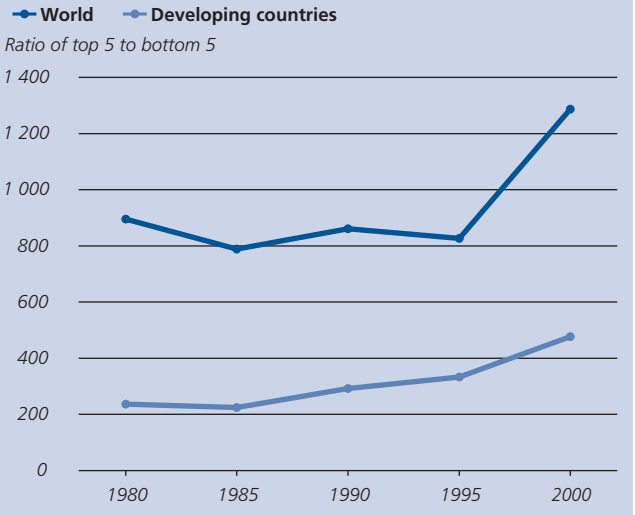
What are the trends at the high and low ends of the industrial scale? The ratio of MVA per capita of the top five countries to the bottom five countries in the world as a whole fluctuated between 800 and 900 in 1980–95 and then rose sharply. Within the developing world, the ratio has risen steadily from 1985, with some acceleration in the late 1990s. The ratio nearly dou-

Figure 7.5 Manufacturing inequality among developing countries (Lorenz curves)



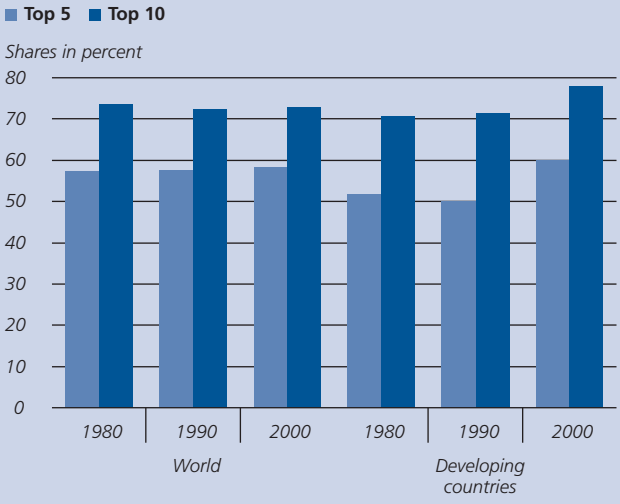
Source: UNIDO Scoreboard database.

Figure 7.6 Ratio of MVA per capita of top 5 to bottom 5 countries



Source: UNIDO Scoreboard database.

Figure 7.7 Share of top 5 & 10 economies in global and developing world MVA



Source: UNIDO Scoreboard database.

bled, from 237 to 477, over the two decades (figure 7.6). In fact, the ratio in the last period would have been higher had it not been for the Asian financial crisis: the top performers, all in East Asia, suffered most from the 1997 crisis.

Finally, consider national manufacturing concentration ratios, worldwide and within developing countries (figure 7.7). These do not show inequality in the strict sense: they reflect trends in the agglomeration of industry at the national level without showing if such agglomerations serve larger or smaller populations. Worldwide, the share of the top five countries increased slightly over 1980–2000, while that of the top ten shrank in the 1980s, then expanded slightly in the 1990s (annex table A.1). In general, concentration levels have changed very gradually at the global level, and there does not appear to be a strong trend in agglomeration one way or another.

In the developing world, by contrast, the trend towards higher concentration is clearer. The shares of the top five and ten economies grew over the period (though there was a slight reduction in the share of the top five in the 1980s). The growth was particularly sharp in the 1990s, when globalization and liberalization gathered strength. A calculation of the share of the bottom 30 countries in developing-world MVA (not percepti-

Box 7.2 China's industrial expansion: fears and facts

The dramatic increase in China's exports of manufactures has caused widespread concern, not only among major importers like the US and China's neighbours in East Asia but also in distant places like Mexico. A recent article in the *International Herald Tribune* says, 'Mexico, long the king of low-cost plants and exporter to the United States of everything from Ford trucks to Tommy Hilfiger shirts to IBM computers, is being rapidly supplanted by China's hundreds of millions of low-wage workers [...] In all, 500 of Mexico's 3 700 so-called maquiladora plants have shut down since 2001, at a cost of 218 000 jobs, the Mexican government says ... Now China, whose American-bound exports grew 20 percent last year while Mexico's remained flat, is expected to surpass this country as the No. 2 exporter to the United States (Canada is still No. 1).'[1]

Even stronger concerns are voiced by China's export-oriented neighbours, who fear for the survival of the export engine that has driven their recent growth. '[China] is already by far the biggest garment exporter in the world, with average wages in the industry of 40 cents an hour – less than a third of, say, Mexico's. Now that China belongs to the WTO, moreover, it will benefit from an agreement to eliminate quotas completely by 2005. As a result, according to estimates by the World Bank, China's share of world garment exports will increase from about 20 today to 50 by the end of the decade. Shoes, semiconductors and televisions are expected to follow. China already makes over half of the world's shoes, and Malaysia frets over the exodus of electronics factories from Penang [...] to Guangdong and the Yangtze delta [...] Comparisons are made with Manchester during the Industrial Revolution. China, it is said, is becoming the 'workshop of the world'. Andy Xie, an economist with Morgan Stanley in Hong Kong SAR, reckons that by 2005 China's exports could have exceeded those of Japan. He also thinks that China has a lot to do with deflation in other countries, because it causes price wars and pushes down profit margins of companies elsewhere. China's industrialization, he says, 'devalues manufacturing assets outside China'.[2]

China's industrial sector has been the largest in the developing world for some time, and its dominance has increased over time. Its share of developing world MVA nearly trebled between 1980 and 2000, from 10.2 percent to 29.3 percent. And it was not only concentrated in simple, low-technology activities; its highest share was in MHT products, and this is where its exports were growing most rapidly. Its share of developing-world MVA grew from 10 percent to 19 percent in RB products, 14 percent to 18 percent in LT products and 15 percent to 21 percent in MHT products. Its annual MVA growth rate over 1980–2000 (11.1 percent) was more than double that of the developing world (5.4 percent) and nearly five times that of the industrialized world (2.3 percent).

Has this expansion run its course? Not if per capita exports and MVA serve to indicate its potential relative to other economies. For instance, China's per capita exports in 2000 are $254, compared to $33 248 for Singapore, $3 951 for Malaysia, $3 601 for the Republic of Korea, $1 459 for Mexico and $937 for Thailand. Similarly, its per capita MVA in 2000 is $350, compared to $5 496 for Singapore, $3 434 for Korea $1 369 for Malaysia and $781 for Mexico (MVA is in 1990 prices, exports in current values). There is also a lot of 'spare capacity' in China in terms of employable labour: the interior of the country is relatively backward and public enterprises are releasing large numbers of workers as they restructure.

China is also strengthening its industrial capabilities, raising educational enrolments and worker training, increasing R&D and improving physical infrastructure and (with WTO accession) the investment climate. Chinese R&D reached 1.1 percent of GDP in 2002, up from 0.6 percent in 1996 – and as much as 60 percent of the R&D expenditure came from companies, rather than the government.[3] Trade liberalization will accelerate the upgrading of enterprises and induce greater specialization. Assuming political and social stability within, and reasonable trade openness abroad, it appears likely that China will continue to expand its share of developing-world manufacturing.

While growing Chinese exports pose a significant competitive threat to many countries, this does not mean that China's economic growth will necessarily damage competing economies. Its imports of raw materials, intermediates, components and finished products are rising as rapidly as its exports. In 2000, its imports from its neighbours were larger than its exports to them: its trade balance in manufactures with East Asia (excluding Hong Kong SAR) showed a massive deficit of $40 billion. The only technological category where it ran a surplus was low technology; in all the others it acted as a catalyst of exports by other countries. Moreover, by serving as an assembly base for exports to other regions, mainly the US and Europe, it strengthened the competitiveness of higher-wage neighbours.

The outcome will depend on how well and rapidly competing economies restructure their industrial sectors with respect to China. Economies with higher wages, like most of its East Asian neighbours, can gain if they shift their production and export structures to more sophisticated activities. If they can enhance their capabilities faster than China, they will benefit. If they cannot, they may be forced to specialize in primary products or slow-growing manufactures. Even the Republic of Korea and Taiwan Province of China fear a hollowing-out of their advanced activities as design, development and research activities also shift to China.

The most direct competitive threat from China arises in labour-intensive products, particularly textiles, clothing and footwear, and here it affects economies with similar wage levels. For these economies, the outcome depends on whether they can specialize in niche products, develop other areas of competitiveness or collaborate with China by attracting its enterprises to take advantage of their labour as wages rise in China. Production and exports within MNCs, as in electronics, are more cushioned from China's competitive threat as the lead firms organise the system in a way that different segments are located in different countries (Lall and Albaladejo, 2003, Lemoine and Unal-Kesenci, 2002).

What is not in doubt is that China will prompt a significant restructuring of developing-world manufacturing, and that it will also affect mature industrial countries.

Sources: Magariños and Sercovich, 2003; Lall and Albaladejo, 2003.

Notes: [1] 'Mexico manufacturers lose business to China.' *International Herald Tribune,* September 3rd, 2003, p. 11.

[2] 'Is the wakening giant a monster?', *The Economist,* February 13th, 2003.

[3] *Science, Technology and Industry Scoreboard 2003,* OECD, 2003.

ble enough to be shown in the figure) supports the impression that industrial activity is diverging rather than converging. The share grew marginally in 1980–90, from 0.05 percent to 0.06 percent, and then halved to 0.03 percent in 2000.

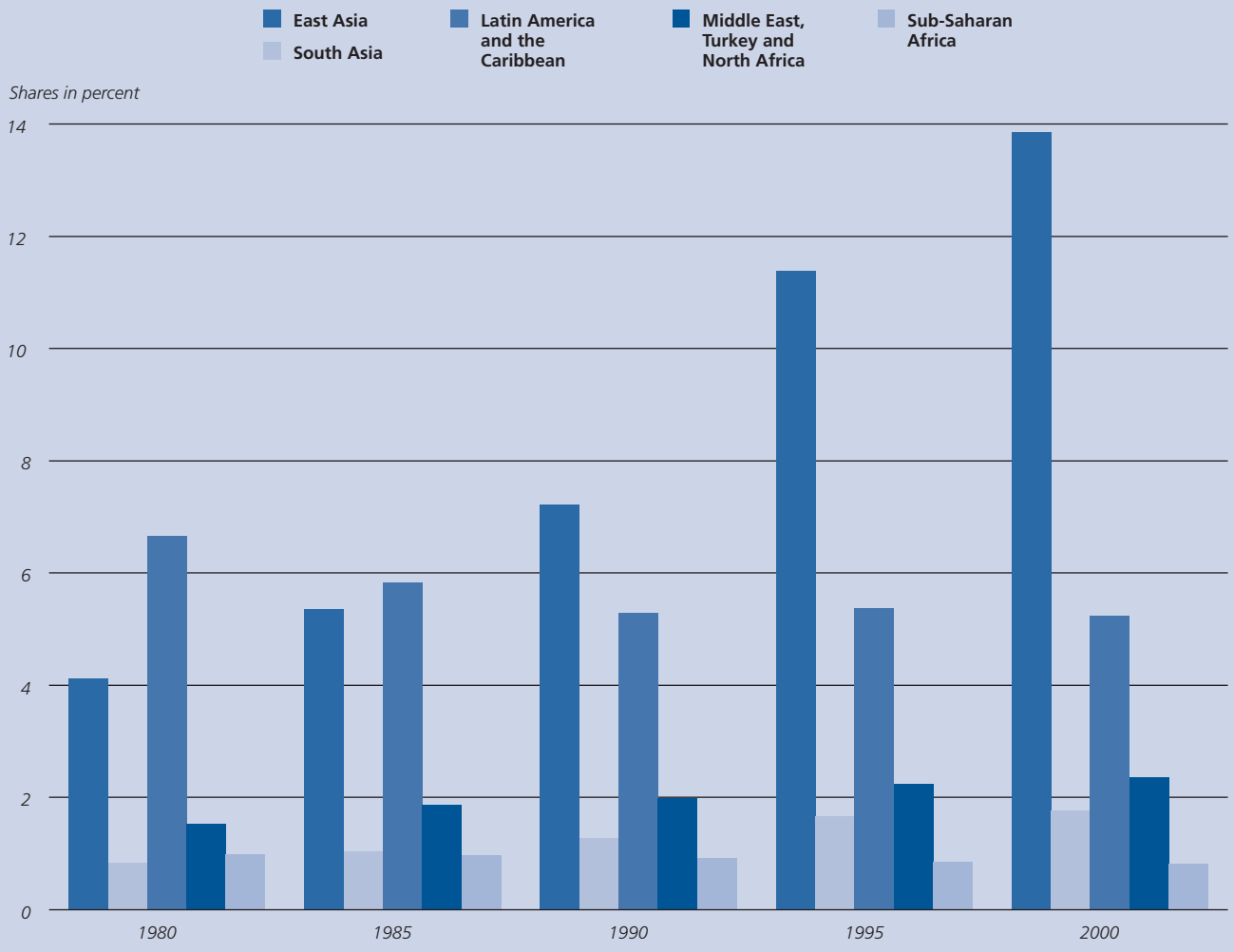
Thus, it seems that in a liberalised environment the factors that determine competitive industrial production are growing more uneven. As argued in the previous *Report,* these factors are structural, mainly related to learning and capability development. This is a cumulative, path-dependent process that generates many spillovers; as a result countries can carry on diverging if they start from different bases and embark upon different trajectories. There are no built-in forces to reverse the process, as successful countries will invest more in new capabilities and better institutions (Lall, 2003). As endogenous growth theory suggests, once skills, technology, learning and agglomeration factors are introduced as growth determinants, countries may never converge. Entry into international trade may reinforce the technological and skill disadvantages of laggards, particularly if their weak capabilities prevent them from benefiting fully from new technologies and knowledge spillovers from abroad (Aghion and Howitt, 1998).

To conclude, industry in the world as a whole and in the developing world on its own is growing less unequal – at a considerably faster pace in the latter than in the former. However, much of the rise in equality is driven by a few large successful economies, mainly China; the bottom half of the developing world's population continues to account for a tiny share of global MVA. The gap between the industrially richest and poorest countries has widened, for the world as a whole in the second half of the 1990s and for developing countries over the last two decades. Similarly, national concentration in MVA has risen in the developing world. To the extent that this greater agglomeration reflects cumulative forces, the gap between the successful and unsuccessful countries may go on widening.

Industrial divergence in the developing world

A trend towards industrial divergence within the developing world is borne out by the data on regions. In per capita terms, EA2 is now the most industrialized region in the devel-

Figure 7.8 **Developing regions' shares of global MVA**



Source: UNIDO Scoreboard database.

oping world (though with China included it still lags behind LAC) and has been the engine of recent industrial growth in the developing world. It has doubled its share of developing-world MVA from 29 percent in 1980 to 54 percent in 2000 – as LAC, from being the leading region in 1980 with a 47 percent share, ended the period a poor second with a 22 percent share. Most of LAC's decline was in the 1980s (the 'lost decade'), when the debt crisis took a massive economic toll. There was some revival in the early 1990s, but after 1995 decline set in again. SSA also lost share, from an already low 1 percent of global MVA to 0.8 (annex table A.2 and figures 7.8 to 7.10).

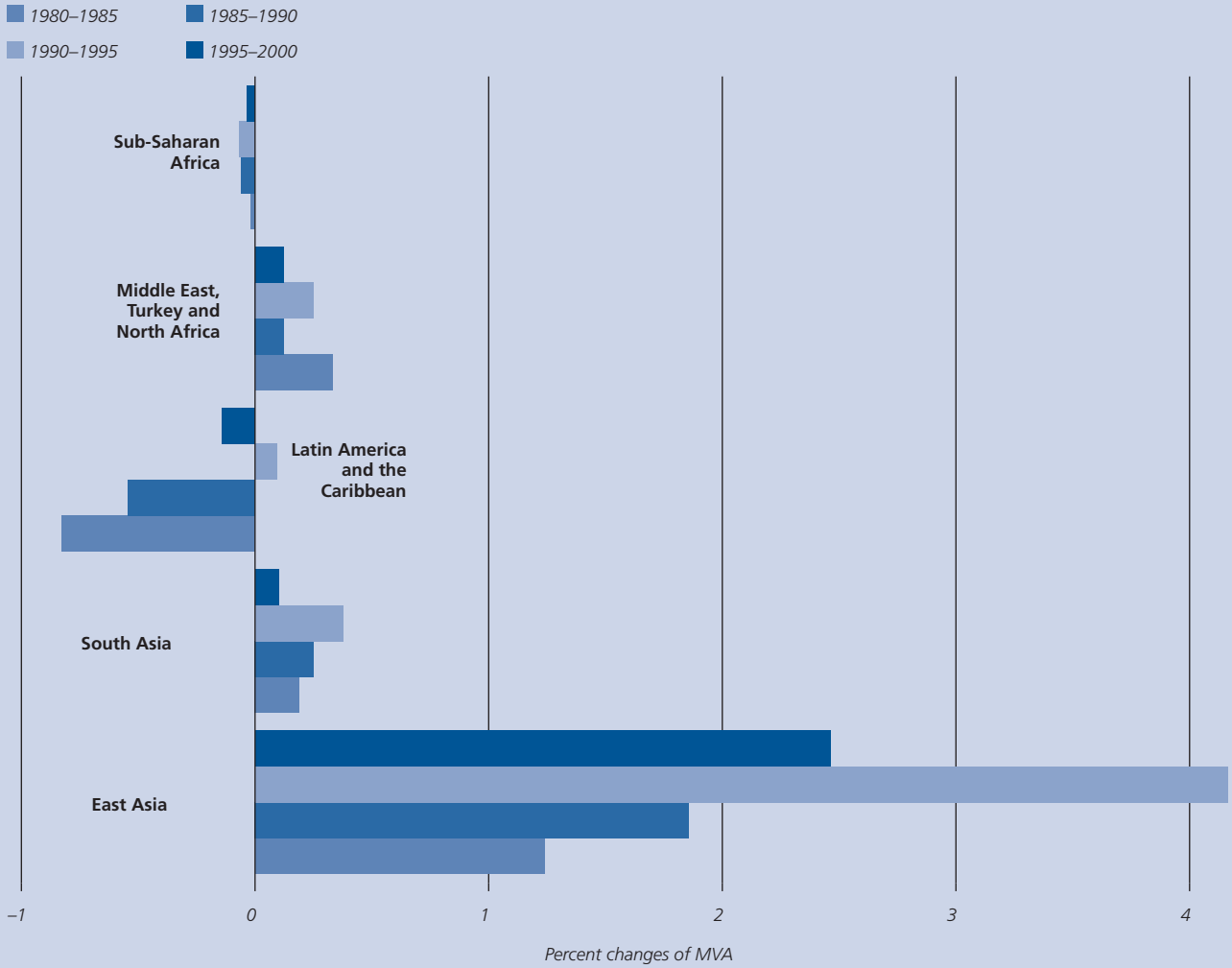
The weak performance of LAC is particularly noteworthy in the context of liberalization policy. Among developing regions, LAC was the earliest and most comprehensive liberalizer. It had a large, long-established industrial sector with a strong base of skills and the 1990s offered exceptional conditions for a revival of growth. There was room for industrial recovery after the 'lost decade', macroeconomic management had improved, there was widespread privatization and opening up to FDI. That LAC failed to grow rapidly raises important questions about how it managed its capability development prior to and during liberalization. Note that it was not just East Asia, with more controlled opening up, that did better – so did less liberalized regions like South Asia and MENA.

The weak performance of Latin America and the Caribbean is particularly noteworthy.

Regional aggregates conceal interesting divergences caused by outliers. Two of these are worth noting: China in East Asia and Mexico in Latin America, the former because of its size, dynamism and recent entry into export markets, the latter because of the impact of the North American Free Trade Agreement (NAFTA) on its manufactured exports. Figure 7.11 shows regional shares of global MVA excluding the two outliers and figure 7.12 MVA growth rates by sub-period for developing regions with China and Mexico separated.

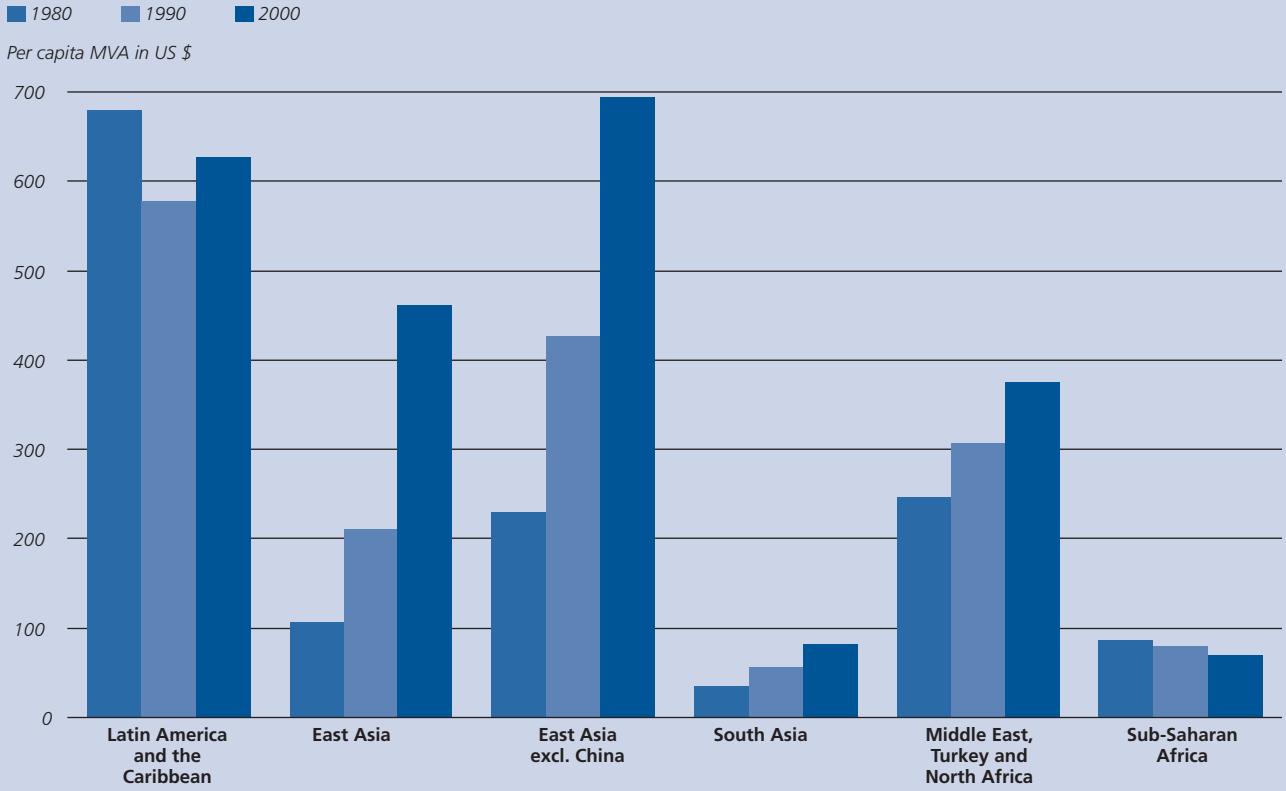
EA2 has grown robustly but less rapidly than China, particularly after 1990. By 2000 China's MVA was larger than that

Figure 7.9 **Changes in shares of global MVA, 1980–2000**



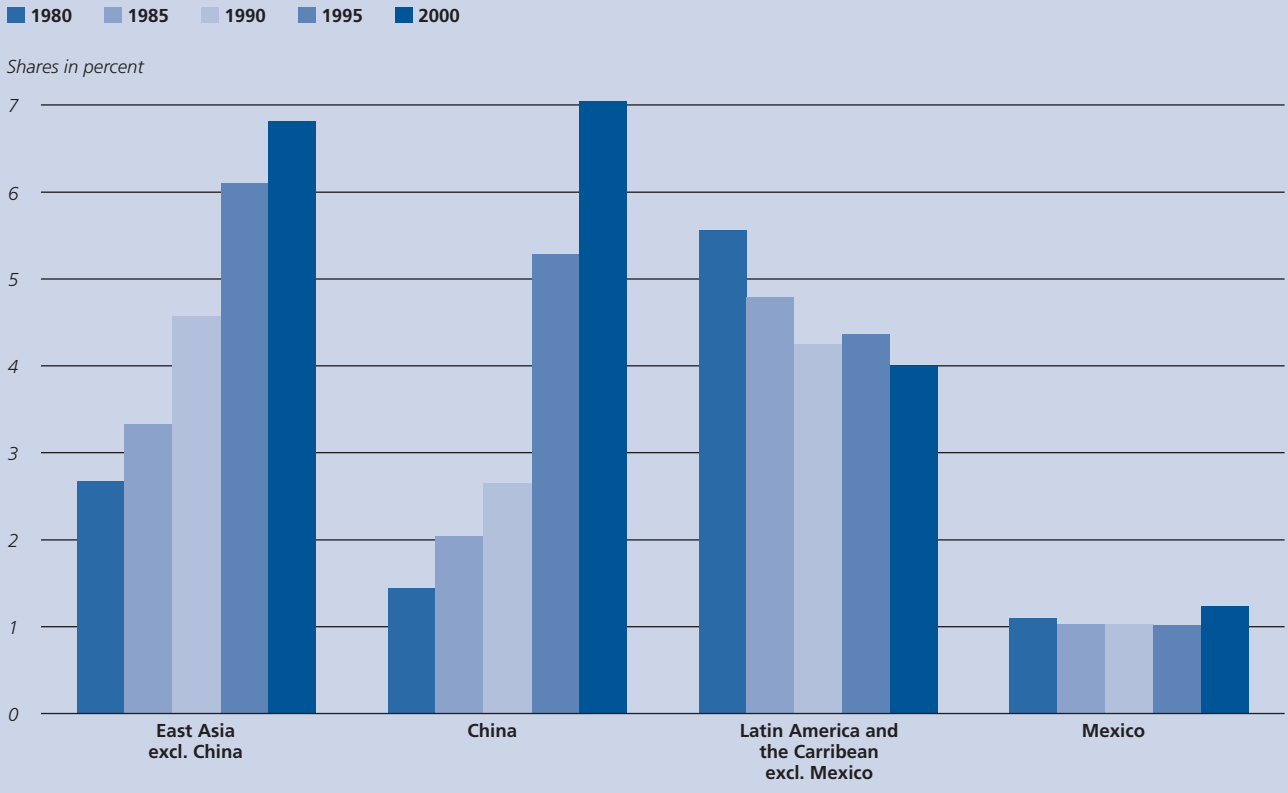
Source: UNIDO Scoreboard database.

Figure 7.10 Per capita MVA in developing regions, 1980, 1990 and 2000



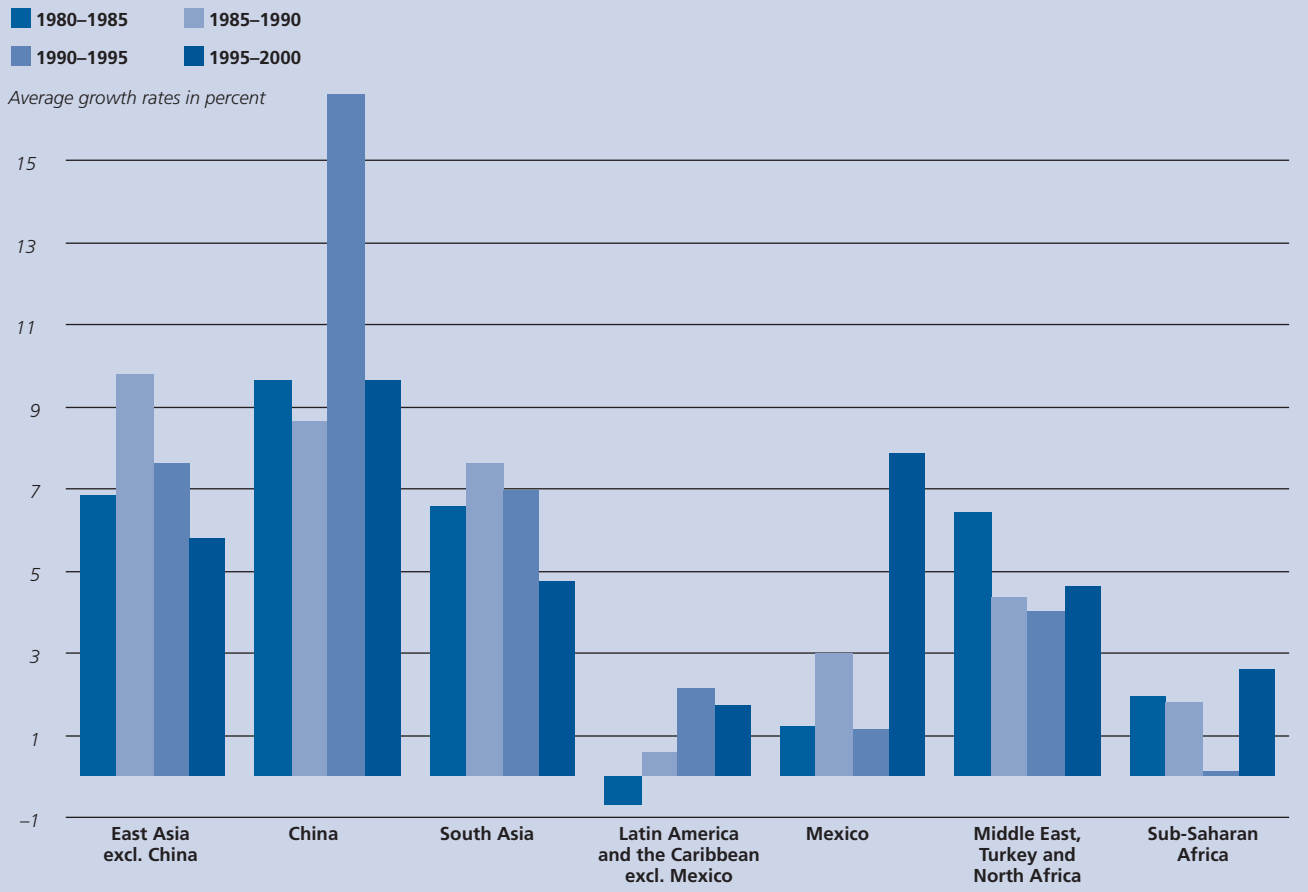
Source: UNIDO Scoreboard database.

Figure 7.11 Shares of global MVA, East Asia and Latin America and the Caribbean, 1980–2000



Source: UNIDO Scoreboard database.

Figure 7.12 MVA growth rates, 1980–2000



Source: UNIDO Scoreboard database.

of the rest of the region put together (and than those of all other developing regions). LAC2 lost MVA share steadily except for a small blip in the early 1990s. Mexico maintained its share with rather modest growth rates until 1995; NAFTA then kicked in, taking its growth rate from 1 percent in 1990–95 to 8 percent in 1995–2000, higher than all regions (but still lower than China).[8]

Patterns of technological upgrading

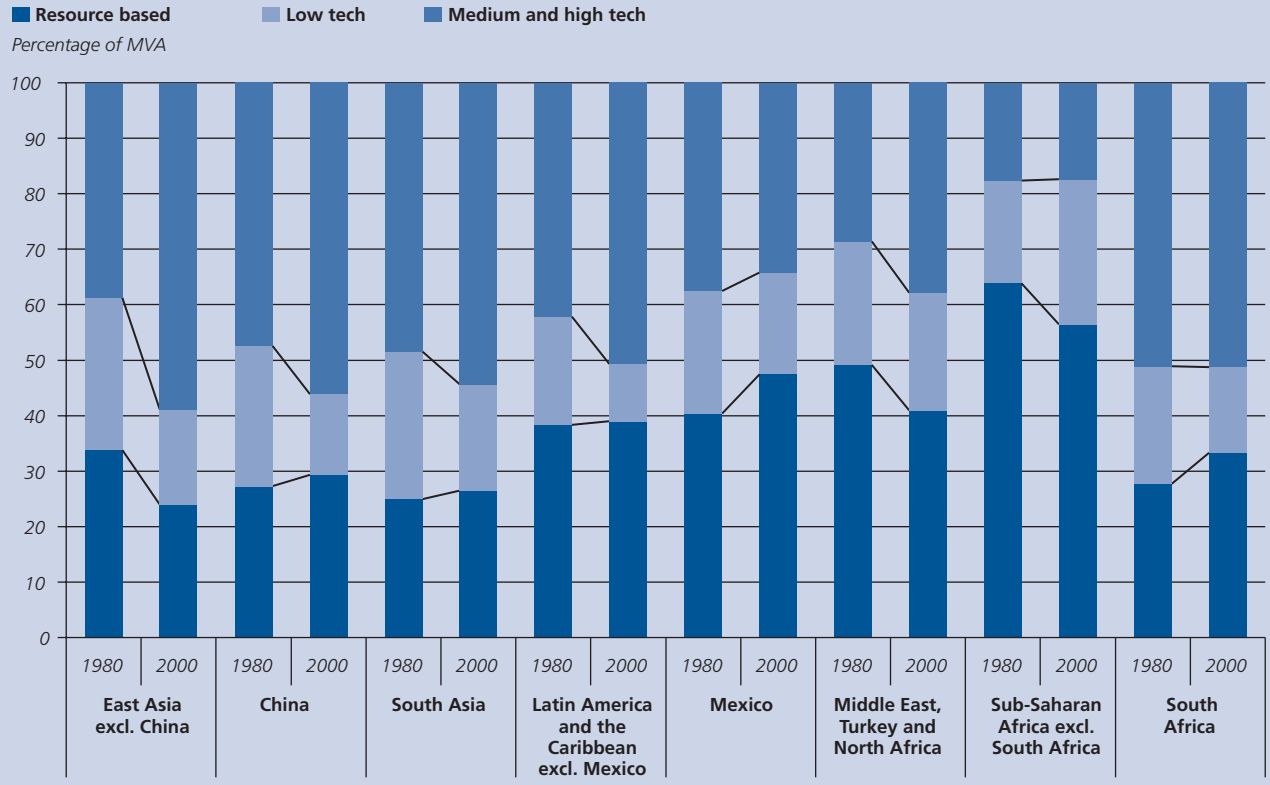
As we have seen, the technology structure of developing countries is upgrading in line with trends in the mature industrial countries (table 7.1). The share of MHT activities in total MVA in the developing world has risen from 41 percent in 1980 to 53 percent in 2000, while that of RB has fallen from 37 to 31 percent, and that of LT from 23 to 16 percent. However, these figures are strongly influenced by the dominant region – East Asia – and the structure differs greatly by region (figure 7.13 shows the shares of the technology categories by region, separating China from East Asia, Mexico from LAC and South Africa from SSA. Annex table A.3 gives the detailed data by sub-period).

The most advanced MVA structure (as measured by the share of MHT activities) is that of EA2. China and South Asia come next (India dominating the latter with its large heavy-industry sector). The least advanced structure is that of SSA excluding South Africa. Latin America and South Africa had fairly similar structures by 2000, while Mexico lagged behind the rest of its region.

The most advanced MVA structure in the developing world is that of East Asia (excluding China). The least advanced is that of Sub-Saharan Africa.

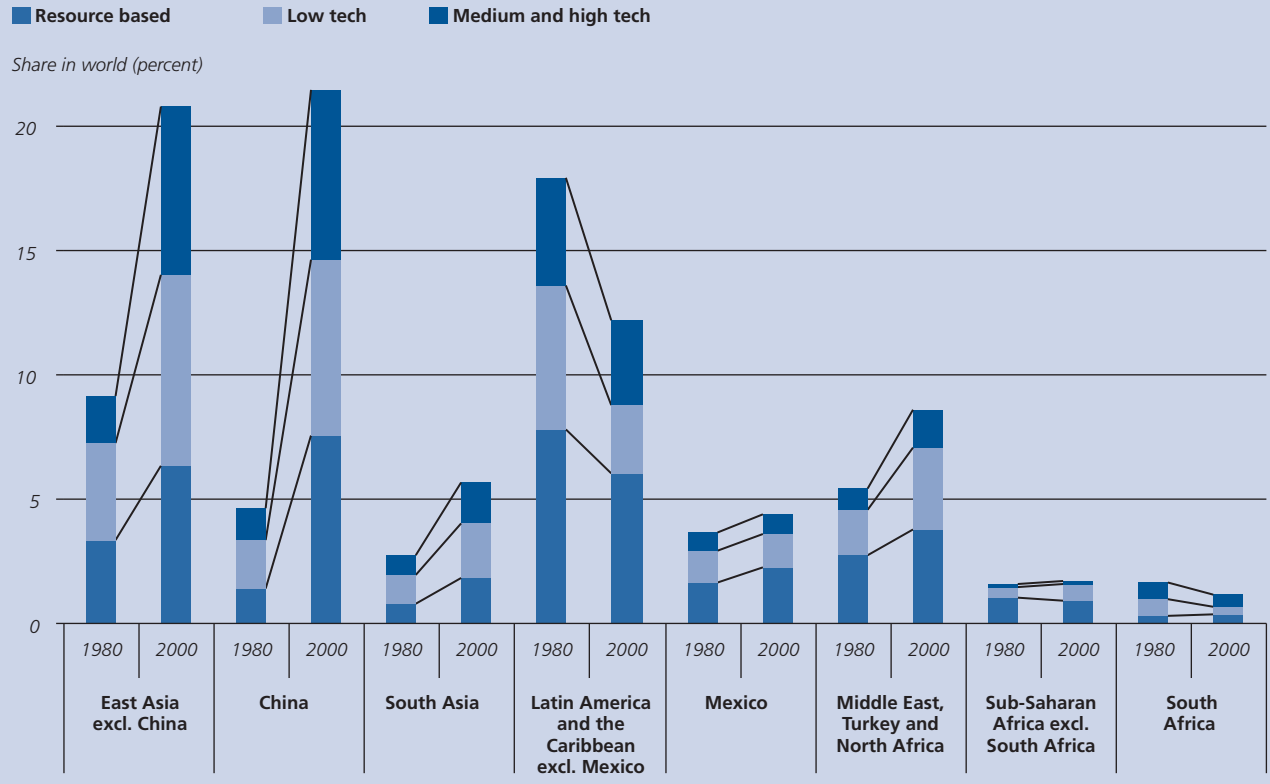
Over time, most regions have increased the share of MHT at the expense of RB and LT, with the largest upgrading taking place in EA2. There are, however, some exceptions. In China, perhaps surprisingly, the share of LT diminished but that of RB expanded, while in Mexico both MHT and LT lost ground to RB. SSA excluding South Africa saw both MHT and RB shrink in favour of LT and South Africa has kept a constant share of MHT but increased that of RB. LAC2 increased its shares of MHT (significantly) and RB (marginally), with that of LT decreasing.

Figure 7.13 Technology structure of MVA, 1980 and 2000



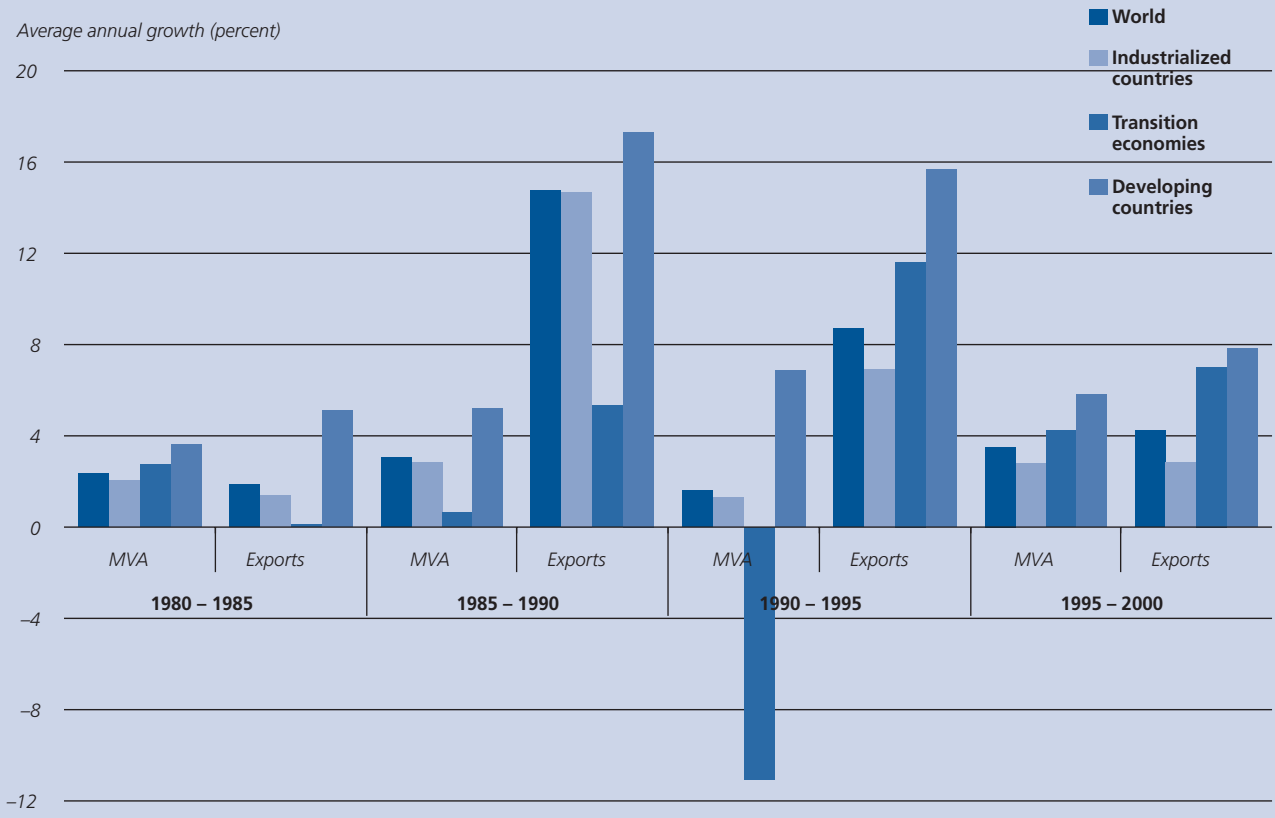
Source: UNIDO Scoreboard database.

Figure 7.14 Shares in world value added by region and technology category, 1980 and 2000



Source: UNIDO Scoreboard database.

Figure 7.15 Annual growth of manufactured exports and MVA by economic grouping, 1980–2000

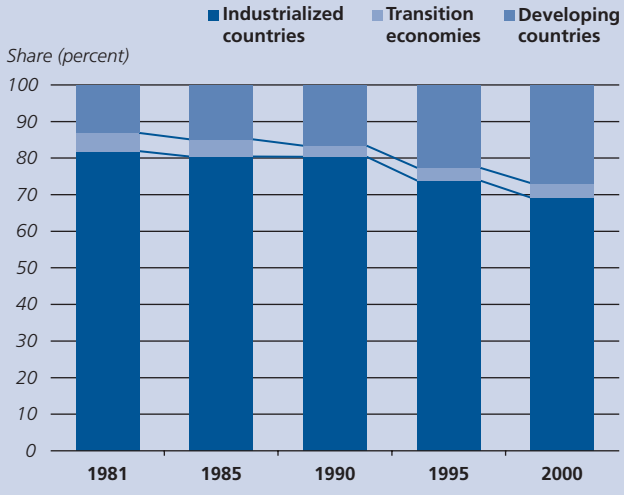


Source: UNIDO Scoreboard database.

How much do the regions weigh in the world scene by each technology group? The largest 'winner' in overall share is China with the highest gains in RB, followed by MHT and LT coming last. Next comes EA2, where MHT leads, with LT and RB following. LAC2 has lost shares in each category, most significantly in LT (3.1 percentage points). Mexico gained share (albeit marginally), most of all in RB (annex table A.4 shows the evolution of shares and figure 7.14 the shares in 1980 and 2000).

In LT activities, East Asia (including China) accounts for 1.7 times the share of all other developing regions put together; for MHT activities the ratio is 1.5. While it is a resource-scarce region, it also accounts for a significant share of global RB activity. Moreover, as we shall see, it is also the dominant developing-world exporter of RB products: several resource-poor countries (like Singapore and Republic of Korea) are large producers and exporters, based on imported inputs.

Figure 7.16 Share in world manufactured exports 1981–2000



Source: UNIDO Scoreboard database.

Export performance

Manufacturing everywhere has become more internationalised in the sense that exports of manufactures have consistently grown faster than MVA – with the exception of the early 1980s, when both slowed down (figure 7.15). The late 1980s then saw a boom in exports, with an annual growth rate of 15 percent. Since then there has been a steady deceleration, but export growth rates still exceed those of MVA. (Note, however, that MVA growth rates are calculated in constant prices while export data, taken from UN Comtrade, are in current values; MVA growth rates are consequently understated relative to exports. However, the previous *Report* calculated both in current terms and found that exports were growing faster than MVA over 1985–98. Note also that

export data start at 1981 rather than 1980 to ensure the maximum coverage of countries.)

Developing economies acquired world market share from industrialized economies throughout the period, while transition economies performed worse in the 1980s and better in the 1990s. The developing world's share of manufactured exports (figure 7.16) doubled from 13 to 27 percent over 1980–2000, while that of transition economies fell slightly, from 5 to 4 percent. The industrialized world still accounts for over two-thirds of world manufactured exports, but if current growth rates are sustained the developing world should equal its share in less than two decades.

The influence of technological content

The data allow manufactured exports to be separated into four technological categories: thus, apart from RB and LT, medium-technology products can be distinguished from HT ones rather than put together, as in the calculation of value added[9] (shares of global manufactured exports for each category are shown in figure 7.17; export values in annex table A.5; per capita exports in table A.14; and growth rates for each technological category, by region, in table A.6).

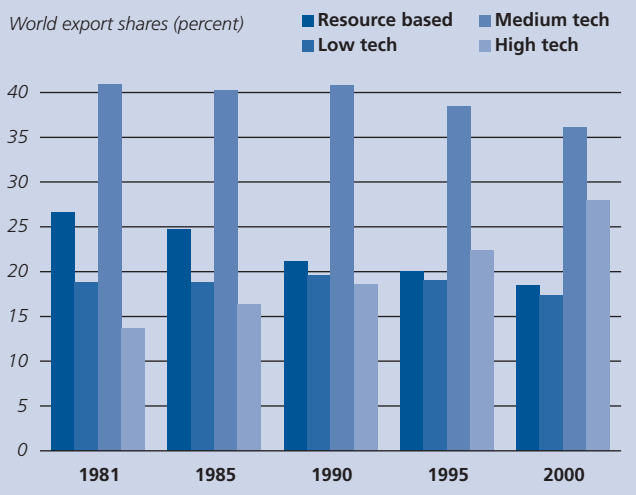
Medium-technology products, the 'heavy-industry' products that are the bulk of industrial activity in mature economies, dominate world exports of manufactures. Their share, however, has been falling steadily, as has that of RB products. LT products have increased their share slightly between 1981 and 1990, but thereafter they have decreased. The only consistent 'winners' are HT products, which started the period as the smallest category, with 14 percent of manufactured exports, and end it as the second-largest, with 28 percent.

Medium-technology products dominate world exports of manufactures, but their share has been falling.

This shows up clearly in the growth data (figure 7.18). HT products have been the fastest growing category in both industrialized and developing countries and in all sub-periods. The rich countries' RB and LT exports slowed down significantly. This is of significance to developing countries, since, as noted above, their point of entry into manufactured exports has traditionally been RB and LT products. However, from the perspective of market positioning (to take advantage of dynamic products) these are less attractive than MT and HT products. As the previous *Report* showed, sustained export success has involved countries and regions moving from the simple to the complex product categories.

Developing countries have grown faster than industrial ones in all categories and periods except for RB products in the early 1980s. The lead of the former over the latter is

Figure 7.17 Technology structure of global manufactured exports 1981–2000



Source: UNIDO Scoreboard database.

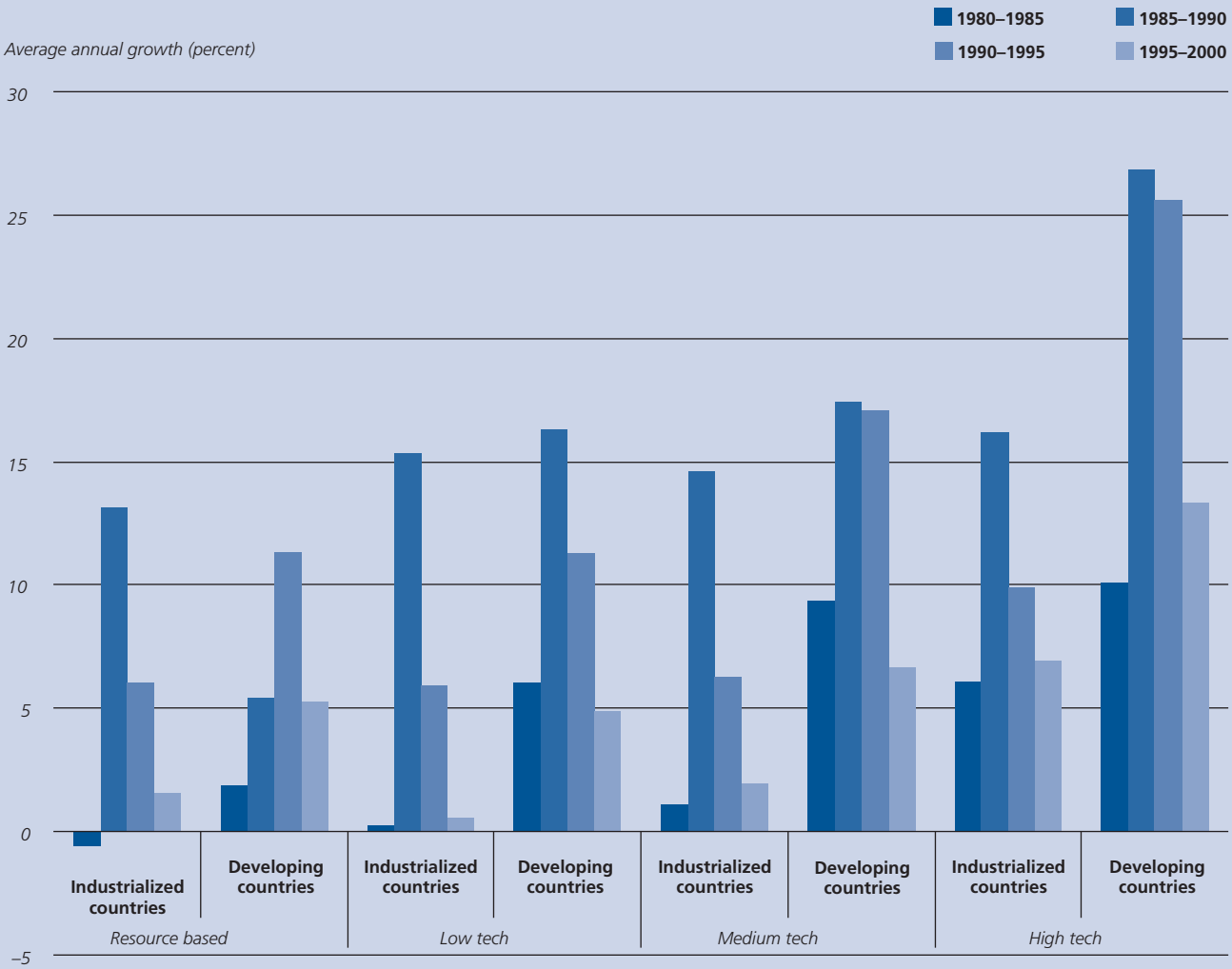
greatest in HT products, followed by MT products. Thus, the more complex the technologies the better developing countries have performed relative to industrialized countries in world markets. This is not a statistical illusion, in the sense that the growth of complex exports by developing countries is exaggerated because of a small starting base. Figure 7.19 shows the world market shares of developing countries in each category and the change in these shares between 1981 and 2000. The largest share of developing-world exports is, as might be expected, in LT, but its share in HT is not far behind and shows the largest increase (23 percentage points) over the period. Developing countries now account for nearly one-third of world HT exports. In terms of value, developing-world HT exports were $113 billion larger than its LT exports in 2000; in 1981 they were $41 billion smaller.

The value of the *increase* in manufactured exports by developing countries between 1990 and 2000 ($884 billion) was two-thirds as large as that of the increase by industrialized countries ($1 289 billion; figure 7.20). Developing countries gained market share in both simple (RB and LT) and complex (MT and HT) categories, but their relative gain was higher in complex products (25.5) than in LT and RB products (17.7).

This pattern may seem to go against the received wisdom that the comparative advantage of poor countries vis-à-vis rich ones in manufactures lies in RB products and products with simple technologies. There are, however, some good explanations as to why developing-world exports of sophisticated products are growing so much faster:

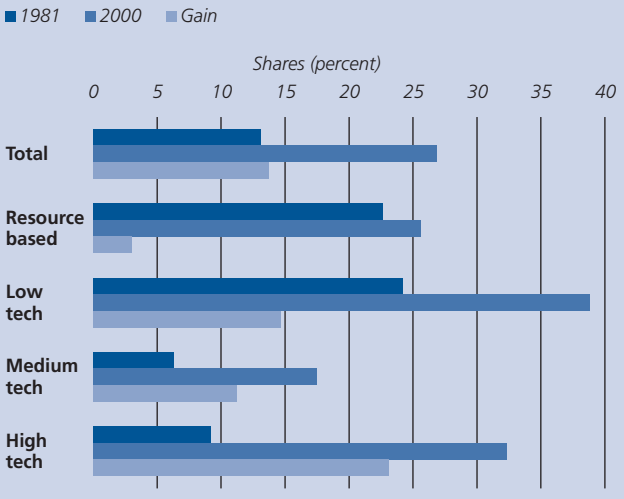
- Some developing countries have built considerable domestic capabilities in high-technology, led by the mature Tiger economies of East Asia, the Republic of Korea and Taiwan Province of China. Their rapid development of capabilities was driven in the early stages by strong and pervasive industrial policy, with restrictions on inward FDI, protection of infant industries, allocation of credit, promotion of local R&D and specialized skills, etc. (Lall, 2001, and the previous *Report*).

Figure 7.18 Annual growth of manufactured exports by technology category and economic grouping, 1980–2000



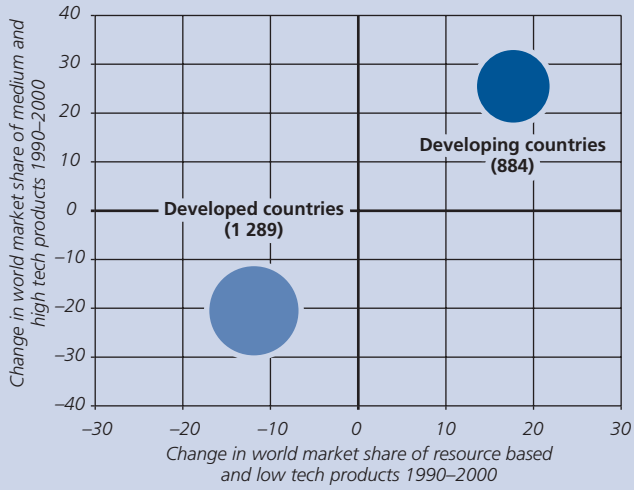
Source: UNIDO Scoreboard database.

Figure 7.19 Developing countries world market shares in manufactured exports by technological category, 1981 and 2000



Source: UNIDO Scoreboard database.

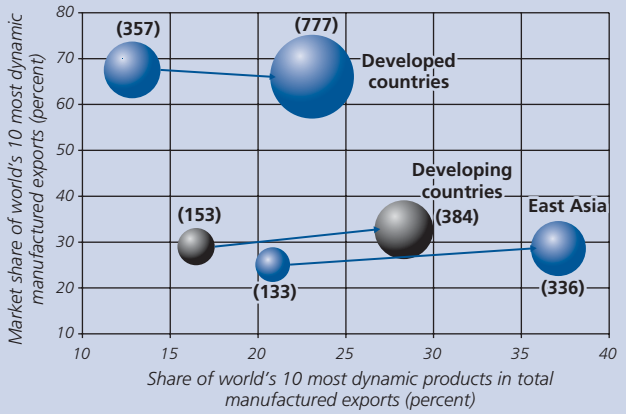
Figure 7.20 Developing countries are catching up in all categories of manufactured exports



Source: UNIDO Scoreboard database.
Note: Bubble size and numbers in paratheses indicate the increase in the value of total manufactured exports between 1990 and 2000 in billions of dollars.

- Several other countries have become major HT exporters by plugging into integrated production systems, without first building local capabilities. Several HT products, particularly in electronics, have labour-intensive assembly that has led to massive relocation to low-wage areas. Over time, some countries have upgraded their role, moving from simple assembly of imported components into greater local content, design and development, and regional marketing. Singapore, for instance, has become one of the global leaders in the manufacture of advanced electronics, with impressive design capabilities and growing local linkages. Other countries, however, are still near the low end of the value chain and remain vulnerable to relocation by transnational corporations (TNCs) to cheaper or more competent areas (China poses the most acute threat here).
- TNC systems have also spread in some heavy MT products like automobiles. Unlike electronics, these systems tend to encompass proximate countries because of transport costs. The three large Latin American economies, Argentina, Brazil and Mexico, are good examples of complex MT exports led by the auto industry. This value chain is unlikely to spread to many other developing regions because of its enormous scale economies and high skill requirements but it does raise the competitive profile of the developing world in sophisticated products.
- In the simple categories, on the other hand, the gains of developing countries are limited by the complexity (in manufacturing or design and marketing) of several categories. Exports of high-quality fashion goods, for instance, remain the preserve of rich countries, as do those of refined and differentiated food products. It is difficult, for example, to conceive of the equivalent of Swiss chocolates being manufactured in and exported by the developing countries that provide the raw materials.
- The growth of developing-world exports of some RB and LT products is held back by trade barriers, tariff escalation (higher tariffs being levied on imports of processed products than on the raw materials) and subsidies in industrialized countries. Textiles and clothing are a good example of trade barriers, agricultural products of subsidies and tariff escalation.

Figure 7.21 Developed countries keep an edge over developing countries in the world's 10 most dynamic manufactured exports, 1995 and 2000



Source: UNIDO Scoreboard database.
Note: Bubble size and figures in parantheses (billion dollars) indicate the export value in the world's 10 most dynamic manufactured exports.

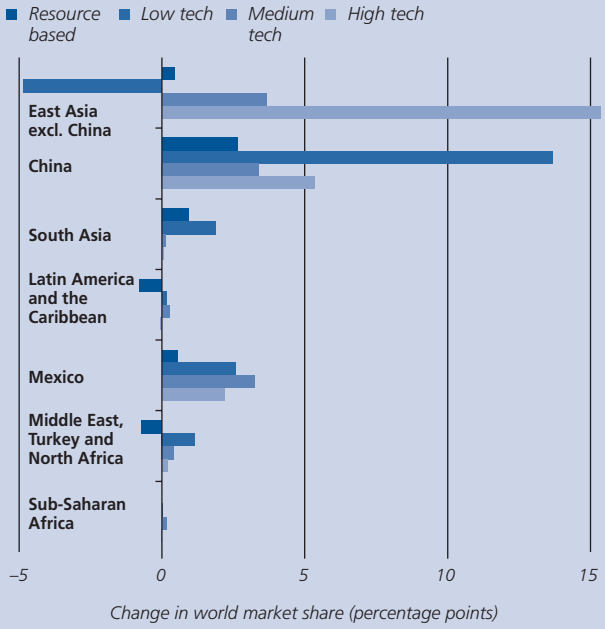
East Asia and Mexico are best positioned for future export growth and technological upgrading.

It is interesting to compare the performance of industrialized and developing countries in the most dynamic products in world trade during 1995–2000. Figure 7.21 shows that, despite losing world market share in all technological categories, industrialized countries have retained their market share in the ten fastest growing manufactured exports. The expansion of developing-world share in these products is almost wholly due to the performance of East Asia.

Regional disparities in export performance

Export performance is highly uneven in the developing world, more so than MVA performance. East Asia accounted for nearly 70 percent of developing-world manufactured exports in 2000, up from 52 percent in 1981. Its share was highest in HT: 85 percent in 2000, up from 73 percent, and lowest in RB, with 46 percent and 39 percent, respectively. While LAC has liberalized more rapidly, the results in terms of export growth

Figure 7.22 Changes in world market share of developing regions, 1981–2000



Source: UNIDO Scoreboard database.

Table 7.3 World market shares of manufactured exports of developing regions, 1981 and 2000

	World market share (percent)									
	1981					2000				
Region or Country	*Total*	*RB*	*LT*	*MT*	*HT*	*Total*	*RB*	*LT*	*MT*	*HT*
East Asia	6.8	8.7	17.6	3.9	6.7	18.4	11.8	26.5	11.0	27.4
East Asia excl. China	5.8	7.6	14.8	3.6	6.5	12.0	8.1	10.0	7.2	21.9
China	1.0	1.1	2.8	0.3	0.2	6.5	3.7	16.5	3.7	5.6
South Asia	0.6	0.5	1.9	0.2	0.1	1.1	1.4	3.8	0.3	0.2
Latin America and the Caribbean	3.2	6.8	2.5	1.5	2.1	5.1	6.5	5.2	5.0	4.2
Latin America and the Caribbean excl. Mexico	2.7	6.3	2.1	1.2	0.9	2.2	5.5	2.2	1.5	0.8
Mexico	0.5	0.5	0.4	0.3	1.2	2.9	1.1	3.0	3.5	3.4
Middle East and North Africa	1.8	4.7	1.6	0.4	0.2	1.6	4.0	2.8	0.8	0.4
Sub-Saharan Africa	0.7	1.9	0.5	0.3	0.1	0.6	1.9	0.6	0.4	0.1
Sub-Saharan Africa excl. South Africa	0.3	0.9	0.2	0.0	0.0	0.2	1.0	0.2	0.0	0.0
South Africa	0.4	0.9	0.4	0.2	0.1	0.4	0.9	0.3	0.4	0.1
All developing countries	13.1	22.5	24.2	6.2	9.2	26.8	25.6	38.8	17.5	32.3

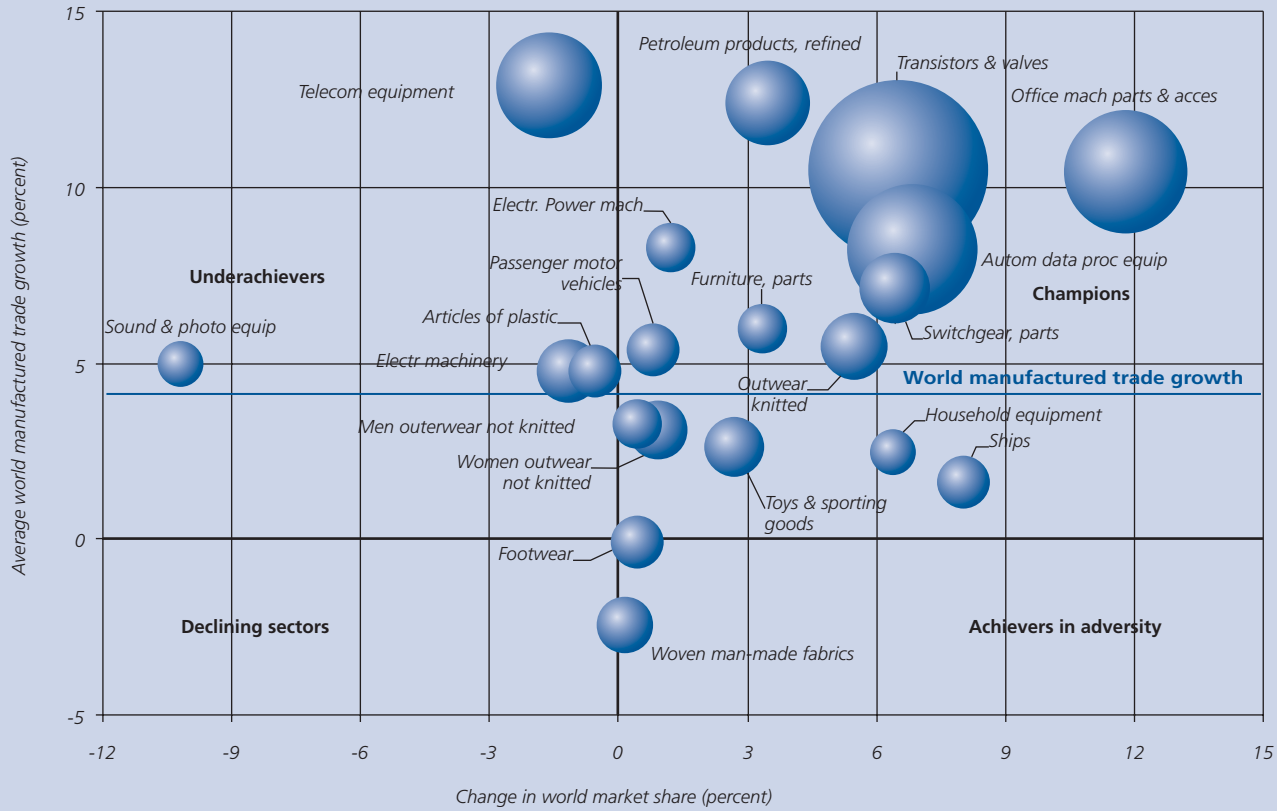
Source: Calculated from the Comtrade database.
Note: RB ... Resource based exports, LT ... low tech exports, MT ... medium tech exports, HT ... high-tech exports.

have been disappointing (Mexico being the exception). LAC2 has lost market share in all categories apart from MT (due largely to auto exports by Brazil and Argentina) – including RB products where it has a natural advantage. Mexico has resembled an Asian Tiger in its export growth since 1995; however, the base has remained shallow, and products with high value-to-weight ratios, like electronics, are moving to China.

South Asia is the only other region to have expanded its world share of manufactured exports (by a modest 0.5 percentage point), mainly in LT products. MENA and SSA have stagnated; in the former, gains in LT and MT products are offset by a loss in RB. East Asia and Mexico are the main 'movers and shakers' of export competitiveness in the developing world (figure 7.22; table 7.3 shows the world market shares of manufactured exports for the main regions, with three important outliers – China, Mexico and South Africa – dis-

Figure 7.23 Market positioning of leading 20 exports by East Asia (including China)

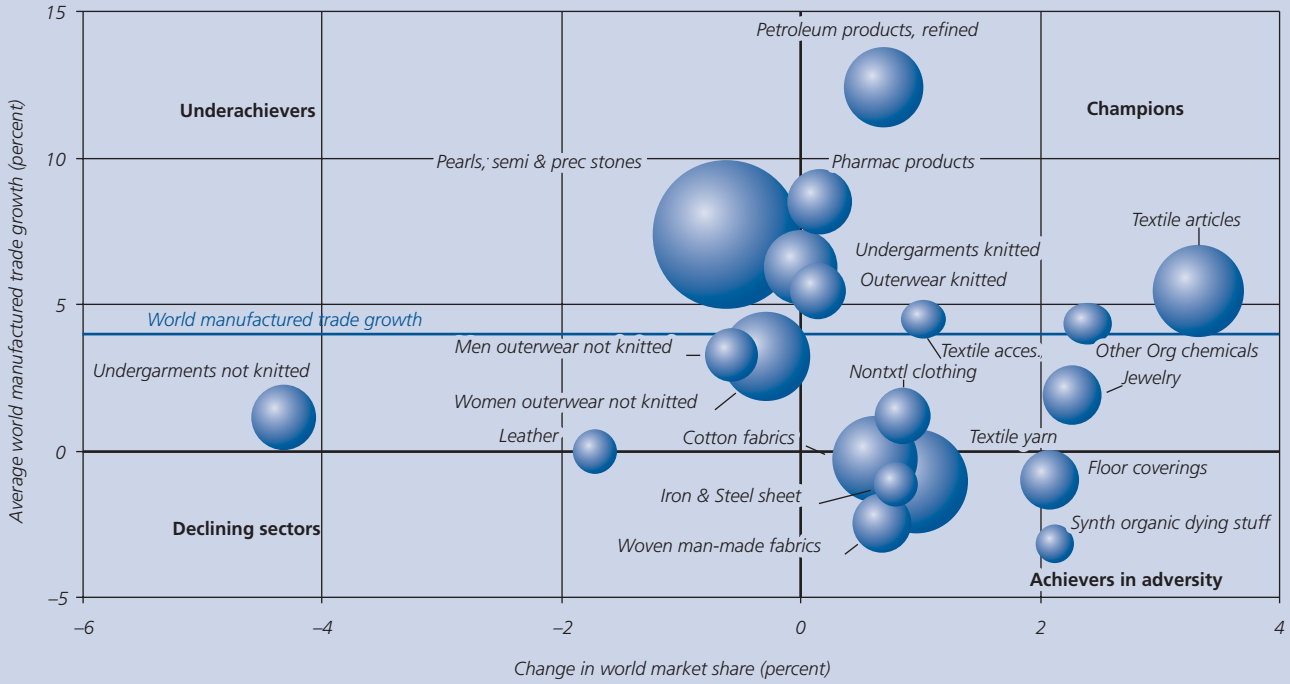
Manufactured export performance in East Asia, 1995-2000



Source: UNIDO Scoreboard database.
Note: The bubble size indicates the value of exports in 2000 in million dollars. The "World manufactured trade growth" line is the average growth rate in worlds manufactured growth between 1995 and 2000.

Figure 7.24 Market positioning of leading 20 exports by South Asia

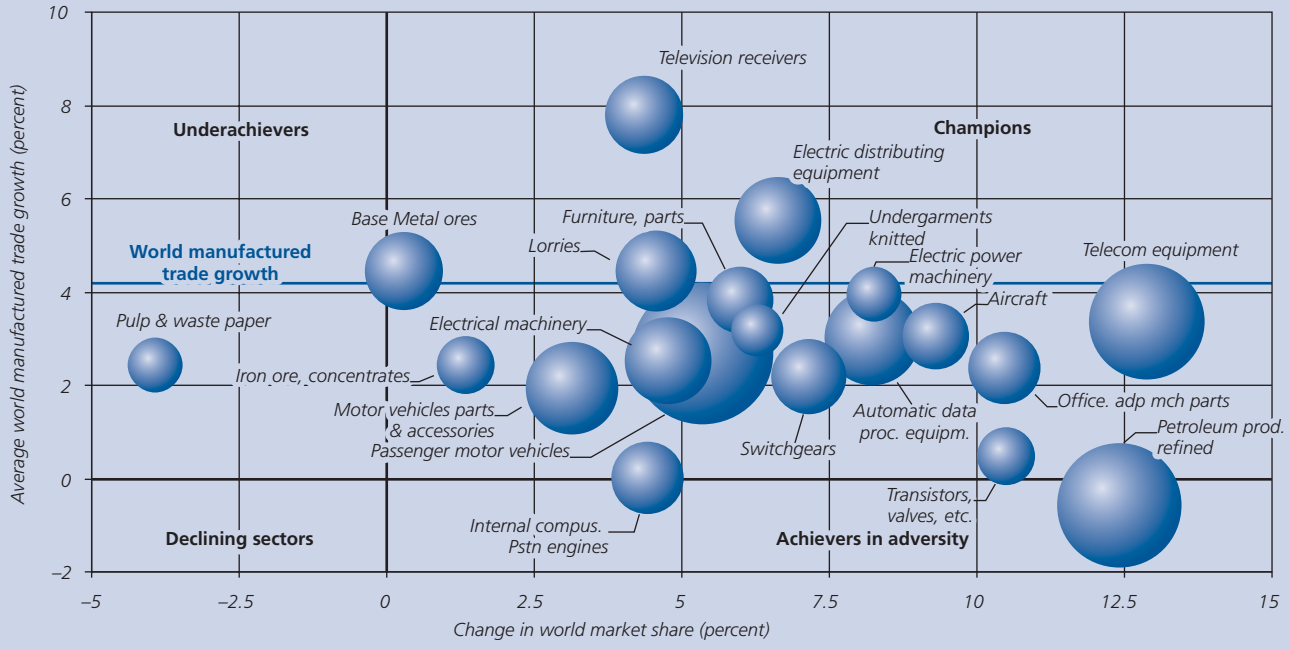
Manufactured export peformance in South Asia



Source: UNIDO Scoreboard database.
Note: The bubble size indicates the value of exports in 2000 in million dollars. The "World manufactured trade growth" line is annual growth in world manufactured exports between 1995 and 2000.

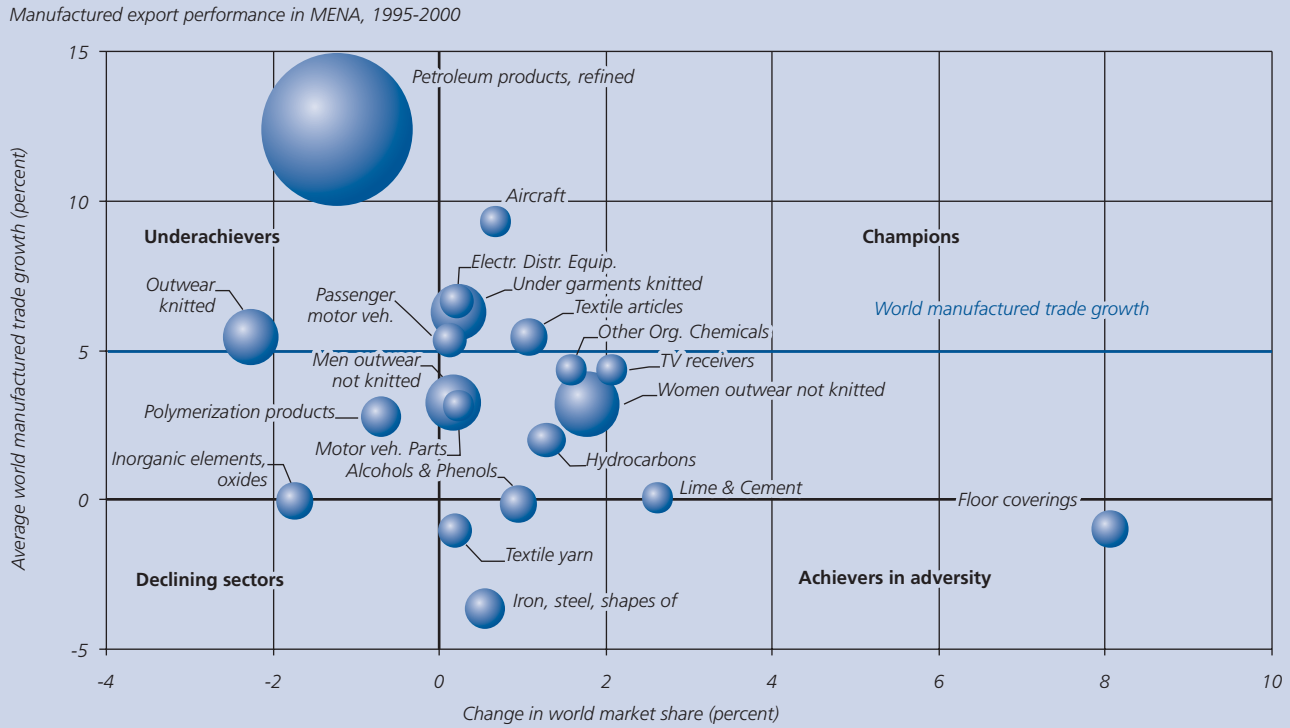
Figure 7.25 Market positioning of leading 20 exports by Latin America and the Caribbean (including Mexico)

Manufactured export performance in Latin America, 1995-2000



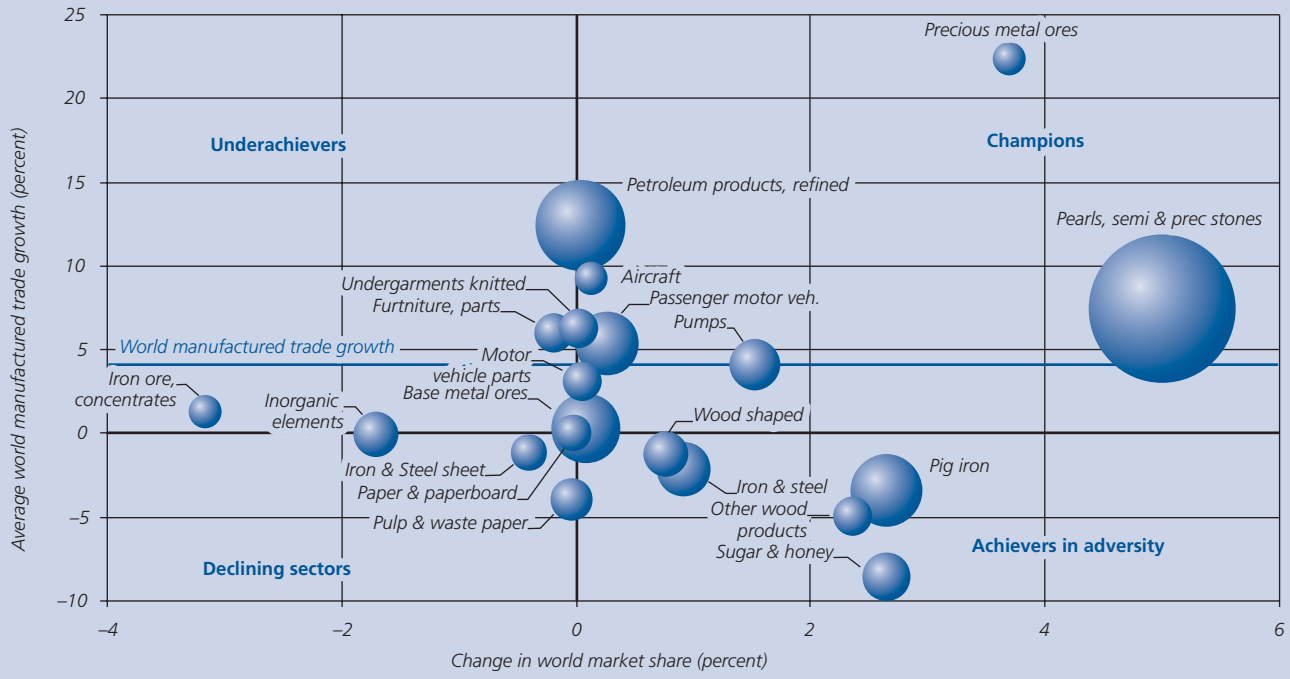
Source: UNIDO Scoreboard database.
Note: The bubble size indicates the value of exports in 2000 in million of dollars. The "World manufactured trade growth" line is annual growth in world manufactured exports between 1995 and 2000.

Figure 7.26 Market positioning of leading 20 exports by the Middle East and North Africa



Source: UNIDO Scoreboard database.
Note: The bubble size indicates the value of exports in 2000 in million dollars. The "World manufactured trade growth" line is annual growth in world manufactured exports between 1995 and 2000.

Figure 7.27 Market positioning of leading 20 exports by Sub-Saharan Africa (including South Africa)



Source: UNIDO Scoreboard database.
Note: The bubble size indicates the value of exports in 2000 in million dollars. The "World manufactured trade growth" line is annual growth in world manufactured exports between 1995 and 2000.

Table 7.4 Matrix of Market Positioning

Share of product in world manufactured exports / *Share of country/region in world exports*	*RISING (Dynamic)*	*FALLING (Stagnant)*
RISING (competitive)	*Optimal "Champions"*	*Vulnerable "Achievers in adversity"*
FALLING (non-competitive)	*Weakness "Underachievers"*	*Restructuring "Declining sectors"*

played separately). China has made large market-share gains in all categories, particularly in LT where it has been taking market share from other East Asian countries. In other categories the two seem to complement each other.

A useful way to analyse the competitive pattern of a region is to look at the distribution of exports in a market-positioning matrix, relating the dynamism of its exports to that of world exports (table 7.4).[10] The best competitive position is 'champions', dynamic products in which the region gains market share. The worst position is to lose market share in dynamic areas ('underachievers'). In between are 'declining sectors' – stagnant products in which the region loses share – and 'achievers in adversity' – products stagnant in world trade in which the region gains share (figures 7.23 to 7.27 show the market positioning of the leading 20 export products of each region).

It is informative to look at the *density* of each quadrant as well as its technology structure.[11] To the extent that export structure affects growth prospects and has different technological benefits, the presence of advanced products in the desirable quadrants is a plus. East Asia and LAC have densely populated 'champions' quadrants containing complex products (though the LAC profile largely reflects Mexican performance). At the other end, SSA has relatively few champions, and the largest two are RB – a sluggish category in world trade that carries few technological benefits. South Asia, despite India's large heavy-industry sector, specializes mainly in LT textile and clothing and in RB gem cutting. MENA focuses on petroleum products (in the oil region countries) and LT products.

These figures suggest that East Asia and Mexico are best positioned for future export growth and technological upgrading. While South Asia and MENA have complex industrial structures, their export structures do not reflect their MVA structures (see below). These comparisons should be treated with care, of course: it *is* possible to grow rapidly within stagnant product groups by taking market share from other countries, and it *is* possible to progress up the technology ladder within simple industries. The process is, however, difficult. Given the cumulative, path-dependent nature of learning, it is generally difficult to achieve sustained export success without upgrading the structure of exports.

How do the developing regions fare in the world's ten most dynamic manufactured exports? These products accounted for about one-quarter of manufactured exports in industrialized and developing countries over 1995–2000, with a higher share in the latter. However, the share was much higher in East Asia than in other regions, with LAC a distant second. East Asia also accounted for the overwhelming bulk of such exports from the developing world (around 87 percent in both 1995 and 2000). The LDCs had only 1 percent of their manufactured exports in these dynamic products, and accounted for negligible world market shares (table 7.5)

Mismatch between export and production structures

Expectations are that in open economies the structure of MVA will be technologically similar to that of exports. In the industrialized world, the two shares are indeed very similar, with the export structure slightly more advanced than that of MVA (presumably because technology gaps between countries are greater in HT products and so lead to more trade in the HT segment). In the developing world, the export structure was significantly less advanced than that of MVA in 1980 and had become more advanced by 2000, as a result of domestic capability development and the spread of HT production systems. (Figure 7.28 compares the share of MHT in MVA and manufactured exports in 1980 and 2000 for developing and industrialized countries and for developing regions. Annex table A.7 has data on the structure of manufactured exports of each.)

Table 7.5 World market shares in 2000 of most dynamic manufactured products in world trade during 1995–2000

Shares (percent)	*Developed countries*	*Developing countries*	*East Asia*	*Latin America and the Caribbean*	*Middle East and North Africa*	*South Asia*	*Sub-Saharan Africa*	*Least developed countries*
Share of 10 most dynamic exports in total manufactured exports in 2000	23.1	28.3	37.1	16.7	3.4	4.6	3.2	1.0
World market share in 10 most dynamic exports in 2000	66.1	32.7	28.6	3.4	0.2	0.2	0.1	–
World market share in 10 most dynamic exports in 1995	67.5	29.0	25.1	2.8	0.3	0.3	0.1	–

Source: Calculated from UN Comtrade.

CHAPTER 8

Benchmarking industrial performance

The previous *Industrial Development Report* introduced a scoreboard of industrial performance and suggested how it could be used in the formulation of industrial strategy. At its core was a competitive industrial performance (CIP) index, benchmarking 87 economies in 1998 and 80 economies in 1985. This issue extends and updates the original CIP index. It ranks economies in three years, 1980, 1990 and 2000, and covers more countries: There is a 'core group' of 93 economies with data for all three years, and there are maximum numbers of countries for the three years, namely, 107 in 1980, 108 in 1990 and 155 in 2000 (the surge in the last year being largely due to the inclusion of a number of transition economies).

The new performance index

From the previous *Report* to the present one the database on which the CIP index builds has improved remarkably. In addition, an effort has been made to improve the design of the index. Thus, while the methodology behind the CIP index remains essentially the same as in the previous *Report,* more detailed information is incorporated in the measure by subdividing two of the index components.[1]

The CIP index in its refined version covers selected crucial features of industrial activity for as many countries as the data permit. It uses 'hard' quantitative data rather than 'soft' qualitative or survey information; in this it differs from other indices

Box 8.1 How the new CIP is built

The CIP index benchmarks competitive industrial activity by countries against the backdrop of liberalization and globalization. As this is difficult to do with one indicator, a combination of four variables is used to capture different aspects of competitive performance. The index has been extended and so differs slightly from the one presented in the previous *Report*.

1. **Manufacturing value added (MVA) per capita:** This is the basic indicator of a country's level of industrialization, and is deflated by population to adjust for the size of the economy. However, MVA does not capture the competitiveness of manufacturing activity, its role in the national economy or its technological structure; all these need to be taken into account elsewhere in the index. Competitiveness is now critical for sustainable industrial development. The technological structure of production matters insofar as industrial growth and maturity invariably entail a shift of the production structure from simple to complex technologies. Moreover, technologically complex activities offer other benefits: they grow more rapidly in production and trade, they have a greater learning potential and beneficial spillovers and they help make economies more responsive to new technological demands. The following variables take these into account.
2. **Manufactured exports per capita:** Exports indicate the ability of countries to produce goods competitively and, implicitly, to keep abreast of changing technologies. Export values cannot, however, capture the extent of local value added and so may give a misleading picture of local manufacturing capabilities when this varies between countries. There is no direct way to adjust for this, but it can be taken into account in analysing the CIP index since the identity of the countries involved in low-value-added assembly is known from other evidence.
3. **Industrialization intensity:** What may be called the 'intensity' of industrialization is measured by the simple average of the *share of MVA in gross domestic product (GDP)* and the *share of medium- and high-technology (MHT) activities in MVA*. The former captures the role of manufacturing in the economy and the latter the technological complexity of manufacturing. The latter variable gives a positive weight to relatively complex activities, on the ground that these are desirable for competitive performance: a more complex structure denotes industrial maturity, flexibility and the ability to move into faster-growing activities. However, the measure only captures shifts *across* activities and not upgrading *within* them, and so can miss an important aspect of technological improvement. It is also a fairly aggregate measure and does not capture fine technological differences within broadly defined categories (for instance, low-technology activities may include some high-technology products and vice versa). These deficiencies are inherent in the available data, but the findings appear generally sound and plausible.
4. **Export quality:** The 'quality' of exports is viewed as indicated by the simple average of the *share of manufactured exports in total exports* and the *share of MHT products in manufactured exports.* The reasoning is similar to that on industrialization intensity. The share of manufactures in total exports captures the role of manufacturing in export activity, its technological complexity the ability to make more advanced products and to move into more dynamic areas of export growth. Again, there are qualifications to the measure: apart from the problems inherent in classifying products by technology levels; there is the problem, noted above, about the extent of local value added in export activity (an exporter who simply assembles high-technology products appears as sophisticated as one who designs and makes such products with local components if both report the same export values).

Each component of the index is normalised by its range in the relevant year, with the highest (lowest) value given by the best (worst) performer in the sample. The normalised scores are then averaged to yield the final CIP index, where no *a priori* weight is attached to any component.

that mix hard and soft data. The index is intended to provide policymakers and analysts with information to locate countries in the evolving global scene, comparing performance to direct competitors, countries ahead (the role models) and a little behind (future competitive threats). Although theory can provide some guidance on how to assess if a country is doing well in terms of industrial production, exports or technological upgrading, much room is left for intuition in the design of a measure. Hence, the present index is probably a good practical way to evaluate national performance. If other countries are doing consistently better in a similar global setting (and in the absence of macroeconomic disruptions, natural disasters,

The CIP index uses 'hard' quantitative data rather than 'soft' qualitative or survey information.

conflicts or other shocks), something clearly has to be done to improve performance. Simple benchmarks like the ones given here only provide a starting point, of course; still needed in order to devise strategies are much more detailed analyses of the 'drivers' of industrial competitiveness (some of which are noted below), the policy framework and investment climate, institutions, governance and the like.

Two decades of evolving rankings

As mentioned before, the CIP index covers different numbers of countries in each base year. This would cause problems for comparison, in particular, that of rankings across years. Therefore, instead of showing all the economies across the three years in one index, a *core group of 93 economies, on which data were available for all three years,* is used to track performance over time.

The main factor of sustained success seems to be the ability to develop exports by tapping into global value chains.

The CIP index, which is computed for this core group of 93 economies in the three benchmark years (table 8.1), breaks ground in terms of benchmarking industrial performance of a large number of countries over a long period.

A first glance

The best global performer in 1990 and 2000 is Singapore, a newly industrializing economy that – according to the previous Report – also led the world in 1998. Next is Ireland, an industrial newcomer in Europe, which leaped to second place in 2000 from 9th in 1990 and 19th in 1980. Interestingly, Singapore and Ireland followed similar strategies, entering high-technology global value chains and developing strong human capital and infrastructure. The next six places in 2000 are held by mature industrial countries, led by Switzerland (the leader in 1980). Finland comes next, having moved up three places in the 1990s, and displacing Japan, which has moved down to the sixth position.

The next entrants (at ranks 9 and 10) are developing countries: Taiwan Province of China and the Republic of Korea.

Table 8.1 Ranking of core sample by the CIP Index, 1980, 1990 and 2000

2000			*1990*			*1980*		
Rank	*Economy*	*Score*	*Rank*	*Economy*	*Score*	*Rank*	*Economy*	*Score*
1	Singapore	0.833	1	Singapore	0.772	1	Switzerland	0.758
2	Ireland	0.738	2	Switzerland	0.748	2	Singapore	0.683
3	Switzerland	0.717	3	Germany	0.683	3	Germany	0.658
4	Finland	0.648	4	Japan	0.661	4	Sweden	0.604
5	Sweden	0.633	5	Sweden	0.611	5	Japan	0.585
6	Japan	0.615	6	Belgium-Luxembourg	0.601	6	Belgium-Luxembourg	0.569
7	Germany	0.594	7	Finland	0.561	7	Netherlands	0.536
8	Belgium-Luxembourg	0.567	8	Austria	0.547	8	Finland	0.519
9	Taiwan, Prov. of China	0.549	9	Ireland	0.530	9	France	0.513
10	Korea, Rep. of	0.537	10	Netherlands	0.525	10	Italy	0.511
11	United States	0.517	11	Italy	0.522	11	Austria	0.497
12	Austria	0.512	12	France	0.509	12	United Kingdom	0.496
13	Netherlands	0.508	13	United Kingdom	0.505	13	United States	0.489
14	France	0.493	14	United States	0.504	14	Denmark	0.480
15	Malaysia	0.492	15	Taiwan, Prov. of China	0.497	15	Norway	0.455
16	Italy	0.488	16	Denmark	0.485	16	Hong Kong, SAR	0.443
17	United Kingdom	0.481	17	Canada	0.455	17	Canada	0.440
18	Canada	0.472	18	Korea, Rep. of	0.440	18	Taiwan, Prov. of China	0.428
19	Denmark	0.460	19	Spain	0.438	19	Ireland	0.426
20	Hungary	0.459	20	Hong Kong, SAR	0.431	20	Israel	0.415
21	Israel	0.458	21	Israel	0.430	21	Spain	0.402
22	Spain	0.426	22	Norway	0.405	22	Poland	0.362
23	Thailand	0.386	23	Malaysia	0.368	23	Korea, Rep. of	0.344
24	China	0.379	24	Hungary	0.354	24	Brazil	0.310

Table 8.1 Ranking of core sample by the CIP Index, 1980, 1990 and 2000 *(continued)*

2000			1990			1980		
Rank	*Economy*	*Score*	*Rank*	*Economy*	*Score*	*Rank*	*Economy*	*Score*
25	Philippines	0.377	25	Portugal	0.324	25	Portugal	0.309
26	Mexico	0.375	26	China	0.323	26	Turkey	0.306
27	Hong Kong, SAR	0.343	27	Brazil	0.321	27	Australia	0.303
28	Portugal	0.342	28	Poland	0.317	28	New Zealand	0.302
29	Poland	0.340	29	Mexico	0.297	29	Barbados	0.296
30	Norway	0.333	30	New Zealand	0.286	30	Hungary	0.285
31	Brazil	0.324	31	Australia	0.285	31	Mexico	0.282
32	Costa Rica	0.318	32	Thailand	0.281	32	Iceland	0.281
33	Turkey	0.309	33	Iceland	0.276	33	Argentina	0.281
34	New Zealand	0.304	34	Argentina	0.272	34	Greece	0.276
35	South Africa	0.299	35	Turkey	0.268	35	Zimbabwe	0.248
36	Australia	0.298	36	India	0.262	36	South Africa	0.246
37	Argentina	0.294	37	Greece	0.262	37	Cyprus	0.245
38	Indonesia	0.292	38	Jordan	0.253	38	India	0.243
39	Iceland	0.291	39	Barbados	0.251	39	China	0.240
40	India	0.275	40	Uruguay	0.246	40	Malaysia	0.240
41	Greece	0.263	41	Mauritius	0.240	41	Peru	0.238
42	Kuwait	0.258	42	Zimbabwe	0.239	42	Philippines	0.228
43	Jordan	0.253	43	Philippines	0.235	43	Kuwait	0.224
44	Barbados	0.249	44	South Africa	0.232	44	Mauritius	0.221
45	El Salvador	0.247	45	Morocco	0.225	45	Uruguay	0.219
46	Tunisia	0.241	46	Cyprus	0.222	46	Dominica	0.215
47	Mauritius	0.240	47	Pakistan	0.219	47	Thailand	0.213
48	Egypt, Arab Rep.	0.238	48	El Salvador	0.218	48	Trinidad and Tobago	0.209
49	Pakistan	0.235	49	Tunisia	0.213	49	Bangladesh	0.201
50	Uruguay	0.230	50	Syrian Arab Republic	0.213	50	Chile	0.196
51	Cyprus	0.230	51	Reunion	0.211	51	Reunion	0.194
52	Morocco	0.227	52	Egypt, Arab Rep.	0.200	52	Fiji	0.194
53	Trinidad and Tobago	0.217	53	French Guiana	0.199	53	Pakistan	0.192
54	French Guiana	0.217	54	Indonesia	0.199	54	Costa Rica	0.188
55	Zimbabwe	0.213	55	Guatemala	0.193	55	Tunisia	0.187
56	Bangladesh	0.203	56	Dominica	0.193	56	El Salvador	0.186
57	Reunion	0.203	57	Bangladesh	0.192	57	Guatemala	0.184
58	Dominica	0.200	58	Colombia	0.189	58	Colombia	0.179
59	Guatemala	0.200	59	Costa Rica	0.187	59	Yemen	0.179
60	Senegal	0.199	60	Venezuela	0.187	60	Bolivia	0.176
61	Colombia	0.199	61	Fiji	0.187	61	Jordan	0.173
62	Sri Lanka	0.192	62	Chile	0.186	62	Morocco	0.173
63	Saudi Arabia	0.192	63	Saudi Arabia	0.185	63	Senegal	0.167
64	Chile	0.191	64	Haiti	0.183	64	French Guiana	0.162
65	Peru	0.187	65	Martinique	0.177	65	Martinique	0.161
66	Venezuela	0.187	66	Kenya	0.175	66	Kenya	0.156
67	Bolivia	0.181	67	Trinidad and Tobago	0.170	67	Ecuador	0.155
68	Fiji	0.164	68	Peru	0.169	68	Venezuela	0.154
69	Nepal	0.161	69	Senegal	0.166	69	Haiti	0.149
70	Martinique	0.152	70	Kuwait	0.166	70	Oman	0.141
71	Syrian Arab Republic	0.152	71	Seychelles	0.148	71	Jamaica	0.141
72	Algeria	0.145	72	Nepal	0.145	72	Egypt, Arab Rep.	0.133
73	Oman	0.145	73	Jamaica	0.144	73	St. Lucia	0.132
74	Libyan Arab Rep.	0.145	74	Algeria	0.143	74	Malawi	0.119
75	Honduras	0.144	75	Panama	0.141	75	Indonesia	0.119
76	Ecuador	0.137	76	Papua New Guinea	0.138	76	Panama	0.117
77	Seychelles	0.137	77	Bolivia	0.136	77	Syrian Arab Republic	0.110
78	Jamaica	0.137	78	Malawi	0.132	78	Sri Lanka	0.107
79	Kenya	0.134	79	Sri Lanka	0.131	79	Nicaragua	0.105
80	Haiti	0.132	80	Cameroon	0.131	80	Papua New Guinea	0.104
81	Togo	0.127	81	Ecuador	0.117	81	Saudi Arabia	0.103
82	Papua New Guinea	0.125	82	Oman	0.117	82	Paraguay	0.102
83	Madagascar	0.123	83	Nicaragua	0.114	83	Cameroon	0.099
84	Panama	0.121	84	St. Lucia	0.113	84	Algeria	0.098
85	Nicaragua	0.117	85	Honduras	0.102	85	Central African Republic	0.094
86	Paraguay	0.117	86	Paraguay	0.101	86	Madagascar	0.093
87	St. Lucia	0.114	87	Libyan Arab Rep.	0.098	87	Honduras	0.091
88	Cameroon	0.111	88	Madagascar	0.095	88	Nepal	0.072
89	Malawi	0.105	89	Mali	0.081	89	Togo	0.072
90	Yemen	0.074	90	Togo	0.078	90	Seychelles	0.067
91	Ethiopia (incl. Eritrea)	0.050	91	Central African Republic	0.075	91	Libyan Arab Rep.	0.066
92	Central African Republic	0.043	92	Yemen	0.066	92	Ethiopia (incl. Eritrea)	0.047
93	Mali	0.040	93	Ethiopia (incl. Eritrea)	0.058	93	Mali	0.035

Source: UNIDO Scoreboard database.

Both used very different strategies from Singapore, seeking to build domestic capabilities, constrain inward foreign direct investment and leverage global value chains by arm's-length relationships rather than rely heavily on FDI. The United States comes 11th, an improvement on its 14th rank in 1990. Given the definition of the index, it is bound to have a relatively low position because its large size yields low values of per capita MVA and manufactured exports relative to other leading countries. The United Kingdom comes 17th – overtaken by one of the newly-industrializing Asian economies, Malaysia, which rose to rank 15 in 2000 from 23 in 1990.

At the low end of the scale are several of the least developed countries (LDC), predominantly from Sub-Saharan Africa (SSA), but also including Yemen from the Middle East.

On the whole, even a casual glance at the index values (rather than the rankings) highlights the striking disparities in performance noted in Chapter 7.

Winners and losers

Changes in CIP ranks over the two decades (table 8.2) provide useful insights into industrial performance in the new setting of rapid technical change, liberalization and globalization. As a general feature, most mature industrial economies have lost ranks to new entrants – notable exceptions being Ireland, Finland and the United States. The biggest losers are Australia, New Zealand and the Netherlands. The newly industrializing economies, particularly those from East and Southeast Asia, show enormous dynamism, but there are some surprises regarding the 'winners' and 'losers' as measured by changes in position.

Table 8.2 Changes in CIP index rankings of 1980, 1990 and 2000 (arranged by 2000 ranks)

2000 rank	Economy	Change in rank 1990–2000	1980–1990	1980–2000	2000 rank	Economy	Change in rank 1990–2000	1980–1990	1980–2000
1	Singapore	0	1	1	47	Mauritius	–6	3	–3
2	Ireland	7	10	17	48	Egypt, Arab Rep.	4	20	24
3	Switzerland	–1	–1	–2	49	Pakistan	–2	6	4
4	Finland	3	1	4	50	Uruguay	–10	5	–5
5	Sweden	0	–1	–1	51	Cyprus	–5	–9	–14
6	Japan	–2	1	–1	52	Morocco	–7	17	10
7	Germany	–4	0	–4	53	Trinidad and Tobago	14	–19	–5
8	Belgium-Luxembourg	–2	0	–2	54	French Guiana	–1	11	10
9	Taiwan, Prov. of China	6	3	9	55	Zimbabwe	–13	–7	–20
10	Korea, Rep. of	8	5	13	56	Bangladesh	1	–8	–7
11	United States	3	–1	2	57	Reunion	–6	0	–6
12	Austria	–4	3	–1	58	Dominica	–2	–10	–12
13	Netherlands	–3	–3	–6	59	Guatemala	–4	2	–2
14	France	–2	–3	–5	60	Senegal	9	–6	3
15	Malaysia	8	17	25	61	Colombia	–3	0	–3
16	Italy	–5	–1	–6	62	Sri Lanka	17	–1	16
17	United Kingdom	–4	–1	–5	63	Saudi Arabia	0	18	18
18	Canada	–1	0	–1	64	Chile	–2	–12	–14
19	Denmark	–3	–2	–5	65	Peru	3	–27	–24
20	Hungary	4	6	10	66	Venezuela	–6	8	2
21	Israel	0	–1	–1	67	Bolivia	10	–17	–7
22	Spain	–3	2	–1	68	Fiji	–7	–9	–16
23	Thailand	9	15	24	69	Nepal	3	16	19
24	China	2	13	15	70	Martinique	–5	0	–5
25	Philippines	18	–1	17	71	Syrian Arab Republic	–21	27	6
26	Mexico	3	2	5	72	Algeria	2	10	12
27	Hong Kong, SAR	–7	–4	–11	73	Oman	9	–12	–3
28	Portugal	–3	0	–3	74	Libyan Arab Rep.	13	4	17
29	Poland	–1	–6	–7	75	Honduras	10	2	12
30	Norway	–8	–7	–15	76	Ecuador	5	–14	–9
31	Brazil	–4	–3	–7	77	Seychelles	–6	19	13
32	Costa Rica	27	–5	22	78	Jamaica	–5	–2	–7
33	Turkey	2	–9	–7	79	Kenya	–13	0	–13
34	New Zealand	–4	–2	–6	80	Haiti	–16	5	–11
35	South Africa	9	–8	1	81	Togo	9	–1	8
36	Australia	–5	–4	–9	82	Papua New Guinea	–6	4	–2
37	Argentina	–3	–1	–4	83	Madagascar	5	–2	3
38	Indonesia	16	21	37	84	Panama	–9	1	–8
39	Iceland	–6	–1	–7	85	Nicaragua	–2	–4	–6
40	India	–4	2	–2	86	Paraguay	0	–4	–4
41	Greece	–4	–3	–7	87	St. Lucia	–3	–11	–14
42	Kuwait	28	–27	1	88	Cameroon	–8	3	–5
43	Jordan	–5	23	18	89	Malawi	–11	–4	–15
44	Barbados	–5	–10	–15	90	Yemen	2	–33	–31
45	El Salvador	3	8	11	91	Ethiopia (incl. Eritrea)	2	–1	1
46	Tunisia	3	6	9	92	Central African Rep.	–1	–6	–7
					93	Mali	–4	4	0

Source: UNIDO Scoreboard database.

Between the 1980s and 1990s the changes in the CIP index show some unexpected winners, like Syria, Jordan, Seychelles and Nepal. The first two gained mainly from growth in MVA, the third from a spurt in exports of processed fish and the fourth from the growth, from a low base, of both MVA and manufactured exports. Some of these early winners lost their gains in the next decade; Syria is a good example, falling 21 places in the 1990s and thus becoming the largest loser (figures 8.1 and 8.2 show the main winners and losers).

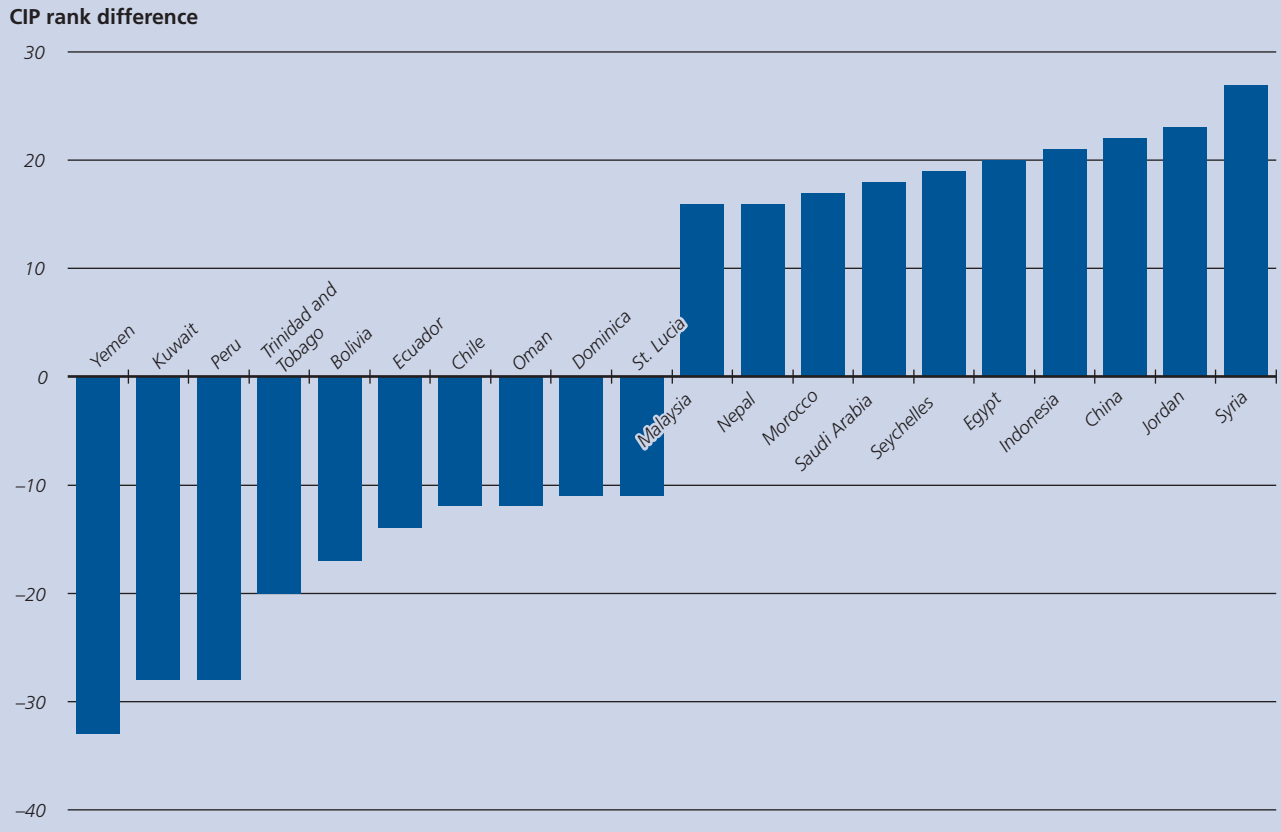
The 1980s also saw more expected winners like China, Indonesia and Malaysia, each sustaining its improvement into the next decade, where Indonesia appears as one of the top ten winners. Each of them has seen rapid rises in manufactured exports and significant upgrading of the technological structure of exports by means of export-oriented FDI. Unlike the early industrial leaders in the developing world (for example, the Republic of Korea and Taiwan Province of China) some of these countries have not built strong domestic capabilities to drive industrial competitiveness.

In the 1990s, the main winners include oil-based economies like Kuwait, Libya and Trinidad and Tobago (the fourth largest loser in the 1980s) and economies without large resource endowments that have plugged into global production systems. In the latter group are the Philippines, Costa Rica, Indonesia and Thailand, with significant high-technology FDI (electronics), as well as Sri Lanka and Honduras, with strong growth in low-technology exports (apparel). Countries like Bolivia have raised their ranks because of non-oil resource-based exports.

As expected, the losers include countries that suffered exogenous shocks, political instability, poor macro-management or over-reliance on primary activities. Some countries, like Chile or Norway, enjoyed strong growth based on primary products, but did not raise their manufacturing performance relative to competitors. Others, like Syria, remained isolated from the global economy or, like Kenya, suffered from deteriorating economic governance.

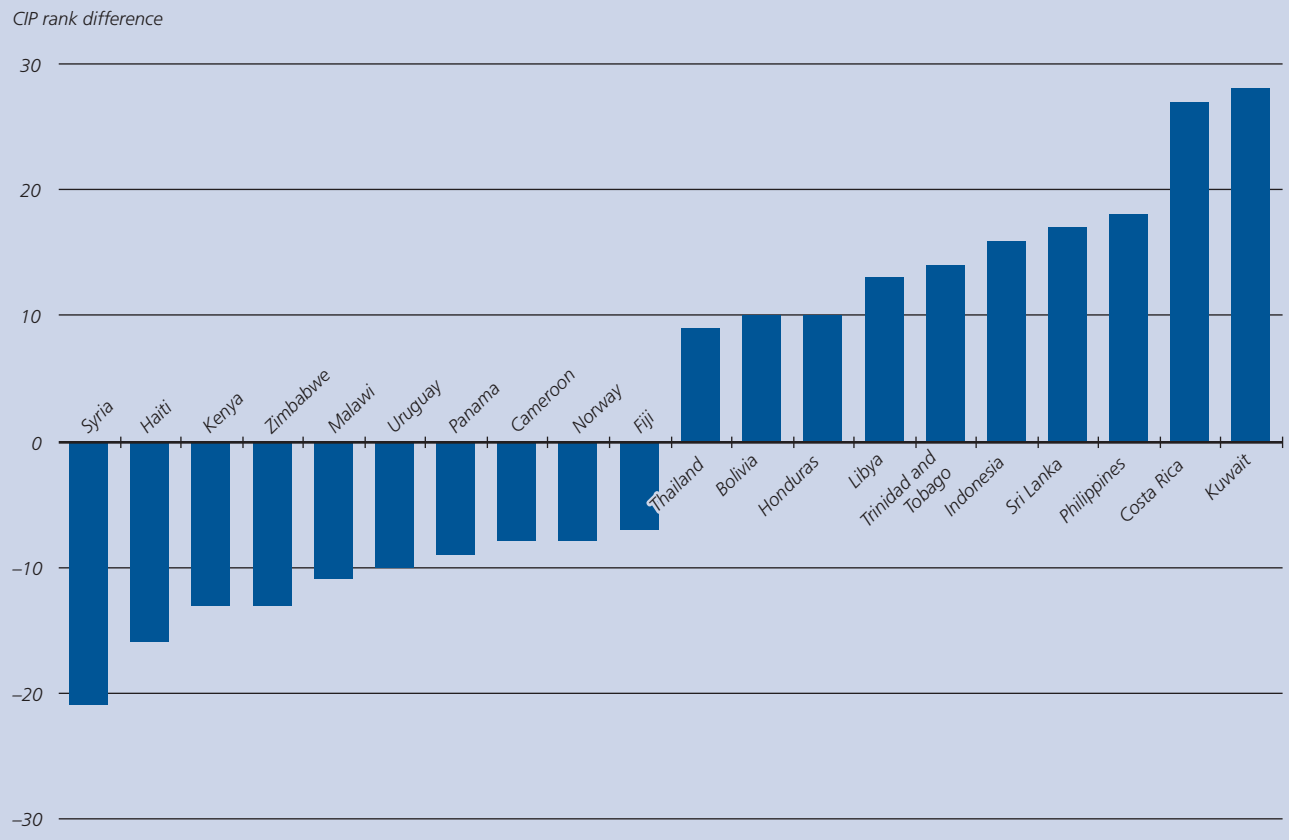
Thus, the factors accounting for shifts in CIP rankings are mixed. Leaving aside the possession of natural resources for local processing (particularly oil), the main factor accounting for sustained success seems to be the ability to develop exports by tapping into global value chains. There are two routes to doing this: building strong local capabilities (in domestic enterprises) or attracting export-oriented FDI (and plugging into global chains by undertaking labour-intensive tasks). Both strategies have been used effectively. In some cases, they have been alternatives – the Republic of Korea and Taiwan Province of China, as noted, chose to build domestic capabilities while Malaysia chose to rely on FDI – but over time there has been growing convergence between them. Autonomous countries are now more open to FDI, and FDI-dependent countries are seeking to upgrade local capabilities in order to climb the technological ladder within global value chains.[2]

Figure 8.1 Main winners and losers in CIP ranks, 1980–1990



Source: UNIDO Scoreboard database.

Figure 8.2 **Main winners and losers in CIP ranks, 1990–2000**

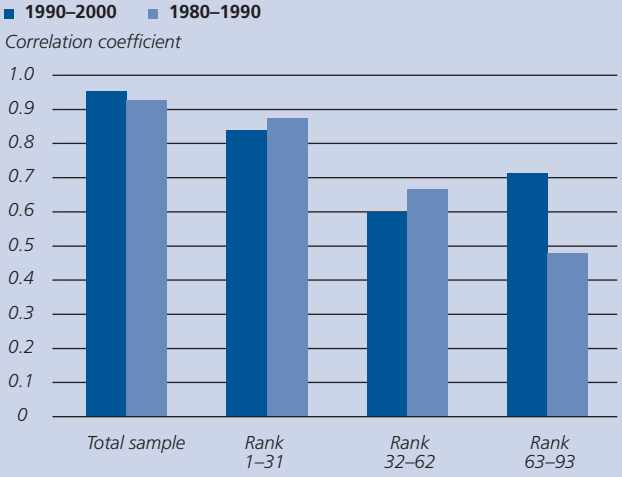


Source: UNIDO Scoreboard database.

Are rankings stable?

While there is some 'churning' in CIP index ranks, overall positionings are fairly stable in statistical terms.[3] While there is some change in each decade, with the 1980s showing slightly larger shifts than the 1990s, the magnitudes remain small. As noted in the previous *Report,* the ability to change ranks depends on slow and incremental capability-building processes. Incumbents at the high levels face inevitable (if gradual) erosion in ranks as industrialising countries build new capabilities. Simply doing nothing (or relatively little) can lead countries to slip down the index ranking as other economies in the neighbourhood do better. Large improvements in the index at higher levels generally come from insertion into high-technology production systems. At lower levels, significant leaps can result from improvements (even modest) in one component of the index (say, the share of manufactures in exports). Sharp shifts downwards are easier to explain: they tend to be caused by external shocks, macroeconomic problems or other forms of instability.

Figure 8.3 **Correlation in CIP ranks, 1980–1990 and 1990–2000**



Source: UNIDO Scoreboard database.

With accelerating globalization the main movement in rankings is among middle-level economies.

How stable are the CIP ranks at different levels of the index? If the core sample is divided into three roughly equal groups, the highest level is consistently the most stable in both decades, though with slightly lower stability in the 1990s (figure 8.3). The second group is the least stable in the 1990s, while the third is the least stable in the 1980s. The implication seems to be that with accelerating liberalization and globalization there is greater movement in the

middle-level countries, with the top group largely holding its own.

Changes by development level and region

Regional CIP indices, calculated for each base year from population-weighted averages of each component for the region, show interesting trends in performance. There is a steady and small decline in the index for the industrialized world and a steady and rapid rise in East Asia's. The index for Latin American countries (LAC) starts at the same level as East Asia in 1980, declines in the 1980s and rises in the 1990s, ending the period slightly higher than at the start but still lagging behind East Asia. The Middle East and North Africa (MENA) starts with the lowest index value in 1980, improves significantly in the first decade and slows down in the second. South Asia has a consistent but small rise in both decades. SSA ends the period more or less where it starts, with a small dip in the middle. Its stagnation leads it to fall from the second lowest to the lowest position of all the regions (figure 8.4; table 8.3).

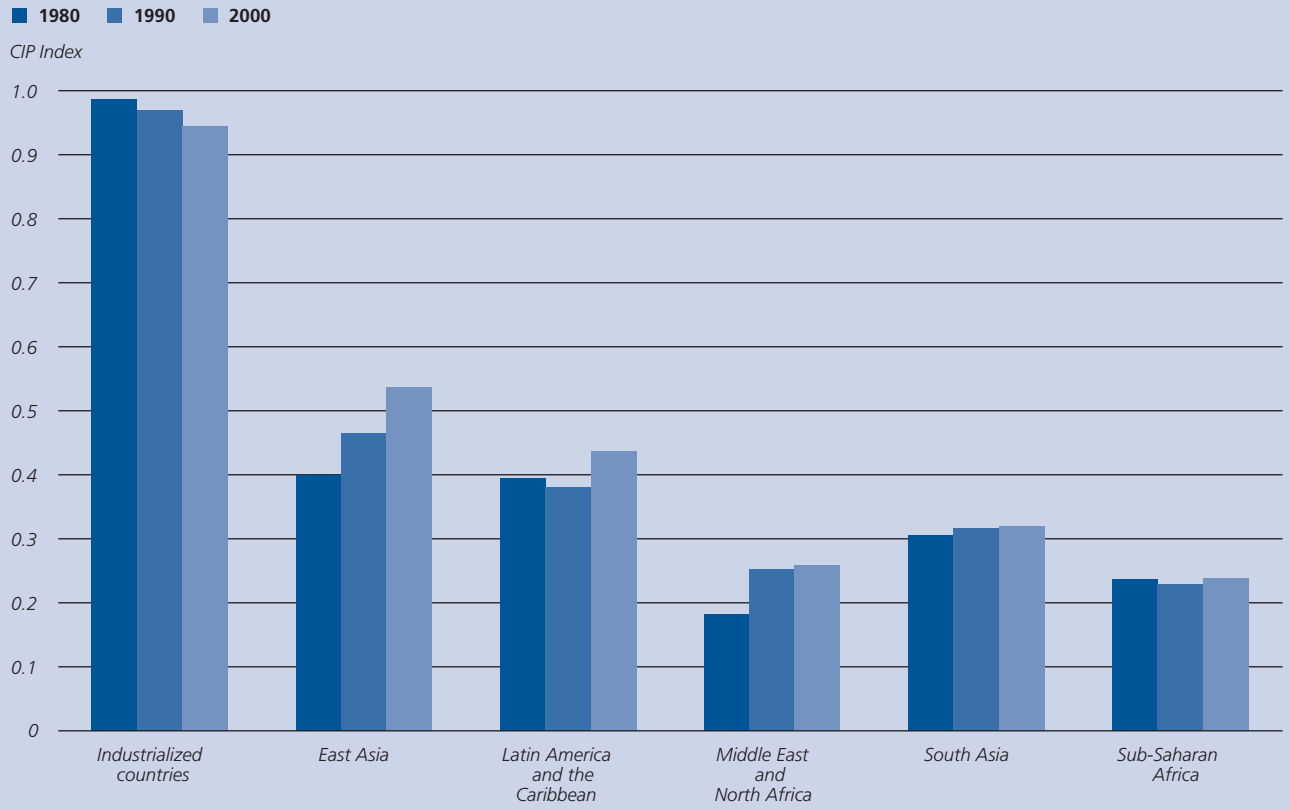
These aggregates do not show the role of 'outliers' in each region, like China in East Asia, Mexico in LAC, South Africa in SSA or India in South Asia. Removing these outliers can affect the regional indices, in both directions. For instance, the static level of performance of East Asia would improve by excluding from the aggregate China, which drags down regional per capita MVA, per capita exports and the technology composition of exports (Chapter 7). The performance of other regions, by contrast, would worsen, if outliers were excluded: Latin America without Mexico (LAC2) has a worse export and technology upgrading record, as does South Asia without India and Africa without South Africa.

Among developing regions, most of the CIP leaders are in East Asia.

The rise in per capita MVA and manufactured exports by industrialized countries, and the growing technology intensity of both, does not prevent a decline in their relative position. East Asia is propelled by massive rises in all components of the index, whereas LAC, South Asia and SSA have mixed records.

Within development groups and regions there is a lot of movement of individual countries up or down the rankings (table 8.4). There are 24 industrialized economies and two transition ones in the core group. Ireland is, as noted, the biggest winner among the industrialized countries, with a leap of ten ranks in the 1980s and another seven in the 1990s. By 2000 it had displaced Switzerland, which had led this group in 1980 and 1990. The next winner is Finland, with

Figure 8.4 **Regional averages of CIP indices, 1980, 1990 and 2000 (population-weighted)**



Source: UNIDO Scoreboard database.

Table 8.3 CIP index components by region, 1980 and 2000

Region or economic grouping	*MVA per capita (dollars)*		*Manufactured exports per capita (dollars)*		*Share of MVA in GDP (percent)*		*Share of medium- and high-tech activity in MVA (percent)*		*Share of manufactures in total exports (percent)*		*Share of medium- and high-tech exports in manufactured exports (percent)*	
	1980	*2000*	*1980*	*2000*	*1980*	*2000*	*1980*	*2000*	*1980*	*2000*	*1980*	*2000*
Industrialized countries	3 772	5 205	1 330	3 967	22.6	20.8	57.6	62.1	83.3	87.3	59.9	67.8
Latin America and the Caribbean	680	627	109	484	24.3	20.5	41.5	47.4	40.0	72.7	28.2	58.5
East Asia	107	462	60	489	25.3	34.7	41.9	58.0	57.8	90.8	37.5	63.2
Middle East and North Africa	247	376	97	212	9.5	16.0	28.6	37.9	11.2	35.3	10.4	24.4
South Asia	35	82	8	40	14.1	17.0	48.4	54.3	59.9	82.1	17.2	15.6
Sub-Saharan Africa	87	70	25	48	14.1	12.5	43.4	41.2	17.2	37.4	17.5	28.6

Source: UNIDO Scoreboard database).

a gain of four places over 1980–2000 (primarily in the 1990s). Germany held third place in the first two years but declined to 7th place by 2000; Japan, while also moving down, has stayed just ahead. The United States moved up the ranks by three places in the 1990s as a result of its robust growth and technological performance.

Within the industrialized world there is a large spread, with the weaker economies well behind the leaders. The last three (Iceland, Greece and Cyprus) rank below all the economies of East Asia; the next two above them, Australia and New Zealand, just come ahead of Indonesia, the lowest-ranking economy in East Asia. The two transition economies included in the sample perform differently: Hungary starts behind Poland but ends ahead due to its integration into European electronic and automotive industries.

Among the developing regions, East Asia has most CIP leaders in the developing world, with every economy in the region (apart from Hong Kong SAR) improving its position consistently – often dramatically – over the two decades. LAC spans a broad range, but generally populates the middle swathe of the core group. SSA economies, with some exceptions, congregate near the bottom.

There are 11 LDCs in the core group, of which seven are from SSA. The majority are at the bottom of the CIP ranks: there are eight LDCs, of which six are from Africa, in the bottom 15 economies in 2000. However, several LDCs improve their ranks over 1980–2000: Nepal gains 19 places, Togo 8, Senegal and Madagascar 3 and Ethiopia 1. The largest 'loser' is Yemen, with a fall of 31 places (all during the 1980s). Malawi comes next with a fall of 15 places, followed by Haiti

Table 8.6 Correlations among the components of the CIP index, 1980, 1990 and 2000

Component	*MVA per capita*	*Manufactured exports per capita*	*Share of medium- and high-tech activity in MVA*	*Share of MVA in GDP*	*Share of medium- and high-tech exports in manufactured exports*	*Share of manufactured in total exports*
2000						
Manufactured exports per capita	0.715	1.000				
Share of medium- and high-tech activity in MVA	0.673	0.614	1.000			
Share of MVA in GDP	0.442	0.373	0.580	1.000		
Share of medium- and high-tech exports in manufactured exports	0.628	0.498	0.708	0.509	1.000	
Share of manufactured exports in total exports	0.444	0.384	0.572	0.524	0.514	1.000
1990						
Manufactured exports per capita	0.735	1.000				
Share of medium- and high-tech activity in MVA	0.695	0.618	1.000			
Share of MVA in GDP	0.405	0.349	0.641	1.000		
Share of medium- and high-tech exports in manufactured exports	0.695	0.526	0.679	0.450	1.000	
Share of manufactured exports in total exports	0.510	0.470	0.521	0.464	0.386	1.000
1980						
Manufactured exports per capita	0.696	1.000				
Share of medium- and high-tech activity in MVA	0.686	0.571	1.000			
Share of MVA in GDP	0.453	0.304	0.674	1.000		
Share of medium- and high-tech exports in manufactured exports	0.595	0.426	0.606	0.311	1.000	
Share of manufactured exports in total exports	0.530	0.501	0.477	0.390	0.334	1.000

Source: UNIDO Scoreboard database.

Table 8.4 Ranking of economies by the CIP index, by region or development group, 1980, 1990 and 2000

Region, group or country	*2000*	*1990*	*1980*
Industrialized			
Ireland	2	9	19
Switzerland	3	2	1
Finland	4	7	8
Sweden	5	5	4
Japan	6	4	5
Germany	7	3	3
Belgium-Luxembourg	8	6	6
United States	11	14	13
Austria	12	8	11
Netherlands	13	10	7
France	14	12	9
Italy	16	11	10
United Kingdom	17	13	12
Canada	18	17	17
Denmark	19	16	14
Israel	21	21	20
Spain	22	19	21
Portugal	28	25	25
Norway	30	22	15
New Zealand	34	30	28
Australia	36	31	27
Iceland	39	33	32
Greece	41	37	34
Cyprus	51	46	37
Transition economies			
Hungary	20	24	30
Poland	29	28	22
Latin America and the Caribbean			
Mexico	26	29	31
Brazil	31	27	24
Costa Rica	32	59	54
Argentina	37	34	33
Barbados	44	39	29
El Salvador	45	48	56
Uruguay	50	40	45
Trinidad and Tobago	53	67	48
French Guiana	54	53	64
Dominica	58	56	46
Guatemala	59	55	57
Colombia	61	58	58
Chile	64	62	50
Peru	65	68	41
Venezuela	66	60	68
Bolivia	67	77	60
Martinique	70	65	65
Honduras	75	85	87
Ecuador	76	81	67
Jamaica	78	73	71
Haiti	80	64	69
Panama	84	75	76
Nicaragua	85	83	79
Paraguay	86	86	82
St. Lucia	87	84	73
East Asia			
Singapore	1	1	2
Taiwan, Prov. of China	9	15	18
Korea, Rep. of	10	18	23
Malaysia	15	23	40
Thailand	23	32	47
China	24	26	39
Philippines	25	43	42
Hong Kong, SAR	27	20	16
Indonesia	38	54	75
Pacific			
Fiji	68	61	52
Papua New Guinea	82	76	80
South Asia			
India	40	36	38
Pakistan	49	47	53
Bangladesh	56	57	49
Sri Lanka	62	79	78
Nepal	69	72	88
Sub-Saharan Africa			
South Africa	35	44	36
Mauritius	47	41	44
Zimbabwe	55	42	35
Reunion	57	51	51
Senegal	60	69	63
Seychelles	77	71	90
Kenya	79	66	66
Togo	81	90	89
Madagascar	83	88	86
Cameroon	88	80	83
Malawi	89	78	74
Ethiopia inc. Eritrea	91	93	92
Central African Rep.	92	91	85
Mali	93	89	93
Middle East, North Africa and Turkey			
Turkey	33	35	26
Kuwait	42	70	43
Jordan	43	38	61
Tunisia	46	49	55
Egypt, Arab Rep.	48	52	72
Morocco	52	45	62
Saudi Arabia	63	63	81
Syrian Arab Republic	71	50	77
Algeria	72	74	84
Oman	73	82	70
Libyan Arab Rep.	74	87	91
Yemen	90	92	59

Source: UNIDO Scoreboard database.

with 11 (table 8.5). A more extensive coverage of the LDCs is given below for the full country sample for 2000.

Significant correlations may be expected between the various components of the CIP index, since each deals with an aspect of industrial performance. This is the case, though the intensity of the relationship differs by variable and over time. MVA per capita is highly correlated with manufactured exports per capita, as is the technological complexity of MVA (MHT share) with MVA per capita and with the technological complexity of exports. But the share of MVA in GDP is not strongly related to MVA or manufactured exports per capita: as noted in Chapter 7, the share of manufacturing in incomes

Table 8.5 CIP ranks of LDCs in the core sample, 1980, 1990 and 2000

Economies	*2000*	*1990*	*1980*
Bangladesh	56	57	49
Senegal	60	69	63
Nepal	69	72	88
Haití	80	64	69
Togo	81	90	89
Madagascar	83	88	86
Malawi	89	78	74
Yemen	90	92	59
Ethiopia (incl. Eritrea)	91	93	92
Central African Republic	92	91	85
Mali	93	89	93

Source: UNIDO Scoreboard database.

is declining in the most advanced ('post industrial') economies as services raise their role. (Table 8.6 shows the correlation between the index components for the core sample in each benchmark year).

Patterns of industrial and export performance

It is interesting to trace the evolution of national patterns of industrial and export performance by development levels. Take two characteristics of MVA performance: the share of MHT in MVA and the contribution of MVA to GDP. The following analysis identifies, among both industrialized countries and transition and developing economies, four 'clusters' with similar performance over the three base years (figures 8.5 and 8.6). The clusters show countries grouped by the similarity of the two variables while the size of the bubble shows the average value of per capita MVA for each group.

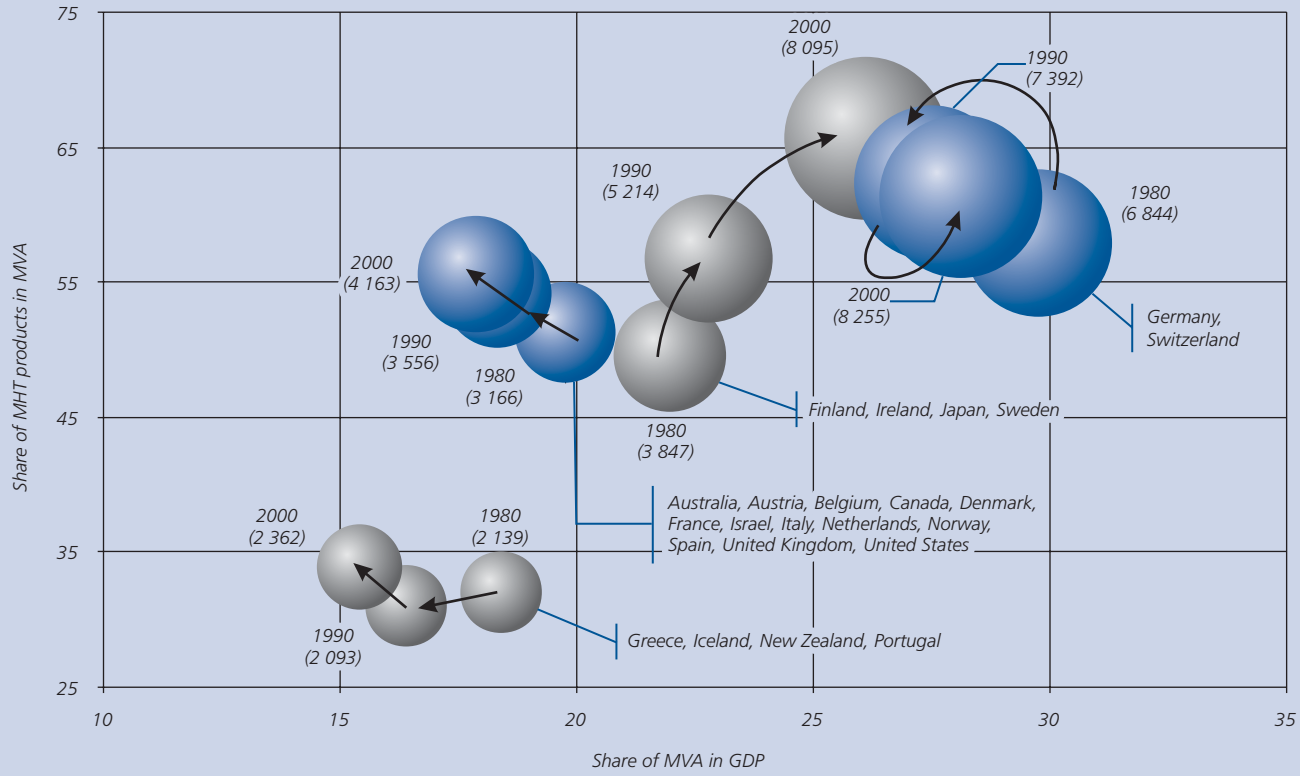
In the industrialized world, Switzerland and Germany form a cluster with the highest average MVA per capita in all three years; the share of MVA in GDP in this cluster falls over 1980–1990 but rises over 1990–2000 while the share of MHT in MVA rises in the first and declines slightly in the second. The second cluster groups four rather diverse economies: two relative newcomers that have shot up the CIP ranks – Ireland and Finland – and two mature industrial economies with stable ranks: Japan and Sweden. This cluster has most upgraded its MVA structure along both axes. The third cluster has mature economies like UK, US, France and Netherlands along with newcomers like Israel and Spain; in it, the share of MVA in income falls steadily while the complexity of MVA rises. Finally, there is a group of less industrialized rich countries with low average values for both parameters.

Rapid upgrading has taken the Republic of Korea and Taiwan Province of China to the top of the technology scale.

In the developing and transition countries, the leading cluster (China, Hungary, Republic of Korea, Taiwan Province of China, Malaysia and Singapore) shows significant industrial upgrading, particularly in the 1990s. The second cluster contains a diverse set of countries (including Argentina, Mexico, India and South Africa), generally with large industrial sectors, that downgraded in the 1980s in terms of both technology structure and share of MVA in GDP, but recovered in the 1990s. The third and fourth clusters have countries with low values for both parameters.

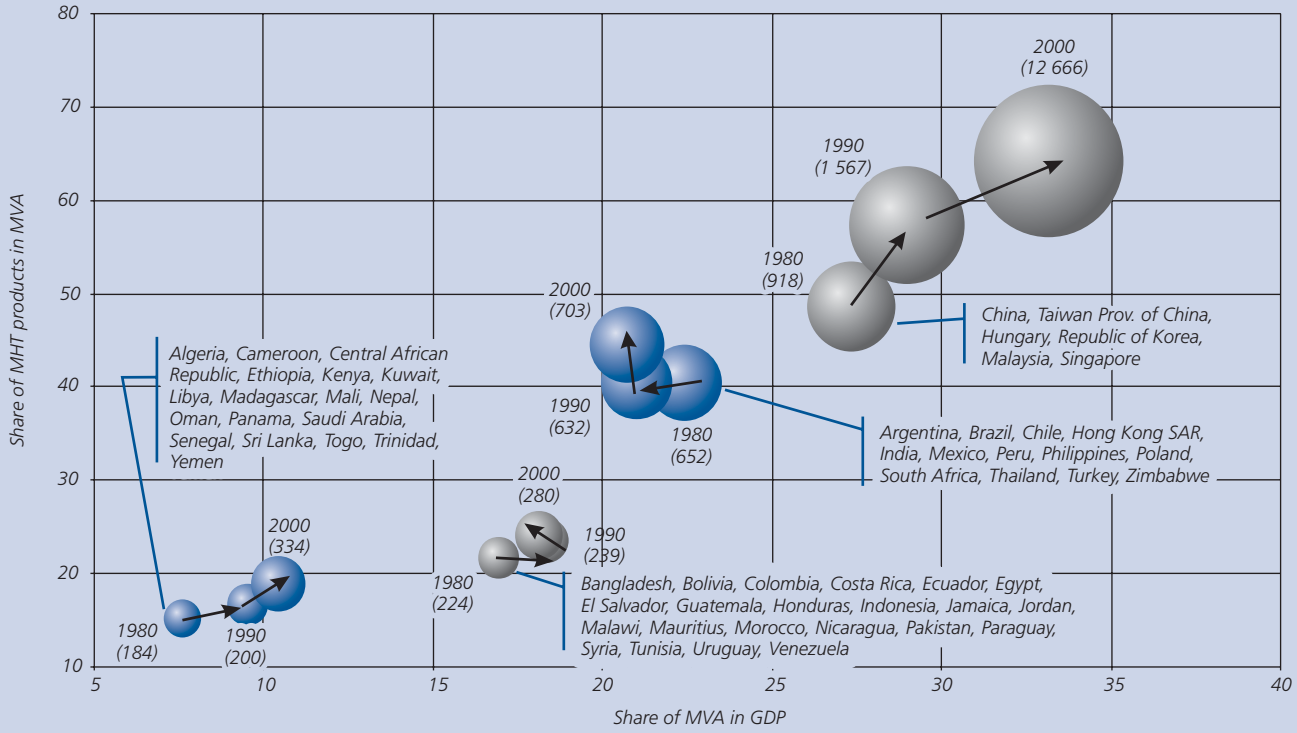
The analysis of *export performance,* which looks at the share of manufactures in total exports and the share of MHT in manufactured exports, reveals more clusters for both sets of economies: five for the industrialized countries and seven

Figure 8.5 Cluster analysis of manufacturing production in industrialized countries, 1980, 1990 and 2000



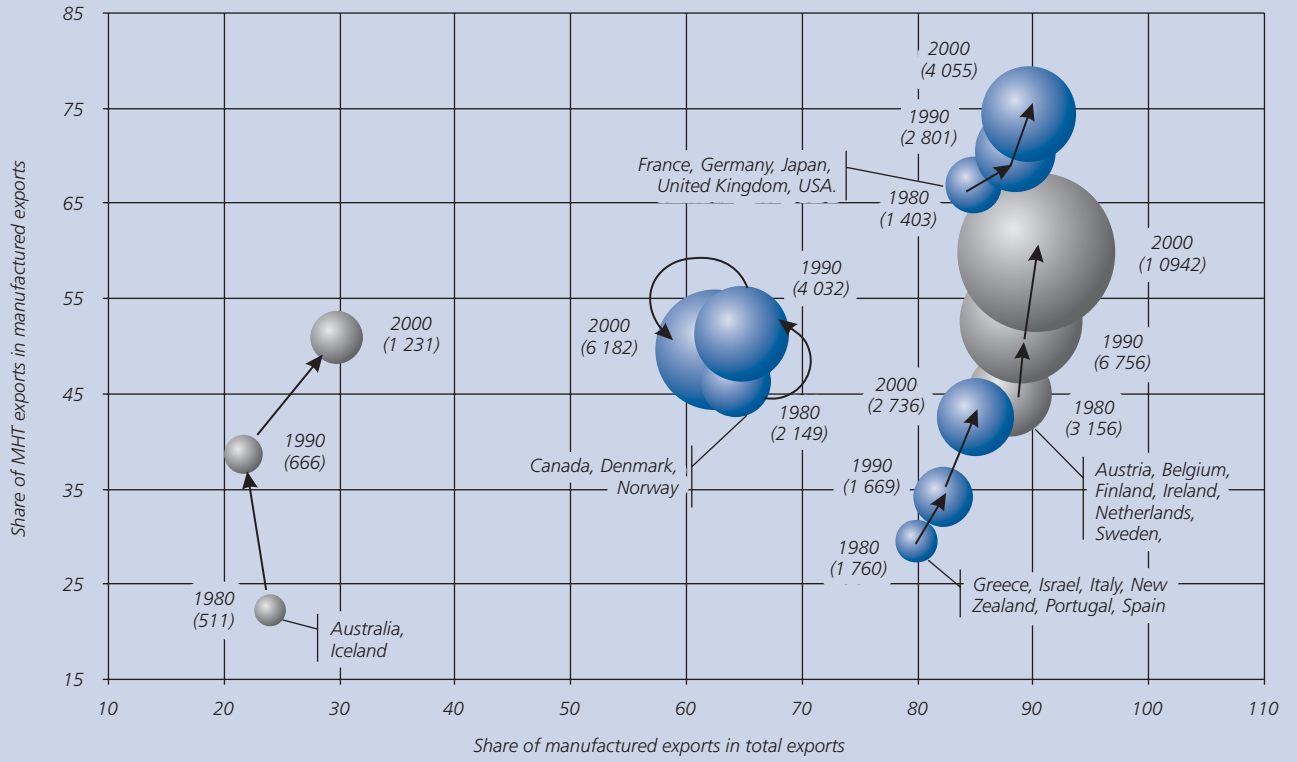
Source: UNIDO Scoreboard database (see part 2 technical notes).
Note: Bubble size and numbers in parantheses indicate MVA per capita in dollars.

Figure 8.6 Cluster analysis of manufacturing production in developing and transition countries, 1980, 1990 and 2000



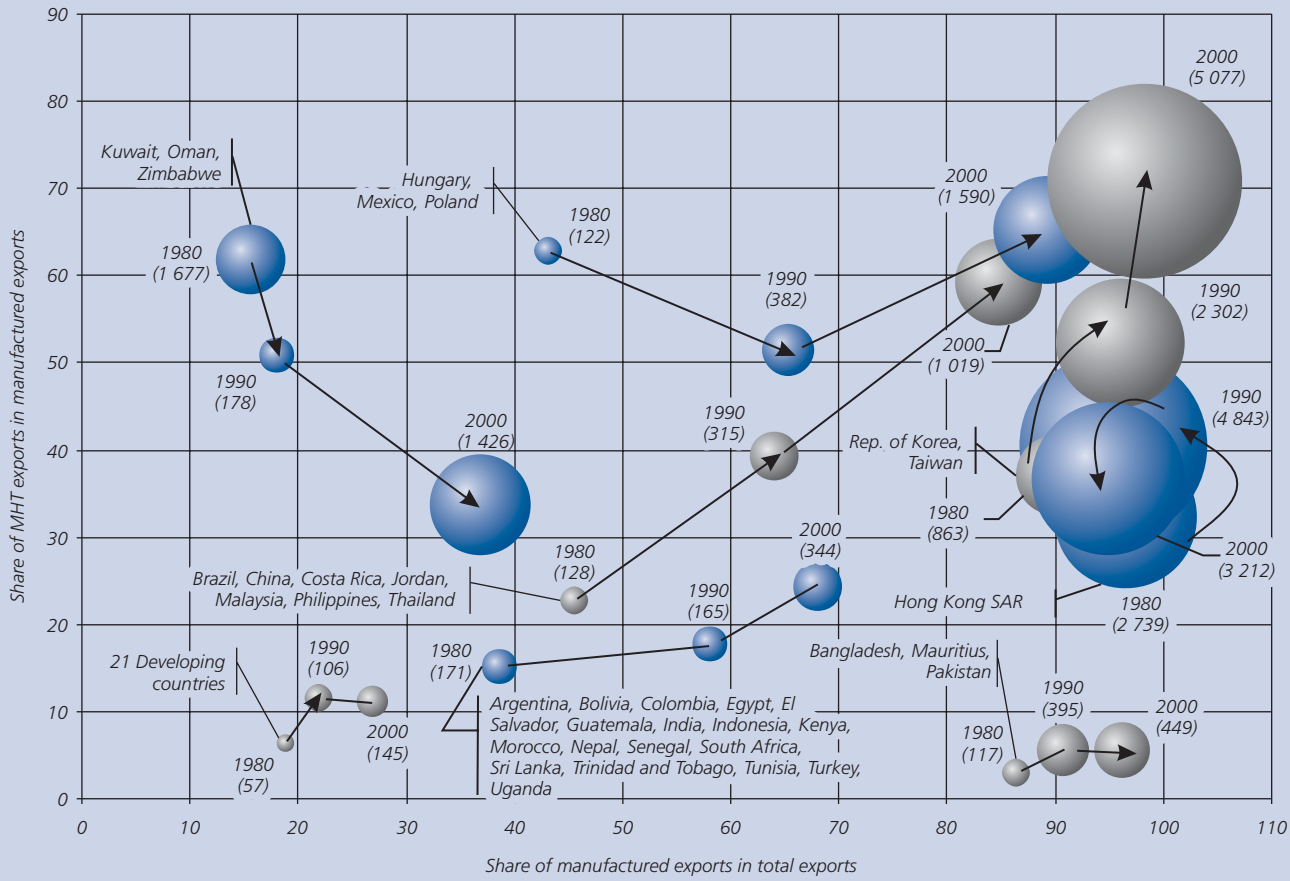
Source: UNIDO Scoreboard database.
Note: Bubble size and numbers in parantheses indicate MVA per capita in dollars.

Figure 8.7 Cluster analysis of manufactured exports in developed countries, 1980, 1990 and 2000



Source: UNIDO Scoreboard database.
Note: Bubble size and numbers in paratheses indicate manufactured exports per capita in dollars.

Figure 8.8 Cluster analysis of manufactured exports in developing and transition countries, 1980, 1990 and 2000



Source: UNIDO Scoreboard database.
Note: Bubble size and numbers in paratheses indicate manufactured exports per capita in dollars.

for the developing and transition economies (figures 8.7 and 8.8; the bubble size reflects the value of per capita manufactured exports).

In the industrialized world, the lead cluster by value of per capita manufactured exports comprises seven small European countries, including Ireland and Finland, along with long-established exporters like Switzerland, the Netherlands and Sweden. The group has very high shares of manufactures in exports and has moved steadily up the complexity ladder. The second cluster, with Norway, Canada and Denmark, has high values of per capita exports but has stagnated in terms of upgrading. The third cluster comprises the leading mature industrial powers (France, Germany, Japan, UK and US). It has the most complex export structure and very high shares of manufactures in exports; however, given the size of many of these economies, per capita export values are relatively low. The fourth group – Italy, Israel and Spain – specialises in manufactured exports and has had rapid technological upgrading (if from low levels) along with low per capita export values. The fifth cluster – Australia and Iceland – shows rapid upgrading of the technology structure but low shares of manufactures in total exports and low per capita export values.

Singapore is not shown in the figure on *developing and transition economies* because the huge value of its per capita exports (over $30 thousand) distorts the chart. The next economy, Hong Kong SAR, appears as a 'cluster' on its own because of its large (but declining) exports per capita and deteriorating technological structure. The second cluster has the Republic of Korea and Taiwan Province of China, with rapid technological upgrading that has taken them to the top of the technology scale, matching the levels of leading industrialized countries. The third cluster (Hungary, Poland and Mexico) experienced a massive increase in the share of manufactures over time, but relatively slow technological upgrading. The next cluster (Kuwait, Oman and Zimbabwe) suffered a fall in per capita exports in the 1980s and a recovery in the 1990s, as well as the largest downgrading of the technological structure in the chart.

Then comes a cluster that contains large economies like Brazil, China, Malaysia, Thailand and the Philippines; this one has had the fastest upgrading of manufactured exports and the largest rise in the share of manufactures in total exports. The remaining three clusters have countries with relatively low technological content, though one – Bangladesh, Mauritius and Pakistan – has a large share of (mainly low-technology) manufactured products in exports. India, Argentina, Egypt, Indonesia, Turkey and South Africa cluster in a large group that upgraded its technology structure from a relatively low level, has medium shares of manufactures in exports and low per capita export values. Finally, there is a cluster of 21

countries, including most LDCs (at the bottom left hand corner of the chart). This group has low export values, small shares of manufactures in exports and very low technological content in manufactured exports.

Transition and African economies in 2000

As mentioned earlier, the CIP index incorporates a large number of new entries in 2000, because of improved data availability in the developing and transition worlds and the emergence of many transition economies as independent states in the 1990s. Thus, compared to the core group, there are 22 more economies from the transition group, 21 from Africa, 6 from LAC, 5 from MENA, 2 each from South and East Asia and 3 from the Pacific.

The inclusion of these new economies in 2000 does not affect the positions of the top 13 countries in the core sample. Malta is the first new entrant in 14th place; thereafter, there are many insertions as several transition economies are included in the ranks: Slovenia at 24, the Czech Republic at 26 and so on (table 8.7 shows the CIP index scores and ranks for the full country sample of the year 2000). It may be useful to discuss separately the scores for these two groups, transition and African economies, because they have the largest number of new entrants.

Table 8.7 CIP index values and ranks for the full sample in 2000

Rank	*Country*	*CIP index*	*Rank*	*Country*	*CIP index*	*Rank*	*Country*	*CIP index*
1	Singapore	0.833	53	Russian Federation	0.279	105	Sudan	0.150
2	Ireland	0.738	54	Bulgaria	0.278	106	Bhutan	0.150
3	Switzerland	0.717	55	Latvia	0.278	107	Belize	0.148
4	Finland	0.649	56	India	0.275	108	Algeria	0.145
5	Sweden	0.633	57	Macedonia, FYR	0.271	109	Oman	0.145
6	Japan	0.615	58	Greece	0.263	110	Libya	0.145
7	Germany	0.593	59	Kuwait	0.258	111	New Caledonia	0.145
8	Luxembourg	0.574	60	Jordan	0.253	112	Honduras	0.144
9	Belgium	0.567	61	Barbados	0.249	113	Ghana	0.139
10	Taiwan, Prov. of China	0.549	62	El Salvador	0.247	114	Zambia	0.139
11	Korea, Rep. of	0.537	63	Qatar	0.243	115	Azerbaijan	0.139
12	United States	0.517	64	Tunisia	0.241	116	Antigua and Barbuda	0.138
13	Austria	0.512	65	Mauritius	0.240	117	Ecuador	0.137
14	Netherlands	0.508	66	Georgia	0.239	118	Seychelles	0.137
15	Malta	0.498	67	Egypt, Arab Rep.	0.238	119	Jamaica	0.137
16	France	0.493	68	Pakistan	0.235	120	Kenya	0.134
17	Malaysia	0.492	69	Macao	0.235	121	Kyrgyz Republic	0.132
18	Italy	0.488	70	Uruguay	0.230	122	Haiti	0.132
19	United Kingdom	0.481	71	Cyprus	0.230	123	Togo	0.127
20	Canada	0.472	72	Morocco	0.227	124	Papua New Guinea	0.125
21	Denmark	0.460	73	Swaziland	0.221	125	Madagascar	0.123
22	Hungary	0.459	74	Trinidad and Tobago	0.216	126	Uganda	0.123
23	Israel	0.458	75	French Guiana	0.216	127	Panama	0.121
24	Slovenia	0.449	76	Zimbabwe	0.213	128	Gambia	0.120
25	Spain	0.426	77	Bangladesh	0.203	129	Burkina Faso	0.118
26	Czech Republic	0.406	78	Reunion	0.203	130	Nicaragua	0.117
27	Thailand	0.386	79	Kazakhstan	0.202	131	Paraguay	0.117
28	Belarus	0.381	80	Dominica	0.200	132	St. Lucia	0.114
29	Slovak Republic	0.379	81	Guatemala	0.200	133	Maldives	0.112
30	China	0.379	82	Senegal	0.199	134	Cameroon	0.111
31	Philippines	0.377	83	Colombia	0.199	135	French Polynesia	0.110
32	Mexico	0.374	84	Moldova	0.199	136	Namibia	0.108
33	Estonia	0.369	85	Albania	0.196	137	United Rep. of Tanzania	0.106
34	Ukraine	0.346	86	Sri Lanka	0.192	138	Malawi	0.105
35	Hong Kong, SAR	0.343	87	Saudi Arabia	0.192	139	Iran, Islamic Republic	0.103
36	Portugal	0.342	88	Chile	0.191	140	Gabon	0.101
37	Poland	0.340	89	Lesotho	0.191	141	St. Vincent and Grenadines	0.101
38	Norway	0.333	90	Turkmenistan	0.187	142	Niger	0.100
39	Brazil	0.324	91	Peru	0.187	143	Suriname	0.099
40	Croatia	0.322	92	Venezuela	0.187	144	Benin	0.093
41	Costa Rica	0.318	93	Cape Verde	0.187	145	Rwanda	0.075
42	Turkey	0.309	94	Lebanon	0.182	146	Yemen	0.074
43	New Zealand	0.303	95	Cuba	0.182	147	Guinea	0.071
44	South Africa	0.299	96	Bolivia	0.181	148	Mongolia	0.070
45	Australia	0.298	97	Grenada	0.180	149	Botswana	0.058
46	Argentina	0.294	98	Côte d'Ivoire	0.171	150	Ethiopia (inc. Eritrea)	0.050
47	Bahrain	0.294	99	Tajikistan	0.167	151	Burundi	0.047
48	Romania	0.294	100	Fiji	0.164	152	Central African Republic	0.043
49	Indonesia	0.292	101	Nepal	0.161	153	Tonga	0.042
50	Iceland	0.291	102	Nigeria	0.153	154	Comoros	0.041
51	Lithuania	0.286	103	Martinique	0.152	155	Mali	0.040
52	Armenia	0.280	104	Syrian Arab Republic	0.152			

Source: UNIDO Scoreboard database.

Transition economies

The transition economies span a large range in the CIP index, from Hungary at 21 to Kyrgyzstan at 121 (table 8.8). There is a fairly steady progression along the ranks, with something of a break after Macedonia (at 57), with Georgia coming ten ranks lower, and Kazakhstan another 13 lower. There is another break after Tajikistan, with Azerbaijan coming 16 ranks later.

The best performers among the transition economies have relatively high indices for industrialization intensity (MVA as a share of GDP and share of MHT in MVA) and export performance (manufactured exports as a share of total exports and share of MHT in manufactured exports). As noted, Hun-

Table 8.8 CIP and component indices for transition economies in 2000

Rank	*Economy*	*MVA p.c. index*	*Man. export p.c. index*	*Industrialization intensity index*	*Export quality index*	*CIP index*
22	Hungary	0.136	0.078	0.736	0.886	0.459
24	Slovenia	0.268	0.126	0.619	0.786	0.450
26	Czech Republic	0.090	0.081	0.654	0.801	0.407
28	Belarus	0.128	0.020	0.650	0.726	0.381
29	Slovakia	0.072	0.063	0.600	0.783	0.379
33	Estonia	0.124	0.073	0.561	0.718	0.369
34	Ukraine	0.041	0.007	0.643	0.692	0.346
37	Poland	0.138	0.022	0.478	0.720	0.340
40	Croatia	0.081	0.027	0.466	0.716	0.323
48	Romania	0.044	0.013	0.487	0.632	0.294
51	Lithuania	0.040	0.028	0.440	0.635	0.286
52	Armenia	0.027	0.001	0.571	0.520	0.280
53	Russian Federation	0.060	0.012	0.620	0.424	0.279
54	Bulgaria	0.069	0.014	0.475	0.555	0.278
55	Latvia	0.068	0.021	0.485	0.536	0.278
57	Macedonia	0.043	0.017	0.470	0.554	0.271
66	Georgia	0.014	0.001	0.372	0.569	0.239
79	Kazakhstan	0.032	0.004	0.405	0.368	0.202
84	Moldova	0.013	0.002	0.361	0.418	0.199
85	Albania	0.008	0.002	0.287	0.487	0.196
90	Turkmenistan	0.011	0.012	0.331	0.395	0.187
99	Tajikistan	0.004	0.001	0.196	0.468	0.167
115	Azerbaijan	0.002	0.002	0.287	0.264	0.139
121	Kyrgyzstan	0.004	0.001	0.140	0.384	0.132

Source: UNIDO Scoreboard database.

Table 8.9 CIP components for transition economies

	MVA per capita (dollars)			*Manufactured exports per capita (dollars)*			*Share of medium- and high-tech activities in MVA (percent)*			*Share of MVA in GDP (percent)*		
Country	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
Albania	248	243	84	..	..	75	..	..	27.4	34.5	36.9	10.7
Armenia	591	654	275	..	..	32	52.7	45.3	47.9	35.0	30.3	24.4
Azerbaijan	226	230	18	..	..	76	..	28.3	35.7	18.6	17.0	6.8
Belarus	726	1 298	1 292	..	..	677	..	45.3	47.9	30.9	38.2	30.8
Bulgaria	640	929	697	..	..	454	38.2	41.9	45.8	30.6	39.1	17.4
Croatia	..	..	816	..	902	895	38.5	40.5	44.2	..	27.7	17.5
Czech Republic	874	834	912	..	1 473	2 668	55.4	59.0	56.9	33.4	24.6	26.9
Estonia	1 574	1 667	1 248	..	..	2 429	..	46.3	38.9	35.4	35.4	27.7
Georgia	361	428	143	..	..	38	..	43.5	27.4	21.7	19.2	17.6
Hungary	733	839	1 377	71	762	2 588	55.9	53.9	52.9	24.6	24.3	35.5
Kazakhstan	383	481	324	..	..	119	9.6	43.5	27.4	26.3	20.3	20.3
Kyrgyzstan	119	156	35	..	..	22	9.6	4.7	5.8	25.0	23.2	8.7
Latvia	1 071	1 530	690	..	..	691	49.7	46.3	38.9	29.7	33.2	21.5
Lithuania	722	997	400	..	..	939	..	46.3	38.9	30.0	20.9	17.8
Macedonia	..	..	434	..	..	546	31.8	35.7	35.8	..	..	21.7
Moldova	399	627	135	..	..	76	..	43.5	27.4	26.5	27.2	16.7
Poland	1 015	743	1 397	260	225	734	49.4	47.9	38.7	22.5	22.5	20.9
Romania	660	605	440	..	235	418	..	43.5	27.4	36.8	36.7	27.0
Russian Federation	1 032	1 141	610	..	..	379	44.3	46.3	61.0	26.5	27.8	22.2
Slovakia	..	1 147	726	..	..	2 069	52.9	53.8	56.3	..	38.9	22.8
Slovenia	..	..	2 705	..	3 104	4 171	42.6	45.3	53.1	..	..	25.8
Tajikistan	130	130	39	..	..	15	9.6	4.7	5.8	16.0	14.8	13.3
Turkmenistan	190	172	106	..	..	411	..	28.3	35.7	13.0	9.9	10.4
Ukraine	750	1 040	410	..	..	238	..	45.3	47.9	30.8	34.7	30.2

Source: UNIDO Scoreboard database.

gary does particularly well in this last index because of its rapid integration into electronics and automotive value chains serving the EU market; the Czech Republic is close behind.

In MVA per capita, the only transition economies to have sustained large rises are Hungary, Belarus and Poland.

Transition economies have undergone major structural shifts in their economies over the last decade. In 1990, most had larger industrial sectors and smaller service sectors than market economies with comparable per capita incomes. Since then, their manufacturing sectors have tended to contract. Allowing for limited data availability in earlier years, the CIP Index captures these structural shifts (only Hungary and Poland have available data in the core group for all three years): there are widespread falls in MVA as a share of GDP and in MVA per capita (table 8.9).

There have been particularly large reductions of MVA shares of GDP in Albania, Kyrgyzstan, Bulgaria and Azerbaijan. In MVA per capita, the only countries to have sustained large rises are Hungary, Belarus and Poland. Eight of the top ten ranking countries are European and Baltic, while six of the lowest ten are in the Commonwealth of Independent States (CIS, the former USSR). Belarus and Ukraine are the exceptions in the CIS, while Bulgaria, Latvia and Albania trail the European economies.

Sub-Saharan Africa

The economies of this region tend to cluster near the bottom of the CIP index, occupying 19 of the last 30 ranks (table 8.10). There is a clear break in the ranks after the leader, South Africa, which is by far the most industrialized economy in the region. In fact, what is surprising is not that South Africa comes so high in the region, but that it appears relatively low in the global ranks. The next country in the region, Mauritius, is 21 ranks lower. Mauritius is the only economy in Africa to emulate the Asian Tigers in terms of rapid export growth, and scores higher than South Africa in two components of the CIP index. However, its exports and manufacturing activity are highly concentrated in one low-technology activity, clothing, which has peaked in terms of growth. Since no other major industrial activity has replaced it, Mauritius faces a rather unpromising future in manufacturing. The Seychelles has improved its core ranking from 90th in 1980 to 77th in 2000, as its MVA per capita has nearly trebled. Cape Verde has also improved its performance over the two decades.

What is surprising is that South Africa appears relatively low in the global ranks.

Zimbabwe shows the most dramatic descent in the ranks, from 35th in 1980 to 55th in 2000, reflecting declines in both MVA per capita and manufactured exports per capita. Malawi and Kenya have also slipped in the rankings, from 74th place to 89th and form 66th to 79th, respectively. Overall, the picture for SSA is rather gloomy, dominated by countries that are barely maintaining their position or are slipping back.

Share of medium and high-tech goods in manufactured exports (percent)			*Share of manufactured goods in total exports (percent)*		
1980	*1990*	*2000*	*1980*	*1990*	*2000*
..	..	6.6	..	..	89.6
..	..	36.0	..	..	61.8
..	..	15.2	..	..	34.9
..	..	43.7	..	..	94.0
..	..	30.9	..	..	74.8
..	..	41.9	..	..	94.0
65.2	..	56.2	95.1	..	94.4
..	..	47.2	..	..	88.3
..	..	45.7	..	..	60.2
63.1	40.9	72.9	8.7	82.4	91.9
..	..	44.4	..	..	21.6
..	..	45.0	..	..	24.1
..	..	15.0	..	..	89.5
..	..	30.5	..	..	91.1
..	..	22.8	..	..	84.0
..	..	10.4	..	..	71.3
63.7	49.5	46.4	69.8	63.0	89.7
..	39.4	30.5	..	93.2	90.5
..	..	26.7	..	..	53.6
..	..	53.4	..	..	94.0
..	..	53.0	..	..	95.0
..	..	68.0	..	..	14.0
..	..	1.0	..	..	77.8
..	..	49.0	..	..	80.9

Competitive performance: beyond the index

The index of competitive industrial performance is meant to be a useful tool for the comparative assessment of countries' industrial potential. Moreover, if embedded in a broader set of characteristics and indicators, it can also shed light on the role of industry in overall development and the achievement of central goals. In this vein, this section broadens the picture, with a view to underlining the part industry plays in the achievement of the Millenium Development Goals.

Labour productivity

One key variable is missing from the set of industry-specific indicators underlying the CIP index, mainly for reasons of data availability: a measure of productivity. That such a measure is crucially important as a performance indicator applied to industry need not be argued. The centrality to the growth

Table 8.10 CIP index and components for SSA economies in 2000

Rank	Economy	MVA per capita index	Manufactured exports per capita index	Industrialization intensity index	Export quality index	CIP index
44	South Africa	0.059	0.012	0.528	0.596	0.299
65	Mauritius	0.078	0.038	0.329	0.515	0.240
73	Swaziland	0.035	0.022	0.354	0.473	0.221
76	Zimbabwe	0.013	0.002	0.444	0.393	0.213
78	Reunion	0.085	–	0.181	0.546	0.203
82	Senegal	0.011	0.001	0.362	0.422	0.199
89	Lesotho	0.006	0.004	0.210	0.543	0.191
93	Cape Verde	0.009	0.001	0.241	0.496	0.187
98	Côte d'Ivoire	0.018	0.004	0.321	0.341	0.171
102	Nigeria	0.002	–	0.271	0.341	0.153
105	Sudan	0.011	0.001	0.191	0.398	0.150
113	Ghana	0.004	0.001	0.265	0.286	0.139
114	Zambia	0.006	0.001	0.315	0.234	0.139
118	Seychelles	0.092	–	0.218	0.237	0.137
120	Kenya	0.003	0.001	0.254	0.278	0.134
123	Togo	0.005	–	0.237	0.264	0.127
125	Madagascar	0.002	–	0.206	0.282	0.123
126	Uganda	0.002	–	0.227	0.261	0.123
128	Gambia	0.001	–	0.113	0.364	0.120
129	Burkina-Faso	0.007	–	0.176	0.290	0.118
134	Cameroon	0.014	0.001	0.252	0.176	0.111
136	Namibia	0.022	0.005	0.175	0.228	0.108
137	Tanzania	0.001	–	0.269	0.153	0.106
138	Malawi	0.002	–	0.269	0.149	0.105
140	Gabon	0.032	0.010	0.261	0.100	0.101
142	Niger	0.002	–	0.108	0.290	0.100
144	Benin	0.004	–	0.199	0.168	0.093
145	Rwanda	0.007	–	0.165	0.128	0.075
147	Guinea	0.002	–	0.156	0.126	0.071
149	Botswana	0.018	0.008	0.111	0.096	0.058
150	Ethiopia and Eritrea	0.001	–	0.131	0.067	0.050
151	Burundi	0.001	–	0.126	0.060	0.047
152	Central African Republic	0.004	0.001	0.166	–	0.043
154	Comoros	0.001	–	0.067	0.094	0.041
155	Mali	0.002	–	0.120	0.039	0.040

Source: UNIDO Scoreboard database.

process of productivity increase, both at aggregate and disaggregate levels, may suffice here as a hint to what is at stake. This particular gap can be bridged: even if productivity cannot be accounted for directly, through the CIP index, in the assessment of industrial performance, it is possible to provide evidence on how the latter is related to the former.

A handful of 'drivers' determine the main components of industry growth and competitive performance.

Such evidence is obtained quite straightforwardly, by correlating, across a relatively small set of developing countries, the CIP index score and the level of average labour productivity for the whole manufacturing sector[4]. In this way an answer can be found to the question of how closely competitive industrial performance is related to the main driving force behind the growth of industry – productivity growth.

Correlations of this kind speak a clear language. The association between performance and productivity is positive throughout and shows a systematic trend between 1980 and 2000. While in the initial year this correlation (0.213) was insignificant, it strengthened dramatically and became significant in the middle year (0.438), then rose once more in the last year to a level of high significance (0.611). Hence, it appears that over two decades the need to account directly for labour productivity in the assessment of industrial performance has been much reduced. This is of course only the technical-statistical reflection of the fact that productivity and overall performance are converging rather fast. At a deeper level, this finding is likely to reflect causation of a kind that is essential to the overall analysis of this chapter. It can be stated as follows: There are a handful of generic factors (some of them named 'drivers' and quantified in the next section), which seem to determine the main components of both industry's growth and its competitive performance. And this co-determination is becoming ever more closely related.

In the above correlations with the CIP index productivity was chosen for good reason: It is the one characteristic of industrial activity that most clearly points to the wider ramifications of industrial progress for the whole economy. And – most importantly for this *Report* – it stands summarily for industry's contributions to the increase of welfare and thus also to the achievement of the Millennium Development Goal of poverty reduction. However, productivity does not provide the only link between industrial development and this partic-

ular goal. Two other such links can be identified, and they will be examined in the remainder of this section. The first is about a direct contribution of industry to achieving the goal by providing jobs and raising incomes for the relatively poor – the unskilled workers. The second has to do with the industry's indirect contribution by promoting economic or income growth in the aggregate.

Low-skill employment and wages

An obvious direct contribution of any sector of an economy to the reduction of poverty is the creation of jobs and the ensuing generation of income for people below the poverty line, however the latter is defined. In the case of the manufacturing sector, such poverty-reducing functions would primarily be expected from those industries that can offer employment to unskilled workers, since a low level of human capital, of which the lack of skills is an important component, is among the main factors of income poverty. What might, in this vein, be called 'pro-poor' industries can, roughly, be characterized by the relatively low skill-intensity[5] of their activities. In consequence, what happens to employment and wages in the segment of low-skill industries[6], is crucial for any direct contribution to poverty reduction that could be ascribed to manufacturing in a given country.

There is no correlation between competitive industrial performance and employment and income growth in low-skill industries.

In a rather limited, but still informative exercise along the above lines, the pro-poor industry segment was identified for a small set of developing countries[7] by use of data for 1990. The growth rates of employment and of the wage sum in this segment over the subsequent decade (1990–2000) can then be taken as a proxy indicator of poverty-reducing developments emanating from the manufacturing sector.

On average among the developing countries surveyed, the annual growth rates of employment and of wages were 0.0 percent and 0.4 percent, respectively. The ranges of the two types of growth rates were also quite similar within the country sample analysed. The relatively highest rates of employment growth were recorded by Honduras (6.8 percent) and Jordan (4.8 percent), whereas Cyprus accounted for a minimum rate of less than –6.0 percent. And the same two countries leading in employment growth also showed the highest growth rates of wages (5.7 and 3.9 percent), while Ecuador exhibited the steepest decline, –5.0 percent annually. Within these bounds, the extent of direct contributions to poverty reduction by the manufacturing sector varies considerably from one country to the next.

Bypassing an analysis of variations in the pro-poor effects of industrial growth, one thing emerges clearly from examining the relationship between these employment and income effects on the one hand, and competitive industrial performance on the other: there is no correlation between competitive industrial performance (as measured by the CIP index) and employment and income growth in low-skill industries, which are those most accessible to workers from the poorer strata of the labour force. The respective standard (rank) correlation coefficients are –0.152 (–0.146) for employment growth and 0.118 (0.139) for income growth, with levels of significance far below even the 90 percent line.

These results are not too surprising. The lack of correlation between competitive performance and the progress of pro-poor industries is most likely the result of two contrasting effects. First, to the extent that improved competitive performance is associated with a higher potential for aggregate growth (as is shown below), pro-poor industries too should benefit in terms of employment and (wage) income. Second, since with rising competitiveness these industries are usually on a structural decline, this should exert a negative impact on pro-poor industry growth. The two effects together may be taken to explain the missing correlation. What the result itself suggests is that, in the absence of a built-in direct contribution of enhanced competitive performance to poverty reduction, the question about pro-poor policies assumes renewed importance in the realm of industrial development as much as in others.

Income level and income growth

While competitive industrial performance does not appear to have much potential to bring about a direct contribution to poverty reduction, expectations are that the situation is different for indirect contributions. These are seen as originating from the positive associations between industrial performance and aggregate growth, and between growth and poverty reduction. While the latter relationship is taken for granted, some evidence on the former is needed to complete the link.

The positive association between the CIP index and GDP per capita is strong.

A natural point of departure is that of the relationship between competitive industrial performance and the level of income per capita. If a sample of over 50 developing countries is examined[8] on the basis of data for 1990 and 2000, conventional expectations are confirmed. The positive association between the CIP index and GDP per capita is strong[9] and suggests that an increase of 0.01 of the former would lead to a rise of between $250 and $300 (in 1990 prices) in the latter. This result comes as no surprise, considering the widely held view that development of an internationally competitive manufacturing sector is very likely to help raise incomes in the aggregate economy. The nature of the relationship between the CIP index and GDP per capita stays vir-

tually the same, and its strength increases, if instead of considering only one year, performance in 1990 is compared with income in 2000.[10]

Given the role of industry in overall economic development, that positive association between performance scores and income levels fits perfectly with the standard hypothesis. However, the argument for a pro-growth and hence pro-poor role of competitive industrial performance would be strengthened considerably if GDP growth were seen to be affected directly and positively by the CIP score. This is indeed the case, as a regression of the 1990-to-2000 growth rate of GDP per capita on the CIP score of the initial year shows. While the positive association with GDP growth is weaker than with GDP levels, it still is highly significant. And industrial performance explains about one-third of the variation in GDP per capita growth across the developing countries in the sample. A slightly expanded regression exercise can take into account the so-called 'convergence' hypothesis.[11] Results obtained along these lines show that the initial level of income exerts the expected negative impact, while industrial performance retains its positive and significant effect on subsequent growth.

A closer look at these regression results reveals some interesting country detail. If industrial performance is taken as a rough-and-ready predictor of levels and growth rates of per capita income, the results of these 'predictions' differ significantly between variables and countries. Thus, the CIP index would suggest considerably higher income levels than those observed in the case of China, and also for countries such as Taiwan Province of China, the Republic of Korea and India. The pattern is quite different for the prediction of income growth. Here, China's growth rate is grossly underestimated by the CIP index (by almost as much as two-thirds) and the same holds for the Republic of Korea, though to a much lesser extent. By contrast, the growth of Taiwan Province of China is overestimated by the same approach.

Drivers of competitive industrial performance

The previous issue of this Report benchmarked five leading factors that greatly influence competitive industrial performance: skills, technological effort, inward FDI, technology licensing and modern infrastructure. These factors, which for the sake of convenience we shall call 'drivers' were not intended to fully 'explain' national industrial performance in the statistical sense – a much larger set of indicators would be needed for this, including socio-political stability, macroeconomic management, trade, competition policies, financial systems, governance, institutions and so on. Rather the five drivers were selected on two criteria: first, to capture the main structural factors expected to affect industrial performance, and, second, to have comparable quantitative data across a wide range of economies.

The present *Report* uses the same data set on drivers as the previous one and tests for their statistical relationship with the new CIP indices – with a lag. Thus, the 1990 CIP index is regressed on the 1985 driver data and the 2000 CIP index on those for 1998. These lags strengthen the statistical analysis inasmuch as the variables are structural in nature and need time to take effect.

The nature of the drivers

While the variables used to represent the drivers are often simplified versions of the ideal, they seem to be the best available. The intention is to add to them and improve them over time, but in the interim it is useful to provide the basic indicators needed to allow policymakers and analysts to assess the structural basis for competitive industrial activity. The benchmarks do come with an explicit warning: they are partial and crude, and have to be supplemented with considerable country-specific information on quantitative, qualitative, institutional and policy-related factors before they can be used for practical purposes.

The five drivers were measured as follows:

- **Skills:** Several skill measures were tried and all yielded very similar ranks. The one finally used was tertiary level enrolments in technical subjects (technical subjects here are science, mathematics and computing, and engineering). All enrolment-based measures suffer from the limitation that they do not capture other forms of skill creation (like on-the-job training) or control for the quality and relevance of formal education. However, in the absence of other measures they are the best available to benchmark countries. Moreover, as *IDR 2002* noted, the rankings they yield are fairly plausible.
- **Technological effort:** Technological effort takes many forms, many of which are informal and diffuse, and so very difficult to measure in practice. The only available measure of technological effort across countries is formal research and development (R&D). While not ideal, R&D does capture a vital element of technological effort even in developing countries: even technology 'followers' have to undertake R&D to absorb complex technologies and use them effectively. The measure used here is R&D financed by productive enterprises (or business enterprise R&D, BERD, in OECD terminology[12]) rather than total national R&D, as the former gives a better picture of effort relevant to manufacturing competitiveness.
- **FDI:** FDI can provide, apart from capital, several industrial inputs from abroad: new technology, access to international markets, advanced skills, supplier networks, state-of-the-art management techniques, and so on. In recent years, entry into MNC integrated production systems has become an important avenue for export growth in many developing countries. Ideally, the measure should only cover FDI into manufacturing, and within that distinguish export-oriented from domestic-oriented flows. But the FDI data for most countries do not allow such distinctions to be drawn, so the available measure is for total FDI, including investment in services, privatisation, agriculture and so on.

- **Royalties and technical fees:** Overseas payments of royalties and technical fees measure technology imports both via FDI (affiliates paying their parents for new technology) and via arm's-length contracts between independent firms.
- **Modern infrastructure:** There are several possible measures of information and communications technology (ICT) infrastructure, all giving fairly similar rankings. The ones used here are telephone mainlines.

The empirical picture

From the viewpoint of empirical evidence on drivers, two aspects are of prime interest. First, the differences between different parts of the globe regarding the strength of the various drivers are a topic deserving attention on its own. Second, the nature and significance of driver impact on competitive industrial performance needs to be known, if a deeper understanding of the latter is to be gained.

Global patterns and underlying resources

There seems to be, at first sight, a clear correspondence between CIP indices and drivers at the regional level (table 8.11). Industrialized countries do better in all drivers, with the largest lead in R&D. In the developing world, East Asia without China has the strongest set of drivers, with the exception of FDI per capita and telephone mainlines per 1 000 people, where LAC does better in the late 1990s. LAC follows in most variables, but MENA has a higher tertiary technical enrolment rate in 1998. South Asia and SSA without South Africa are the laggards.

In analysing the role of technology in growth and international specialization three aspects are of prime concern: (1) that of *creation* of new technologies which takes place predominantly in the industrialized world, (2) that of *transmission,* particularly between developed and developing countries, and (3) that of *adoption,* particularly by the latter. For each one of these aspects one key resource can be selected that corresponds to one of the drivers: for creation, research and development expenditure; for transmission, inward FDI; and for adoption, high-level technical skills.

In the developing world, East Asia without China has the strongest set of drivers.

Instead of looking at the variation of drivers across development groups and regions, the global distribution of the driver-related resources can be assessed. This can be done (by using Gini coefficients[13]) in a way that assesses resource inequalities between countries rather than regions. And, in keeping with the per-capita definition of drivers, this assessment is based on a comparison between the distributions across countries of population on the one hand and a given resource on the other (table 8.12 summarises the results, distinguishing between global inequality and inequality among developing countries, and computing coefficients for the mid-1980s and the late 1990s).

Table 8.12 The distribution of driver resources: Gini coefficients, mid-1980s and late 1990s

	Period	*World*	*Developing Countries*
Research and Development Expenditure	1985	90.1	89.1
	1998	87.3	90.1
FDI	1981–1985	79.4	79.2
	1993–1997	70.8	57.3
Tertiary Enrolment	1985	50.2	44.5
	1995	53.5	45.5

Source: Own calculations based on UNIDO Scoreboard database.

Table 8.11 Drivers of industrial performance

	Skills		*Technological effort*		*FDI*		*Technology imports*		*ICT Infrastructure*	
	Tertiary technical enrolment (per 1000 of population)		*R&D per capita (dollars)*		*FDI per capita (dollars)*		*Royalties and technical fees per capita (dollars)*		*Telephone mainlines (per 1000 of population)*	*Personal computers (per 1000 of population)*
Group or region	*1985*	*1998*	*1985*	*1998*	*1981–85*	*1993–97*	*1985*	*1998*	*1998*	*1998*
World	11.1	14.6	22.9	71.4	13.3	63.4	2.6	14.2	152.5	64.9
Industrialized countries	34.3	40.1	122.3	402.4	54.8	241.6	12.0	66.2	571.1	316.5
Transition economies	..	26.3	..	8.8	–	40.8	..	2.5	214.0	42.7
Developing countries	6.3	8.7	0.6	4.6	4.3	26.9	0.6	3.9	62.6	14.2
East Asia	4.6	9.2	..	8.7	4.3	39.7	..	7.1	82.7	19.3
East Asia excl. China	12.3	21.9	3.2	31.0	14.5	63.3	2.7	26.6	119.3	48.6
South Asia	5.1	5.4	0.3	0.3	0.2	2.1	–	0.2	19.7	2.6
Latin America and the Caribbean	16.6	17.3	1.1	6.3	11.1	70.4	1.9	5.3	122.3	33.3
Sub-Saharan Africa	..	4.0	0.6	1.3	1.7	8.2	0.4	0.6	16.5	7.8
Sub-Saharan Africa excl. South Africa	1.7	2.7	–	–	1.9	5.3	–	0.2	5.7	3.4
Middle East and North Africa	13.6	20.5	0.4	1.4	16.9	14.1	0.1	3.0	115.0	14.8

Source: UNIDO Scoreboard database.

The different patterns of resource inequality are abundantly clear. Research and development expenditure (resource for the creation of new technology) is distributed very unequally, both globally and within the developing world – and there has been hardly any change in the degree of inequality between the two time periods. One of the chief means of transmission, namely FDI, is considerably less unequally distributed, and inequality has declined remarkably over the one-and-a-half decades – drastically so among developing countries. Finally, the distribution of key resources for adoption and adaptation, measured here by high-level technical skills, shows the lowest relative degree of inequality, which moreover remained stable over the period examined.

R&D expenditure is distributed very unequally, both globally and within the developing world.

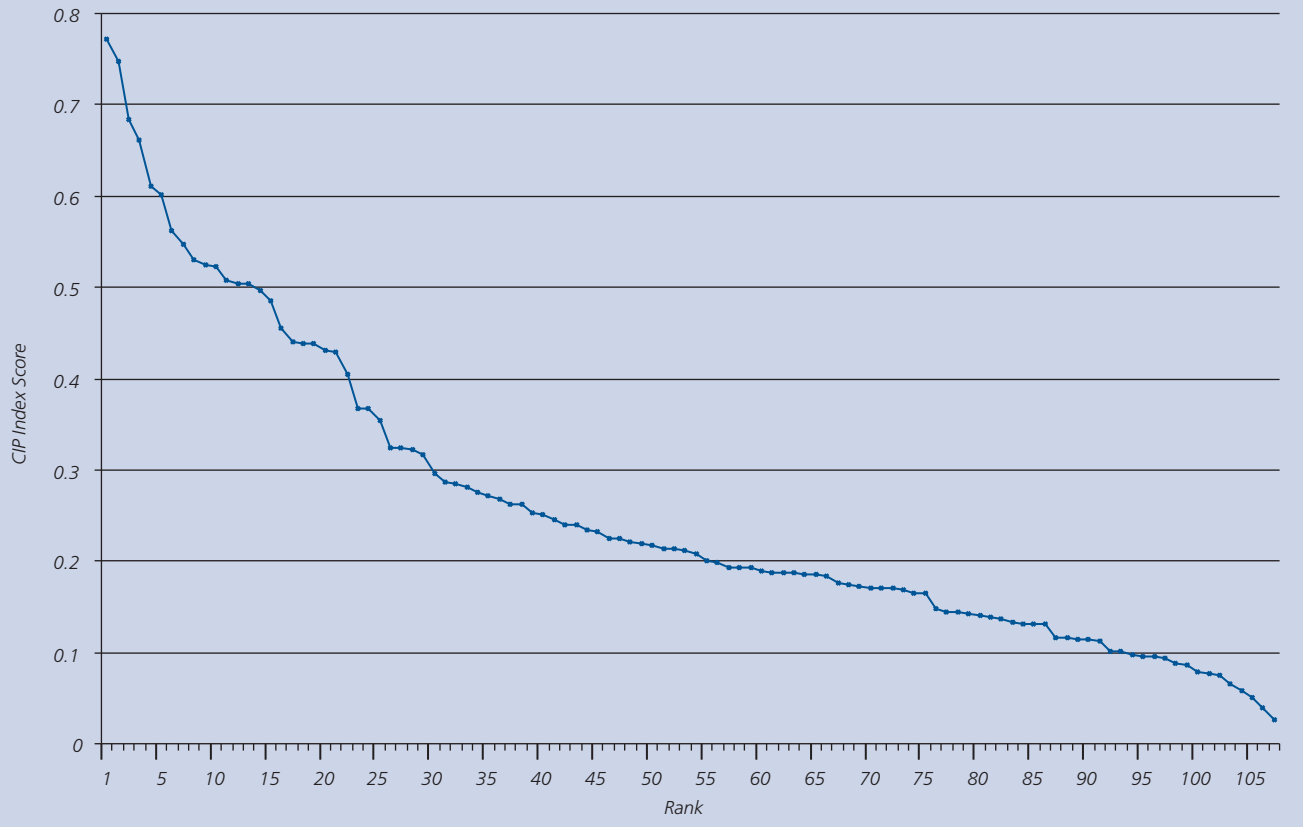
This empirical assessment of inequality of driver-related resources squares almost perfectly with the conventional view of extreme concentration of technology creation; unequal yet improving means of transmission; and not so bleak prospects regarding ability to adopt and adapt new technology. Given the wide variation among countries in per capita levels of these technology-related resources (as implied by the high degrees of inequality) and their hypothesized close relationship with competitive performance, the next step is to determine the strength of this relationship.

Relating drivers to competitive industrial performance

Owing to data limitations, the statistical analysis of the performance index and drivers uses a sample of 35 countries in 1990 and 51 countries in 2000 (table 8.13).[14] The regressions yield good results in explaining variations, and strongly suggest that the drivers do seem to influence countries' ability to mount competitive industrial performance – even though the significance of the equation declines between 1990 and 2000. The equations satisfy the normal tests of statistical significance. However, not all the drivers appear to be significant. The ones that achieve consistent significance are R&D, FDI and royalties. Skills and ICT fail to do so – though the skills variable is highly correlated with R&D and the latter may be picking up its impact. The analysis yields interesting results, generally in line with the findings reported in the previous Report:

- **Technological effort** is significantly and positively related to CIP, supporting the argument that learning and innovation lie at the core of industrial success, regardless of the level of economic development.

Figure 8.9 **Relationship between CIP index score and rank, 1990**



Source: UNIDO Scoreboard database.

- **FDI** has a negative effect in 1990 and a positive one in 2000. Clearly the recent surge in FDI-driven production and export of high-technology products affects competitive industrial performance. The impact is mainly confined to (relatively few) industrialized, transition and developing countries, but their rapid shift in the CIP ranks shows up in the regression analysis.
- The **purchase of technology** as measured by royalties and technical payments is positively associated with industrial performance.

Table 8.13 Regression analysis explaining CIP index scores

Independent variable	*2000*	*1990*
Skills	0.277	0.573
R&D	0.036**	0.104**
FDI	0.008*	–0.090**
Royalties	0.021**	0.464**
ICT	0.009	0.017
Constant	27.017	27.700
No. of observations	51	35
Adjusted R^2	0.666	0.747

Note: * Significant to within 10% significance level.
** Significant to within 5% significance level.

Taking the results literally, a one percent increase in R&D expenditure would increase the CIP Index score by 0.1 percent in 1990 and 0.03 percent in 2000. However, this has to be interpreted carefully. Differences between successive countries' index scores are generally around 0.005–0.1 percent. This interval in scores can correspond to a change in rankings of up to four or five places, depending upon where the country lies in the rankings. Different score intervals correspond to different rankings, as shown by the curve relating the rankings to the score (figure 8.9). Changes in index scores have different effects on rankings at different levels. Thus, at the lower end of the CIP Index scale even small increases in the index score can boost countries up the rankings by several places. By contrast, large increases in the score are needed for a high-ranking country to move up one rank at the upper end of the scale. The marginal effects yielded by the regressions should therefore be interpreted with caution. They are only rough guides to the magnitude of the effects.

Impact of drivers on CIP components

Regressions were also conducted on the impact of the drivers on each component of the CIP Index for 1990 and 2000 (the results are shown in annex tables A.20 to A.25). Most consistent and stable were the regressions for MVA per capita and manufactured exports per capita, with high R^2 values of around 80 percent. Least stable were regressions on the MHT share of manufactured exports and the share of manufactures in total exports, with R^2 values below 0.20 and explanatory variables whose significance varied inconsistently.

The driver that had the greatest impact was R&D: it was significant most often for the dependent variables, particularly for MHT shares in MVA and in manufactured exports. Skills rarely showed up as significant, possibly reflecting the collinearity of the skills measure with R&D. FDI was sometimes significant for manufactured exports per capita, and its sign changed from negative in 1990 to positive in 2000, suggesting that even with the rather broad measure (capturing a large element of non-manufacturing FDI) it was having a widespread effect on competitiveness. Royalties were significant for MVA per capita and manufactured exports per capita, while infrastructure was significant for MVA as a proportion of GDP and MVA per capita.

Three giants compared: China, India and Brazil

It is instructive to compare the three giants of the developing world, Brazil, China and India, in terms of CIP scores. China, the rising star in the global industrial firmament, shows consistent gains in each component (table 8.13). It leads the other two countries in share of MVA in GDP, and makes impressive gains in shares of MHT in manufactured exports and of manufactures in total exports. India shows increases in most components apart from the share of MHT in manufactured exports, but these are not enough to lead to significant gains in *relative* performance. It only shows small improvements in the share of MVA in GDP and of manufactured exports in total exports, whilst the share of MHT in manufactured exports declines. The decline in the technological complexity of its exports contrasts with its MVA structure, where the MHT share rises from 54.5 percent to 58.4 percent over 1980–2000. Brazil suffers from declines in MVA per capita and MVA share in GDP. Its manufactured exports per capita and the share of MHT in manufactured exports increase marginally, just enough to allow it to maintain its rank in these components. Overall, however, its rank slips from 24th to 31st place in the core CIP Index.

China leads in share of MVA in GDP, and makes impressive gains in shares of MHT in manufactured exports.

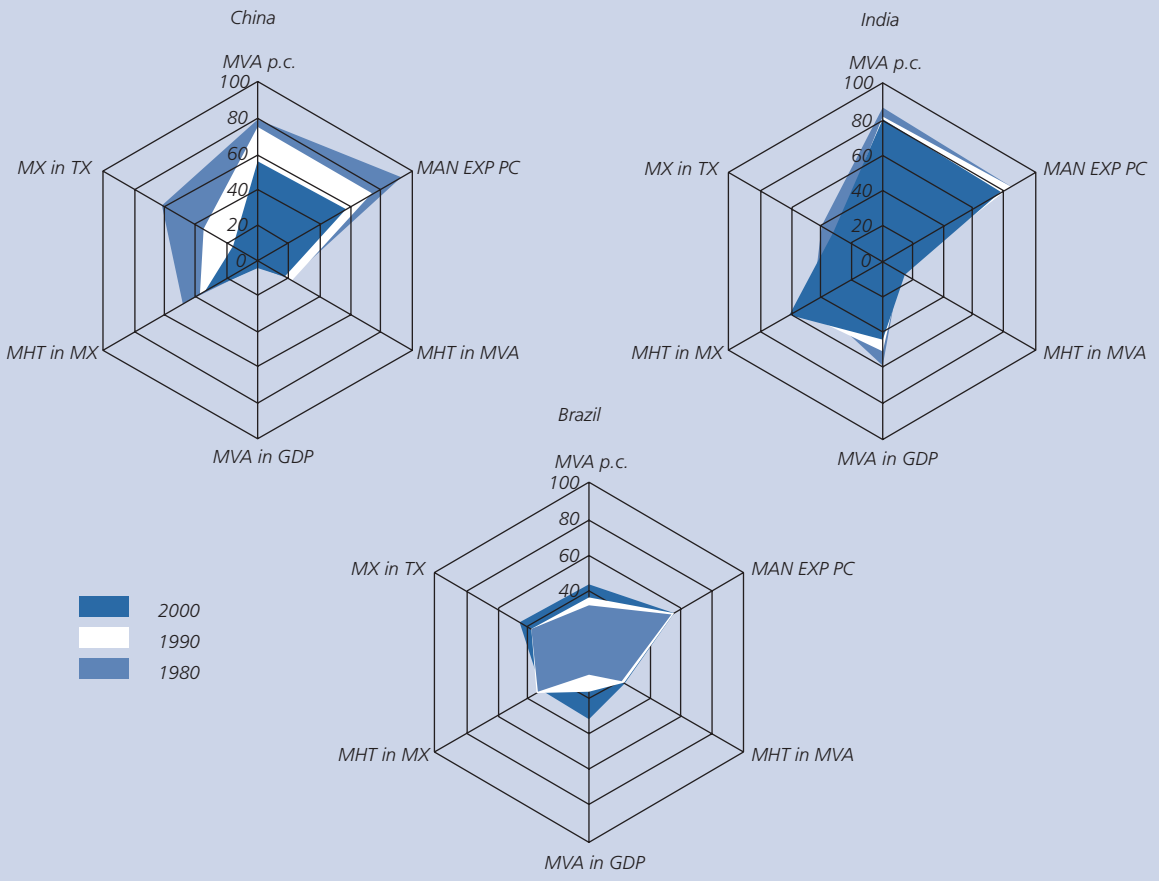
The relative ranks for the giants in the core CIP index – out of 93 countries – are shown in figure 8.10; positions near the centre of the spider diagrams indicate lower rank and so better performance. China shows the largest shifts in ranks over the three years, with all components moving towards the middle. While the values of its per capita MVA and manufactured exports are still relatively low, the latter shows a sharp improvement over the period. Remarkable is the rapid rise in its ranking in manufactured exports as a share of total exports and in the share of MHT in total exports. The pattern for India is notable mainly for its lack of change over time. Brazil is similar but with higher ranking in all components and a shift outwards in MVA per capita.

Table 8.14 Components of the CIP Index for the three giants, 1980, 1990 and 2000

Component	*Brazil*	*China*	*India*
2000			
MVA per capita (dollars)	694.0	350.0	90.0
Manufactured exports per capita (dollars)	247.4	183.0	38.5
MHT value added as percent of MVA (percent)	54.1	57.3	58.4
MVA as percent of GDP (percent)	19.6	34.5	17.4
Medium- and high-tech exports as percent of manufactured exports (percent)	49.2	45.6	19.7
Manufactured exports as percent of total exports (percent)	76.8	92.0	85.8
1990			
MVA per capita (dollars)	703.0	113.0	60.0
Manufactured exports per capita (dollars)	159.3	41.6	16.8
MHT value added as percent of MVA (percent)	51.6	51.6	55.3
MVA as percent of GDP (percent)	22.5	33.1	16.6
Medium- and high-tech exports as percent of manufactured exports (percent)	40.0	34.4	17.9
Manufactured exports as percent of total exports (percent)	75.1	76.0	79.6
1980			
MVA per capita (dollars)	880.0	55.0	36.0
Manufactured exports per capita (dollars)	74.9	..	6.8
MHT value added as percent of MVA (percent)	47.3	47.4	54.5
MVA as percent of GDP (percent)	27.0	33.0	14.2
Medium- and high-tech exports as percent of manufactured exports (percent)	30.7	18.5	22.7
Manufactured exports as percent of total exports (percent)	62.8	32.1	59.2

Source: UNIDO Scoreboard database.

Figure 8.10 Ranking of CIP components for China, India and Brazil



Source: UNIDO Scoreboard database.
Note: The acronym MX stands for manufactured exports, TX for total exports, MHT for medium- and high-technology activities/commodities, MAN EXP PC for manufactured exports per capita, MVA for manufacturing value added and p.c. for per capita values.

Notes:

This chapter (except the section on 'Competitive performance: beyond the index') is based on a background paper by S. Lall (2003). However, the views expressed here are of UNIDO and do not necessarily reflect those of the author.

[1] See box 8.1 for the major considerations behind and some technical features included in the 'new' performance index.

[2] The experience of the successful countries suggests that such convergence is essential. Entering global value chains with low technology exports or with assembly of high-technology exports is a good way to launch competitive industrial activity. It does not, however, guarantee that exports will continue to grow in the future as wages rise, new competitors appear and production processes grow more complex and demanding. It becomes necessary to 'add more value' locally and this entails deepening local capabilities. At the same time, countries that have built strong local capabilities find it necessary to integrate more fully with the international economy – the pace of knowledge creation is too rapid and its spread too wide for any economy to cope without greater specialisation, networking and alliances. For a good analysis see Radosevic, 1999.

[3] A correlation of the rankings for the 93 core sample countries yields coefficients as high as 0.955 for 1990–2000, 0.926 for 1980–1990 and 0.904 for 1980–2000.

[4] The productivity measure used here is that of average labour productivity in the manufacturing sector, i.e. value added per worker in the sector as a whole. The sample consists of 34 developing countries for which both CIP index values and productivity data were available.

[5] The definition of skill-intensity applied here is in terms of the average wage rate (wages per worker) for a given industry.

[6] In order to define the low-skill segment of manufacturing industries, these industries are first ranked by ascending wage rate. Then those industries at the bottom of this ranking are aggregated, which together account for at least one-fifth of total manufacturing value added. This bottom fifth – the composition of which is specific to each country – is termed the low-skill or 'pro-poor' segment of the manufacturing sector in a given country.

[7] The sample of developing countries for which the required information was available for the years 1990 and 2000 comprises 34 countries.

[8] The results reported here are those of a regression exercise, carried out by use of the UNIDO CIP index and information on GDP per capita taken from the Penn World Tables 6.1. In this way 58 developing countries could be covered in regressing levels or growth rates of GDP per capita on the index.

[9] The significance of the coefficient for the CIP index is high (t-values of over 7.0 and 8.0 for 1990 and 2000, respectively) and adjusted R-square values suggest that over one-half of the variation in GDP-per-capita levels is explained by the index.

[10] If the 2000-level of GDP per capita is regressed on the 1990-score of the CIP index, the t-value rise to 9.6 and the adjusted R-square to over 0.6.

[11] The hypothesis of a convergence of income growth among countries in the long run implies that the higher initial income is, the lower will be the associated growth rate.

[12] The OECD's *STI Scoreboard* (the acronym stands for science, technology and innovation) provides many measures of technological activity in OECD countries. In addition to R&D spending by source, it examines different kinds of R&D (basic, applied, defence, health, ICT and so on), international cooperation in R&D, migration of R&D personnel and students, spread of ICT, the share of medium and high-technology manufacturing and services. It also includes several skill measures, including 'human resources and science and technology', and measures the distribution of the workforce across occupations by science and technology intensity. The European Commission, in *The European Innovation Scoreboard,* benchmarks innovative activity in EU member states and many neighbouring countries. In addition to most of the measures used by the OECD, it also benchmarks innovation by SMEs, innovation finance, and the share of new products in sales. Needless to say, such data are not available for most countries outside the industrialized world, and the UNIDO Scoreboard has to manage with patchy data on R&D financed by productive enterprises.

[13] This analytical tool was introduced in Chapter 7 in order to examine so-called manufacturing inequality.

[14] The dependent variable in the regression analysis is the CIP index score times 100. In the nature of the index, countries may have a decline in score even when the underlying variables are static or improving – other countries may be improving faster. Inevitably, the richness of detail in individual components of the index is lost because the final index is an average.

References

Lall, S. 2003. Background paper to this *Report.*

Radosevic, S. 1999, 'Restructuring and Reintegration of Science and Technology Systems in Economies in Transition.' European Commission, DGXII, Targeted Socio-Economic Research (TSER) Programme, 1996–98.

Second part | **Annex tables**

Table A.1 Shares of top five and ten economies in global and developing world MVA

Rank	*All economies*	*Share in world (percent)*	*Developing economies*	*Share in developing economies (percent)*
		1980		
1	United States of America	21.9	Brazil	20.0
2	Japan	13.6	China	10.0
3	Western Germany	10.6	Argentina	8.6
4	Italy	5.7	Mexico	7.6
5	France	5.6	Yugoslavia (Former)	5.4
	Top 5 ranks	**57.4**	**Top 5 ranks**	**51.7**
6	United Kingdom	5.0	Taiwan, Province of China	4.8
7	Russian Federation	3.9	Korea, Republic of	4.7
8	Brazil	2.9	India	4.6
9	Spain	2.5	Turkey	3.1
10	Canada	1.9	Philippines	1.9
	Top 10 ranks	**73.6**	**Top 10 ranks**	**70.7**
	Bottom 30 ranks	**0.0083**	**Bottom 30 ranks 0**	**0.05**
		1990		
1	United States of America	21.5	China	15.7
2	Japan	16.8	Brazil	12.7
3	Western Germany	9.5	Korea, Republic of	8.9
4	Italy	5.1	Taiwan, Province of China	6.4
5	France	4.7	India	6.2
	Top 5 ranks	**57.6**	**Top 5 ranks**	**50.0**
6	United Kingdom	4.2	Mexico	6.1
7	Russian Federation	3.5	Argentina	4.6
8	China	2.7	Turkey	4.0
9	Spain	2.3	Yugoslavia (Former)	3.9
10	Brazil	2.2	Indonesia	2.9
	Top 10 ranks	**72.5**	**Top 10 ranks**	**71.5**
	Bottom 30 ranks	**0.0096**	**Bottom 30 ranks**	**0.06**
		2000		
1	United States of America	24.1	China	29.4
2	Japan	14.0	Korea, Republic of	10.8
3	Western Germany	8.5	Brazil	7.9
4	China	7.0	India	6.1
5	Italy	4.6	Taiwan, Province of China	5.9
	Top 5 ranks	**58.2**	**Top 5 ranks**	**60.0**
6	France	4.5	Mexico	5.2
7	United Kingdom	3.5	Turkey	3.3
8	Korea, Republic of	2.6	Argentina	3.3
9	Spain	2.0	Indonesia	3.1
10	Canada	2.0	Thailand	3.0
	Top 10 ranks	**72.9**	**Top 10 ranks**	**77.9**
	Bottom 30 ranks	**0.0095**	**Bottom 30 ranks**	**0.03**

Source: UNIDO Scoreboard database.

Table A.2 MVA, shares in world and average annual growth, by economic grouping and region, 1980–2000

Group, region or country	1980 Value (billion dollars)	1980 Share (percent)	1985 Value (billion dollars)	1985 Share (percent)	1990 Value (billion dollars)	1990 Share (percent)	1995 Value (billion dollars)	1995 Share (percent)	2000 Value (billion dollars)	2000 Share (percent)
World	3 709.2	100	4 163.0	100	4 836.5	100	5 233.5	100	6 225.2	100
Industrialized countries	2 863.7	077.2	3 168.6	76.1	3 649.9	75.5	3 895.3	74.5	4 469.6	71.8
Western Europe	1 424.8	38.4	1 483.1	35.6	1 651.3	34.1	1 690.3	32.3	1 892.6	30.4
North America	883.9	23.8	991.5	23.8	1 129.5	23.4	1 311.8	25.1	1 626.9	26.1
Other industrialized	555.6	15.0	694.8	16.7	870.0	18.0	894.2	17.1	951.1	15.3
Transition economies	318.9	8.6	365.2	8.8	376.9	7.8	209.5	4.0	257.3	4.1
Europe	304.0	8.2	345.1	8.3	355.9	7.4	198.3	3.8	244.4	3.9
Central Asia	14.9	0.4	20.0	0.5	21.0	0.4	11.1	0.2	12.8	0.2
Developing countries	525.8	14.2	628.3	15.1	808.7	16.7	1 127.6	21.6	1 497.3	24.1
Sub-Saharan Africa	37.1	1.0	40.9	1.0	44.7	0.9	45.0	0.9	51.2	0.8
Sub-Saharan Africa excl. South Africa	15.9	0.4	18.6	0.5	20.7	0.4	20.8	0.4	25.6	0.
South Africa	21.1	0.6	22.2	0.5	24.0	0.5	24.2	0.5	25.5	0.41
Latin America and the Caribbean	246.8	6.7	242.5	5.8	255.4	5.3	281.2	5.4	325.8	5.2
Latin America and the Caribbean excl. Mexico	206.3	5.6	199.5	4.8	205.4	4.3	228.3	4.4	248.5	4.0
Mexico	40.5	1.1	43.0	1.0	50.0	1.0	52.9	1.0	77.2	1.2
Middle East and North Africa	57.0	1.5	77.8	1.9	96.4	2.0	117.5	2.3	147.3	2.4
South Asia	31.2	0.8	42.9	1.0	62.0	1.3	86.9	1.7	109.7	1.8
East Asia	153.5	4.1	224.0	5.4	350.0	7.2	596.9	11.4	863.2	13.9
East Asia excl. China	99.3	2.7	138.4	3.3	221.0	4.6	319.4	6.1	423.8	6.8
China	53.5	1.5	84.8	2.1	128.2	2.7	276.5	5.3	438.2	7.1

Group, region or country	Average annual growth (percent) 1980–1985	1985–1990	1990–1995	1995–2000	1980–1990	1990–2000	1980–2000
World	2.3	3.0	1.6	3.5	2.7	2.6	2.6
Industrialized countries	2.0	2.9	1.3	2.8	2.5	2.0	2.3
Western Europe	0.8	2.2	0.5	2.3	1.5	1.4	1.4
North America	2.3	2.6	3.0	4.4	2.5	3.7	3.1
Other industrialized	4.6	4.6	0.5	1.2	4.6	0.9	2.7
Transition economies	2.7	0.6	–11.1	4.2	1.7	–3.7	–1.1
Europe	2.6	0.6	–11.0	4.3	1.6	–3.7	–1.1
Central Asia	6.1	0.9	–11.9	2.9	3.5	–4.8	–0.7
Developing countries	3.6	5.2	6.9	5.8	4.4	6.4	5.4
Sub-Saharan Africa	1.9	1.8	0.1	2.6	1.9	1.4	1.6
Sub-Saharan Africa excl. South Africa	3.2	2.1	0.1	4.3	2.6	2.2	2.4
South Africa	0.9	1.6	0.1	1.1	1.3	0.6	0.9
Latin America and the Caribbean	–0.3	1.0	1.9	3.0	0.3	2.5	1.4
Latin America and the Caribbean excl. Mexico	–0.7	0.6	2.1	1.7	0.0	1.9	0.9
Mexico	1.2	3.0	1.1	7.9	2.1	4.4	3.3
Middle East and North Africa	6.4	4.4	4.0	4.6	5.4	4.3	4.9
South Asia	6.6	7.6	7.0	4.8	7.1	5.9	6.5
East Asia	7.8	9.3	11.3	7.7	8.6	9.4	9.0
East Asia excl. China	6.9	9.8	7.6	5.8	8.3	6.7	7.5
China	9.6	8.6	16.6	9.6	9.1	13.1	11.1

Source: UNIDO database.
Note: East Asia, includes the Pacific economies.

Table A.3 Technology structure of MVA in developing regions, 1980–2000

Region or country	Technology	Share in MVA (percent) 1980	1985	1990	1995	2000
East Asia	Resource based	31.4	30.7	28.8	26.7	25.8
	Low	26.7	23.3	22.0	17.7	16.3
	Medium and high	41.9	46.1	49.2	55.6	58.0
East Asia excl. China	Resource based	33.8	32.0	28.9	24.8	24.0
	Low	27.5	25.7	22.8	18.6	17.2
	Medium and high	38.7	42.3	48.3	56.6	58.9
China	Resource based	27.3	28.5	28.7	30.9	29.3
	Low	25.3	19.1	19.7	15.9	14.5
	Medium and high	47.4	52.4	51.6	53.2	56.1
South Asia	Resource based	25.0	28.7	28.7	26.4	26.5
	Low	26.6	20.0	21.2	19.1	19.2
	Medium and high	48.4	51.3	50.2	54.5	54.3
Latin America	Resource based	38.7	38.6	37.2	40.8	40.7
	Low	19.9	18.3	17.5	14.1	11.9
	Medium and high	41.5	43.1	45.2	45.1	47.4
Latin America excl. Mexico	Resource based	38.3	37.8	35.9	38.8	39.0
	Low	19.5	18.2	17.7	13.1	10.3
	Medium and high	42.2	44.1	46.3	48.1	50.7
Mexico	Resource based	40.4	43.1	42.5	50.2	47.5
	Low	22.1	19.0	16.6	18.9	18.3
	Medium and high	37.6	37.9	40.9	30.9	34.2
Middle East and North Africa	Resource based	49.1	46.5	44.7	43.3	40.9
	Low	22.3	21.5	20.9	20.4	21.2
	Medium and high	28.6	32.0	34.4	36.3	37.9
Sub-Saharan Africa	Resource based	36.0	42.7	40.0	40.0	40.2
	Low	20.6	17.4	20.6	19.2	18.6
	Medium and high	43.4	39.9	39.4	40.8	41.2
Sub-Saharan Africa excl. South Africa	Resource based	63.8	63.8	49.7	57.7	56.4
	Low	18.5	17.2	23.2	27.0	26.2
	Medium and high	17.7	19.0	27.1	15.3	17.4
South Africa	Resource based	27.7	35.7	34.4	33.7	33.3
	Low	21.2	17.5	19.1	16.5	15.4
	Medium and high	51.1	46.9	46.4	49.8	51.3

Source: UNIDO Scoreboard database.

Table A.4 Shares in world value added, by technology category and region, 1980–2000

Technology category or region	Share in world value added (percent) 1980	1985	1990	1995	2000
Resource based activities					
East Asia	4.8	6.3	8.1	11.5	13.9
East Asia excl. China	3.3	4.1	5.1	5.7	6.4
Latin America and the Caribbean	9.4	8.6	7.7	8.3	8.3
Latin America and the Caribbean excl. Mexico	7.8	6.9	5.9	6.4	6.1
Middle East and North Africa	2.8	3.3	3.5	3.7	3.8
South Asia	0.8	1.1	1.4	1.7	1.8
Sub-Saharan Africa	1.3	1.6	1.4	1.3	1.3
Sub-Saharan Africa excl. South Africa	1.0	1.1	0.8	0.9	0.9
Low technology activities					
East Asia	5.9	7.1	9.5	12.9	14.8
East Asia excl. China	3.9	4.9	6.2	7.2	7.6
Latin America and the Caribbean	7.1	6.1	5.5	4.9	4.1
Latin America and the Caribbean excl. Mexico	5.8	5.0	4.5	3.7	2.7
Middle East and North Africa	1.8	2.3	2.5	2.9	3.3
South Asia	1.2	1.2	1.6	2.0	2.2
Sub-Saharan Africa	1.1	1.0	1.1	1.1	1.0
Sub-Saharan Africa excl. South Africa	0.4	0.4	0.6	0.7	0.7
Medium- and high-technology activities					
East Asia	3.2	4.4	6.2	10.9	13.6
East Asia excl. China	1.9	2.5	3.8	6.0	6.8
Latin America and the Caribbean	5.1	4.4	4.2	4.2	4.2
Latin America and the Caribbean excl. Mexico	4.3	3.7	3.4	3.6	3.4
Middle East and North Africa	0.8	1.1	1.2	1.4	1.5
South Asia	0.8	0.9	1.1	1.6	1.6
Sub-Saharan Africa	0.8	0.7	0.6	0.6	0.6
Sub-Saharan Africa excl. South Africa	0.1	0.2	0.2	0.1	0.1

Source: UNIDO Scoreboard database.

Table A.5 Manufactured exports by technology category and region, 1981–2000

Technology-, economic grouping, region or country	*Manufactured exports (current billion dollars)*				
	1980	*1985*	*1990*	*1995*	*2000*
Total manufactured exports					
World	1 233.5	1 325.6	2 635.4	4 004.8	4 924.7
Industrialized countries	1 009.9	1 066.2	2 117.2	2 958.5	3 406.6
Western Europe	629.9	655.3	1 412.0	1 874.6	2 052.0
North America	216.8	224.8	399.2	607.8	833.3
Other industrialized countries	163.0	186.1	305.9	476.0	521.2
Transition economies	61.9	62.2	80.6	139.7	196.3
Developing countries	161.6	197.1	437.6	906.6	1 321.7
Sub-Saharan Africa	9.0	6.7	10.2	22.6	30.4
Sub-Saharan Africa excl. South Africa	3.6	2.1	3.6	6.8	11.9
South Africa	5.3	4.5	6.5	15.8	18.4
Latin America and the Caribbean	39.5	47.5	63.0	149.8	250.7
Latin America and the Caribbean excl. Mexico	33.4	39.0	49.3	84.3	106.4
Mexico	6.0	8.5	13.7	65.5	144.2
Middle East and North Africa	21.7	28.0	40.0	58.6	79.3
Middle East and North Africa excl. Turkey	20.1	22.2	30.0	40.0	54.9
Turkey	1.6	5.8	9.9	18.5	24.3
South Asia	7.3	9.0	20.6	38.2	53.7
East Asia	83.9	105.7	303.7	637.2	907.5
East Asia excl. China	71.6	90.0	237.6	453.6	589.7
China	12.2	15.6	66.1	183.6	317.7
Resource based exports					
World	332.9	333.4	556.6	801.7	911.5
Industrialized countries	235.9	230.2	427.1	572.8	618.5
Western Europe	169.2	164.8	307.9	394.7	416.5
North America	48.8	47.9	87.0	124.7	140.6
Other industrialized countries	17.9	17.4	32.2	53.3	61.3
Transition economies	21.7	22.2	23.9	48.0	59.3
Developing countries	75.2	80.9	105.5	180.8	233.6
Sub-Saharan Africa	6.1	4.0	4.9	12.0	16.9
Sub-Saharan Africa excl. South Africa	3.0	1.3	1.7	4.0	9.0
South Africa	3.1	2.6	3.1	7.9	7.9
Latin America and the Caribbean	22.4	24.2	27.3	50.1	59.6
Latin America and the Caribbean excl. Mexico	20.8	22.2	23.9	43.9	50.0
Mexico	1.6	1.9	3.3	6.1	9.5
Middle East and North Africa	15.5	19.6	18.3	24.5	36.0
Middle East and North Africa excl. Turkey	15.0	18.3	16.6	20.9	32.6
Turkey	0.4	1.3	1.6	3.5	3.4
South Asia	1.6	2.5	4.8	8.9	13.0
East Asia	29.2	30.5	50.0	85.1	107.8
East Asia excl. China	25.7	26.1	40.3	60.7	74.1
China	3.5	4.3	9.7	24.4	33.6
Low technology exports					
World	235.9	253.9	516.1	763.3	855.7
Industrialized countries	168.6	170.2	347.5	463.3	476.7
Western Europe	125.2	130.5	280.0	354.4	339.9
North America	19.5	15.5	37.0	65.9	95.0
Other industrialized countries	23.9	24.0	30.3	42.8	41.8
Transition economies	10.1	11.5	15.3	38.1	46.8
Developing countries	57.0	72.1	153.3	261.8	332.1
Sub-Saharan Africa	1.2	1.2	2.7	4.4	4.7
Sub-Saharan Africa excl. South Africa	0.3	0.4	1.2	1.9	1.9
South Africa	0.9	0.7	1.4	2.5	2.7
Latin America and the Caribbean	5.8	8.0	13.0	27.5	44.5
Latin America and the Caribbean excl. Mexico	4.9	6.9	11.2	16.3	19.2
Mexico	0.9	1.0	1.8	11.1	25.3
Middle East and North Africa	3.8	4.8	12.6	19.9	23.9
Middle East and North Africa excl. Turkey	2.9	1.8	6.6	9.5	10.9
Turkey	0.9	3.0	6.0	10.4	12.9
South Asia	4.4	5.3	12.7	23.3	32.2
East Asia	41.5	52.6	112.1	186.5	226.6
East Asia excl. China	35.0	43.8	78.0	92.0	85.7
China	6.5	8.8	34.1	94.5	140.8
Medium technology exports					
World	512.1	543.2	1 074.5	1 541.3	1 778.9
Industrialized countries	454.0	474.5	937.9	1 271.6	1 400.3
Western Europe	259.4	266.0	610.3	783.1	813.0
North America	97.1	101.7	164.8	254.1	336.2
Other industrialized countries	97.3	106.6	162.7	234.3	250.9
Transition economies	26.1	22.9	34.0	44.0	67.6
Developing countries	32.0	45.8	102.5	225.6	310.9
Sub-Saharan Africa	1.3	1.3	2.2	5.4	7.4
Sub-Saharan Africa excl. South Africa	0.1	0.3	0.5	0.7	0.8

Table A.5 Manufactured exports by technology category and region, 1981–2000 *(continued)*

Technology-, economic grouping, region or country	*Manufactured exports (current billion dollars)*				
	1980	*1985*	*1990*	*1995*	*2000*
South Africa	1.2	1.0	1.6	4.6	6.5
Latin America and the Caribbean	7.6	11.8	19.4	52.7	88.4
Latin America and the Caribbean excl. Mexico	6.1	8.2	12.0	21.0	26.0
Mexico	1.4	3.6	7.3	31.7	62.4
Middle East and North Africa	1.9	3.1	7.5	11.7	14.2
Middle East and North Africa excl. Turkey	1.7	1.7	5.7	7.6	8.4
Turkey	0.2	1.3	1.8	4.0	5.8
South Asia	1.0	0.8	2.2	4.4	5.8
East Asia	20.0	28.6	71.1	151.2	194.9
East Asia excl. China	18.2	26.7	53.4	113.1	128.4
China	1.7	1.8	17.7	38.1	66.5
High technology exports					
World	171.0	220.2	489.0	898.2	1 378.6
Industrialized countries	151.3	191.6	405.6	650.7	911.1
Western Europe	76.1	93.7	213.6	342.2	482.4
North America	51.3	59.5	110.3	162.9	261.3
Other industrialized countries	23.8	37.9	80.6	145.4	167.0
Transition economies	3.8	5.4	7.2	9.4	22.5
Developing countries	15.7	23.1	76.1	238.0	445.0
Sub-Saharan Africa	0.1	0.1	0.2	0.7	1.2
Sub-Saharan Africa excl. South Africa	0.0	0.0	0.0	0.0	0.1
South Africa	0.1	0.1	0.2	0.6	1.1
Latin America and the Caribbean	3.5	3.3	3.2	19.4	58.1
Latin America and the Caribbean excl. Mexico	1.4	1.5	2.0	2.9	11.1
Mexico	2.0	1.8	1.1	16.4	46.9
Middle East and North Africa	0.3	0.4	1.3	2.1	5.0
Middle East and North Africa excl. Turkey	0.2	0.3	1.0	1.6	2.9
Turkey	0.0	0.0	0.3	0.5	2.1
South Asia	0.2	0.2	0.8	1.5	2.5
East Asia	11.5	18.8	70.3	214.2	378.0
East Asia excl. China	11.1	18.3	65.8	187.6	301.3
China	0.3	0.5	4.5	26.5	76.7

Source: UNIDO Scoreboard database.

Table A.6 Annual growth of manufactured exports, 1980–2000

Technology category, economic grouping, region or country	*Average annual growth (percent)*						
	1980–1985	*1985–1990*	*1990–1995*	*1995–2000*	*1980–1990*	*1990–2000*	*1980–2000*
Total manufactured exports							
World	1.8	14.5	8.8	4.3	8.7	6.5	7.5
Industrialized countries	1.4	14.7	6.9	2.9	8.6	4.9	6.6
Western Europe	1.0	16.6	5.8	1.8	9.4	3.8	6.4
North America	0.9	12.2	8.8	6.5	7.0	7.6	7.3
Other industrialized countries	3.4	10.4	9.2	1.8	7.2	5.5	6.3
Transition economies	0.1	5.3	11.6	7.0	3.0	9.3	6.3
Developing countries	5.5	15.9	16.7	8.2	11.1	12.4	11.8
Sub-Saharan Africa	–7.1	8.7	17.3	6.1	1.4	11.5	6.6
Sub-Saharan Africa excl. South Africa	–12.4	10.9	13.3	11.9	–0.1	12.6	6.4
South Africa	–4.0	7.5	19.2	3.1	2.3	10.9	6.7
Latin America and the Caribbean	4.8	5.8	18.9	10.8	5.3	14.8	10.2
Latin America and the Caribbean excl. Mexico	3.9	4.8	11.3	4.8	4.4	8.0	6.3
Mexico	8.9	9.9	36.7	17.1	9.5	26.5	18.1
Middle East and North Africa	6.6	7.3	7.9	6.2	7.0	7.1	7.1
Middle East and North Africa excl. Turkey	2.6	6.2	5.9	6.5	4.6	6.2	5.4
Turkey	37.6	11.2	13.3	5.6	22.3	9.4	15.3
South Asia	5.2	17.9	13.1	7.0	12.1	10.0	11.0
East Asia	5.9	21.3	17.8	8.0	14.2	12.8	13.4
East Asia excl. China	5.8	18.5	15.9	6.2	12.7	10.9	11.8
China	6.4	33.4	22.7	11.6	20.6	17.0	18.7
Resource based exports							
World	0.2	11.1	7.5	2.6	6.1	5.0	5.6
Industrialized countries	–0.6	13.2	6.0	1.5	6.8	3.7	5.2
Western Europe	–0.7	13.3	5.1	1.1	6.9	3.1	4.9
North America	–0.5	12.7	7.5	2.4	6.6	4.9	5.7
Other industrialized countries	–0.6	13.0	10.6	2.8	6.7	6.7	6.7
Transition economies	0.6	1.5	14.9	4.3	1.1	9.5	5.4
Developing countries	2.8	6.3	11.6	5.4	4.8	8.4	6.7
Sub-Saharan Africa	–10.3	4.3	19.5	7.1	–2.5	13.1	5.4
Sub-Saharan Africa excl. South Africa	–17.8	4.5	18.3	17.4	–6.1	17.9	5.9
South Africa	–4.5	4.2	20.1	–0.1	0.2	9.5	5.0
Latin America and the Caribbean	1.9	2.4	12.9	3.5	2.2	8.1	5.3

Table A.6 Annual growth of manufactured exports, 1980–2000 *(continued)*

Technology, category, economic grouping, region or country	*Average annual growth (percent)*						
	1980–1985	*1985–1990*	*1990–1995*	*1995–2000*	*1980–1990*	*1990–2000*	*1980–2000*
Latin America and the Caribbean excl. Mexico	1.7	1.5	12.9	2.6	1.6	7.6	4.7
Mexico	4.4	11.1	13.0	9.2	8.1	11.1	9.7
Middle East and North Africa	5.9	–1.4	6.0	8.0	1.8	7.0	4.5
Middle East and North Africa excl. Turkey	5.0	–1.9	4.7	9.2	1.1	7.0	4.1
Turkey	28.1	5.4	16.0	–0.7	15.0	7.3	10.9
South Asia	10.9	13.7	13.0	7.9	12.5	10.5	11.4
East Asia	1.1	12.7	12.5	5.5	7.4	8.9	8.2
East Asia excl. China	0.3	11.8	10.2	5.0	6.5	7.6	7.1
China	5.5	17.3	20.3	6.7	11.9	13.3	12.6
Low technology exports							
World	1.5	16.2	8.7	2.7	9.4	5.7	7.4
Industrialized countries	0.2	15.3	5.9	0.6	8.4	3.2	5.6
Western Europe	1.1	16.5	4.8	–0.8	9.4	2.0	5.4
North America	–5.5	18.9	12.2	7.6	7.4	9.9	8.7
Other industrialized countries	0.1	4.7	7.1	–0.5	2.7	3.3	3.0
Transition economies	3.2	5.8	20.0	4.2	4.6	11.8	8.4
Developing countries	5.7	20.3	13.4	5.9	13.5	9.6	11.4
Sub-Saharan Africa	–0.8	17.5	10.3	1.4	9.0	5.7	7.3
Sub-Saharan Africa excl. South Africa	4.7	24.0	9.1	0.4	15.0	4.7	9.5
South Africa	–3.3	13.3	11.3	2.0	5.6	6.6	6.1
Latin America and the Caribbean	8.0	10.3	16.1	10.1	9.3	13.0	11.2
Latin America and the Caribbean excl. Mexico	8.7	10.2	7.9	3.2	9.5	5.5	7.4
Mexico	4.3	11.3	43.0	17.8	8.1	29.8	19.0
Middle East and North Africa	6.0	21.0	9.5	3.7	14.1	6.6	10.1
Middle East and North Africa excl. Turkey	–11.5	29.7	7.5	2.7	9.4	5.1	7.1
Turkey	35.5	14.3	11.6	4.5	23.3	8.0	15.0
South Asia	4.8	18.9	12.9	6.7	12.4	9.8	11.0
East Asia	5.3	21.4	13.6	5.5	14.0	9.5	11.6
East Asia excl. China	4.5	17.7	7.2	2.1	11.6	4.6	7.9
China	7.7	30.9	22.6	8.3	20.1	15.2	17.5
Medium technology exports							
World	1.5	14.6	7.5	2.9	8.6	5.2	6.8
Industrialized countries	1.1	14.6	6.3	1.9	8.4	4.1	6.1
Western Europe	0.6	18.1	5.1	0.8	10.0	2.9	6.2
North America	1.2	10.1	9.0	5.8	6.0	7.4	6.8
Other industrialized countries	2.3	8.8	7.6	1.4	5.9	4.4	5.1
Transition economies	–3.2	8.3	5.3	9.0	3.0	7.1	5.1
Developing countries	9.4	17.5	17.1	6.6	13.8	11.7	12.7
Sub-Saharan Africa	–0.8	10.9	19.3	6.4	5.5	12.7	9.2
Sub-Saharan Africa excl. South Africa	13.3	13.5	5.4	2.5	13.4	4.0	8.3
South Africa	–3.7	10.0	23.0	7.0	3.7	14.7	9.4
Latin America and the Caribbean	11.7	10.4	22.2	10.9	11.0	16.4	13.8
Latin America and the Caribbean excl. Mexico	7.5	7.9	11.7	4.3	7.7	8.0	7.9
Mexico	26.0	15.2	34.1	14.5	19.9	23.9	22.0
Middle East and North Africa	12.4	19.4	9.2	3.9	16.2	6.5	11.0
Middle East and North Africa excl. Turkey	0.3	26.5	6.1	1.9	14.1	4.0	8.6
Turkey	59.6	6.5	17.0	7.4	27.5	12.1	19.1
South Asia	–4.4	20.3	14.8	5.8	8.6	10.2	9.5
East Asia	9.4	19.9	16.3	5.2	15.1	10.6	12.7
East Asia excl. China	10.0	14.8	16.2	2.6	12.7	9.2	10.8
China	1.7	56.8	16.6	11.8	29.4	14.1	21.1
High technology exports							
World	6.5	17.3	12.9	8.9	12.4	10.9	11.6
Industrialized countries	6.1	16.2	9.9	7.0	11.6	8.4	9.9
Western Europe	5.4	17.9	9.9	7.1	12.2	8.5	10.2
North America	3.8	13.1	8.1	9.9	8.9	9.0	8.9
Other industrialized countries	12.3	16.3	12.5	2.8	14.5	7.6	10.8
Transition economies	8.6	6.0	5.5	18.9	7.1	12.0	9.7
Developing countries	10.1	26.9	25.6	13.3	19.1	19.3	19.2
Sub-Saharan Africa	–3.8	11.9	19.5	12.3	4.6	15.9	10.4
Sub-Saharan Africa excl. South Africa	–16.2	14.7	5.2	8.8	–0.3	7.0	3.5
South Africa	1.6	11.1	22.8	12.8	6.8	17.7	12.4
Latin America and the Caribbean	–1.1	–1.0	43.2	24.5	–1.0	33.5	15.9
Latin America and the Caribbean excl. Mexico	0.6	6.3	7.7	30.5	3.7	18.6	11.3
Mexico	–2.3	–8.8	69.3	23.3	–6.0	44.5	17.9
Middle East and North Africa	11.1	23.8	9.7	18.2	18.0	13.9	15.8
Middle East and North Africa excl. Turkey	7.4	21.4	10.9	11.5	14.9	11.2	12.9
Turkey	40.9	32.4	6.3	33.5	36.1	19.1	26.9
South Asia	5.2	26.3	12.7	10.1	16.5	11.4	13.8
East Asia	13.2	30.1	25.0	12.0	22.3	18.3	20.2
East Asia excl. China	13.3	29.1	23.3	9.9	21.8	16.4	19.0
China	10.7	53.4	42.3	23.6	32.7	32.7	32.7

Source: UNIDO Scoreboard database.

Table A.7 Structure of manufactured exports by region, 1981–2000

Technology category, economic grouping, region or country	Share in group's exports (percent) 1981	1985	1990	1995	2000
Resource based exports					
World	26.6	24.7	21.1	20.0	18.5
Industrialized countries	23.4	21.6	20.2	19.4	18.2
Transition economies	35.1	35.8	29.7	34.4	30.2
Developing countries	41.8	36.5	24.1	19.9	17.7
Sub-Saharan Africa	68.6	59.5	48.4	53.1	55.8
Sub-Saharan Africa excl. South Africa	83.3	64.4	47.7	59.2	75.2
South Africa	58.5	57.2	48.7	50.5	43.1
Latin America and the Caribbean	56.9	51.1	43.4	33.4	23.8
Latin America and the Caribbean excl. Mexico	62.3	57.2	48.6	52.1	47.0
Mexico	27.4	23.2	24.4	9.4	6.7
Middle East and North Africa	71.7	69.8	45.9	42.0	45.5
Middle East and North Africa excl. Turkey	75.2	82.2	55.4	52.6	59.4
Turkey	29.7	22.3	17.1	19.2	14.1
South Asia	22.8	28.2	23.5	23.4	24.4
East Asia	34.9	28.9	16.5	13.4	11.9
East Asia excl. China	28.6	22.7	17.0	13.4	12.6
China	29.0	28.0	14.7	13.3	10.6
Low technology exports					
World	18.8	18.8	19.6	19.1	17.4
Industrialized countries	16.7	16.0	16.4	15.7	14.0
Transition economies	16.5	18.6	19.0	27.3	23.9
Developing countries	31.7	32.5	35.0	28.9	25.1
Sub-Saharan Africa	13.9	18.1	26.7	19.7	15.6
Sub-Saharan Africa excl. South Africa	9.7	19.7	34.4	28.4	16.5
South Africa	16.8	17.3	22.4	15.9	15.1
Latin America and the Caribbean	14.9	16.8	20.7	18.4	17.8
Latin America and the Caribbean excl. Mexico	14.8	17.7	22.7	19.4	18.0
Mexico	15.2	12.8	13.6	17.1	17.6
Middle East and North Africa	17.8	17.4	31.7	34.2	30.2
Middle East and North Africa excl. Turkey	14.7	8.1	22.2	24.0	19.9
Turkey	56.0	52.8	60.5	56.1	53.2
South Asia	60.1	59.2	61.7	61.0	60.0
East Asia	49.6	49.8	36.9	29.3	25.0
East Asia excl. China	38.8	38.1	32.8	20.3	14.5
China	53.9	56.7	51.6	51.5	44.3
Medium technology exports					
World	40.9	40.2	40.8	38.5	36.1
Industrialized countries	44.9	44.5	44.3	43.0	41.1
Transition economies	42.2	36.8	42.3	31.5	34.4
Developing countries	17.8	20.6	23.4	24.9	23.5
Sub-Saharan Africa	15.4	20.0	22.1	24.1	24.4
Sub-Saharan Africa excl. South Africa	5.1	14.3	16.0	11.1	7.2
South Africa	22.4	22.7	25.5	29.7	35.6
Latin America and the Caribbean	19.3	25.0	30.8	35.2	35.3
Latin America and the Caribbean excl. Mexico	18.5	21.2	24.5	25.0	24.5
Mexico	23.5	42.1	53.3	48.4	43.3
Middle East and North Africa	9.0	11.1	19.0	20.1	18.0
Middle East and North Africa excl. Turkey	8.7	7.9	19.0	19.2	15.3
Turkey	12.9	23.3	18.7	22.0	23.8
South Asia	14.3	9.7	10.8	11.6	10.9
East Asia	23.8	27.1	23.4	23.7	21.5
East Asia excl. China	20.3	23.3	22.5	24.9	21.8
China	14.3	11.9	26.8	20.8	20.9
High technology exports					
World	13.7	16.3	18.5	22.4	28.0
Industrialized countries	15.0	18.0	19.2	22.0	26.7
Transition economies	6.3	8.7	9.0	6.8	11.5
Developing countries	8.7	10.4	17.4	26.3	33.7
Sub-Saharan Africa	2.1	2.5	2.8	3.1	4.2
Sub-Saharan Africa excl. South Africa	1.9	1.6	1.9	1.3	1.1
South Africa	2.3	2.9	3.4	3.9	6.1
Latin America and the Caribbean	8.9	7.1	5.1	12.9	23.2
Latin America and the Caribbean excl. Mexico	4.4	3.9	4.1	3.5	10.5
Mexico	33.9	21.9	8.6	25.1	32.5
Middle East and North Africa	1.4	1.7	3.5	3.7	6.4
Middle East and North Africa excl. Turkey	1.4	1.7	3.3	4.2	5.3
Turkey	1.4	1.6	3.8	2.7	8.8
South Asia	2.9	2.9	4.1	4.0	4.7
East Asia	13.7	17.9	23.2	33.6	41.7
East Asia excl. China	12.4	15.9	27.7	41.4	51.1
China	2.9	3.4	6.9	14.5	24.1

Source: UNIDO Scoreboard database.

Table A.8 Fastest growing 50 products in world trade, 1990–2000

Product	Exports (billion dollars) 1990	Exports (billion dollars) 2000	Average annual growth (percent) 1990–2000
Ores and concentrates of uranium	22.0	352.6	32.0
Optical instruments and apparatus	3 809.7	22 096.3	19.2
Thermionic valves (semiconductors)	59 098.6	284 417.0	17.0
Telecommunications equipment and parts	56 766.0	206 333.3	13.8
Gas, natural and manufactured	22 329.4	80 008.2	13.6
Parts of and accessories of computers	47 956.7	150 491.3	12.1
Electric power machinery and parts	10 540.9	31 662.9	11.6
Medicinal and pharmaceutical products	36 276.6	106 455.4	11.4
Automatic data processing machines	67 418.0	188 641.0	10.8
Equipment for distributing electric	13 284.7	37 110.1	10.8
Ores and concentrates of precious met	1 222.9	3 319.7	10.5
Electrical machinery and apparatus	36 738.8	97 259.5	10.2
Organo-inorganic and heterocyclic compounds	11 597.7	30 532.7	10.2
Elect. Apparatus such as switches relays etc	35 297.0	90 569.0	9.9
Under garments knitted or crocheted	11 814.2	30 188.5	9.8
Nickel	2 870.8	7 243.2	9.7
Road motor vehicles n.e.s.	6 570.2	16 070.7	9.4
Medical instruments and appliances	9 944.4	23 281.8	8.9
Articles of rubber n.e.s.	4 798.1	11 058.8	8.7
Silver, platinum and similar metals	5 050.7	11 517.1	8.6
Photographic apparatus and equipment	7 259.5	16 539.4	8.6
Perfumery cosmetics and toilet prep	10 069.0	22 686.4	8.5
Non alcoholic beverages n.e.s.	2 297.6	5 119.1	8.3
Knitted or crocheted fabrics	6 023.7	13 383.3	8.3
Rotating electric plant and parts	13 205.5	28 533.3	8.0
Articles of materials described in division 58	28 728.7	62 055.0	8.0
Engines and motors. non-electrical	22 013.4	47 353.5	8.0
Misc. non-ferrous base metals	1 606.5	3 454.6	8.0
Glass	9 352.2	20 036.5	7.9
Furniture and parts thereof	29 066.6	61 736.6	7.8
Essential oils perfume and flavouring	3 571.4	7 558.0	7.8
Residual petroleum products n.e.s.	5 183.4	10 918.7	7.7
Motorcycles, motor scooters	9 833.9	20 478.5	7.6
Pearls precious and semi-precious stones	24 132.3	49 827.5	7.5
Spices	1 185.6	2 430.8	7.4
Edible products and preparations n.e.s.	7 337.6	15 021.9	7.4
Wood manufactures n.e.s.	8 057.1	16 447.8	7.4
Manufactures of base metal n.e.s.	23 796.9	48 525.9	7.4
Nitrogen-function compounds	17 113.5	34 659.1	7.3
Made-up textile articles	8 087.2	16 302.7	7.3
Optical goods n.e.s.	4 636.0	9 337.6	7.3
Miscellaneous chemical products n.e.s.	21 154.2	42 479.8	7.2
Other organic chemicals	6 871.7	13 724.7	7.2
Other miscellaneous manufactured articles	10 463.1	20 871.8	7.2
Cork natural raw and waste	122.0	243.3	7.1
Pigments paints varnishes	11 761.2	23 448.3	7.1
Petroleum products refined	78 781.0	156 343.5	7.1
Measuring checking analysing instruments	36 365.6	72 086.9	7.1
Pumps & compressors fans & blowers	19 716.6	38 920.5	7.0
Meters and counters n.e.s.	1 352.6	2 659.2	7.0

Source: UNIDO Scoreboard database.

Table A.9 Top 25 exporters of resource-based products, 1990 and 2000

	2000		1990	
Rank	*Country*	*Exports (million dollars)*	*Country*	*Exports (million dollars)*
1	United States	81 743	United States	54 110
2	Germany	61 115	Germany	47 168
3	Canada	51 370	France	39 807
4	France	48 139	Netherlands	33 399
5	Belgium	46 319	Canada	31 793
6	United Kingdom	41 291	United Kingdom	29 507
7	Netherlands	39 728	Belgium	27 930
8	Italy	32 148	Italy	22 528
9	Japan	30 015	Japan	17 237
10	Ireland	22 478	Sweden	14 683
11	China	21 814	Singapore	13 572
12	Spain	20 429	Switzerland	12 023
13	Singapore	19 707	Spain	11 866
14	Korea, Rep. of	19 515	Finland	11 468
15	Russian Federation	19 163	Australia	9 740
16	Finland	15 384	Brazil	9 449
17	Brazil	15 108	Austria	7 335
18	Indonesia	14 343	Denmark	6 997
19	Sweden	13 670	Malaysia	6 935
20	Australia	13 565	China	6 850
21	Switzerland	12 953	Indonesia	6 445
22	India	12 624	Saudi Arabia	6 393
23	Israel	11 913	Ireland	6 009
24	Saudi Arabia	11 801	Norway	5 821
25	Malaysia	11 422	Israel	4 896
Share in world total (percent)		79.9	Share in world total (percent)	82.7

Source: UNIDO Scoreboard database.

Table A.10 Top 25 exporters of low-technology products, 1990 and 2000

	2000		1990	
Rank	*Country*	*Exports (million dollars)*	*Country*	*Exports (million dollars)*
1	China	105 985	Germany	66 281
2	Italy	74 442	Italy	57 164
3	United States	73 793	France	33 583
4	Germany	69 134	United States	30 986
5	France	41 664	Japan	29 145
6	Taiwan, Prov. of China	37 843	Taiwan, Prov. of China	28 189
7	Japan	37 125	Korea, Rep. of	28 074
8	Korea, Rep. of	32 826	China	26 029
9	United Kingdom	29 045	United Kingdom	23 833
10	Belgium	28 209	Belgium	22 918
11	Mexico	25 702	Netherlands	17 000
12	Canada	23 145	Hong Kong, SAR	15 620
13	Netherlands	19 565	Austria	10 968
14	Spain	18 341	Switzerland	10 932
15	India	17 947	Spain	10 215
16	Indonesia	14 435	Sweden	8 105
17	Turkey	13 565	Portugal	7 433
18	Thailand	13 155	Thailand	7 249
19	Hong Kong, SAR	13 084	Canada	6 842
20	Austria	12 895	India	6 716
21	Switzerland	12 155	Turkey	6 133
22	Sweden	10 205	Denmark	6 049
23	Poland	9 334	Singapore	5 069
24	Denmark	9 170	Brazil	4 551
25	Singapore	9 060	Indonesia	4 422
Share in world total (percent)		85.7	Share in world total (percent)	90.5

Source: UNIDO Scoreboard database.

Table A.11 Top 25 exporters of medium-technology products, 1990 and 2000

	2000		1990	
Rank	*Country*	*Exports (million dollars)*	*Country*	*Exports (million dollars)*
1	Germany	248 192	Germany	198 789
2	United States	242 963	Japan	157 021
3	Japan	238 512	United States	121 380
4	France	108 901	France	76 890
5	Italy	94 214	United Kingdom	66 618
6	Canada	93 192	Italy	63 455
7	United Kingdom	84 239	Belgium	43 652
8	Belgium	66 414	Canada	43 383
9	Mexico	62 420	Netherlands	31 847
10	Korea, Rep. of	56 595	Switzerland	26 179
11	China	48 566	Sweden	23 175
12	Spain	48 299	Spain	21 793
13	Netherlands	41 481	Korea Rep. of	19 551
14	Taiwan, Prov. of China	36 973	Taiwan, Prov. of China	16 669
15	Switzerland	30 479	Austria	16 283
16	Sweden	25 270	China	12 940
17	Singapore	23 035	Singapore	11 455
18	Austria	22 136	Denmark	8 539
19	Malaysia	15 455	Finland	8 119
20	Thailand	13 995	Brazil	8 063
21	Brazil	13 778	Mexico	7 317
22	Russian Federation	12 295	Norway	6 008
23	Czech Republic	11 661	Hong Kong, SAR	5 437
24	Hungary	10 877	Yugoslavia, Fed. Rep.	4 915
25	Poland	10 592	Malaysia	3 928
Share in world total (percent)		90.8	Share in world total (percent)	96.4

Source: UNIDO Scoreboard database.

Table A.12 Top 25 exporters of high-technology products, 1990 and 2000

	2000		1990	
Rank	*Country*	*Exports (million dollars)*	*Country*	*Exports (million dollars)*
1	United States	225 903	United States	99 649
2	Japan	152 121	Japan	77 639
3	Germany	103 213	Germany	55 877
4	United Kingdom	86 274	United Kingdom	36 310
5	Singapore	81 125	France	31 933
6	France	71 603	Singapore	19 129
7	Taiwan, Prov. of China	67 103	Netherlands	17 394
			Italy	16 841
8	Korea, Rep. of	61 823	Taiwan, Prov. of China	16 457
9	China	56 007	Korea, Rep. of	13 457
10	Malaysia	51 686	Switzerland	10 749
11	Netherlands	51 201	Canada	10 655
12	Mexico	46 928	Sweden	8 455
13	Canada	35 468	Malaysia	7 688
14	Ireland	32 295	Belgium	7 688
15	Italy	27 723	Ireland	6 640
16	Philippines	25 585	Hong Kong, SAR	5 791
17	Belgium	21 467	Austria	5 068
18	Thailand	21 280	Spain	4 745
19	Sweden	21 207	Denmark	4 221
20	Switzerland	19 990	Thailand	3 556
21	Finland	13 738	China	3 320
22	Spain	11 562	Finland	2 625
23	Israel	10 230	Israel	1 945
24	Denmark	9 197	Norway	1 373
25	Hungary	7 914		
Share in world total (percent)		95.1	Share in world total (percent)	97.7

Source: UNIDO Scoreboard database.

Table A.13 Leading developing country exporters of manufactures, 1990 and 2000

	All manufactures		*Resource based*	
Rank	*1990*	*2000*	*1990*	*2000*
1	Taiwan, Prov. of China	China	Singapore	China
2	Korea, Rep. of	Korea, Rep of	Brazil	Singapore
3	Singapore	Taiwan	Malaysia	Korea
4	China	Mexico	China	Brazil
5	Hong Kong, SAR	Singapore	Indonesia	Indonesia
6	Brazil	Malaysia	Saudi Arabia	India
7	Malaysia	Thailand	India	Saudi Arabia
8	Thailand	Indonesia	Korea	Malaysia
9	Indonesia	Brazil	Taiwan	Thailand
10	Mexico	India	Thailand	Venezuela
11	India	Philippines	Argentina	Mexico
12	Saudi Arabia	Turkey	South Africa	South Africa
13	Turkey	Hong Kong, SAR	Mexico	Chile
14	Argentina	South Africa	Algeria	Taiwan
15	South Africa	Saudi Arabia	Chile	Argentina
16	Chile	Argentina	Libya	Botswana
17	Algeria	Chile	Philippines	Ukraine
18	Philippines	Algeria	Turkey	Algeria
19	Pakistan	Venezuela	Peru	Bahrain
20	Venezuela	Pakistan	Hong Kong, SAR	Turkey

Source: UNIDO Scoreboard database.

Low technology		*Medium technology*		*High technology*	
1990	*2000*	*1990*	*2000*	*1990*	*2000*
Taiwan, Prov. of China	China	Korea, Rep. of	Mexico	Singapore	Singapore
Korea	Taiwan, Prov. of China	Taiwan, Prov. of China	Korea, Rep. of	Taiwan, Prov. of China	Taiwan, Prov. of China
China	Korea	China	China	Korea, Rep. of	Korea, Rep. of
Hong Kong, SAR	Mexico	Singapore	Taiwan	Malaysia	China
Thailand	India	Brazil	Singapore	Hong Kong, SAR	Malaysia
India	Indonesia	Mexico	Malaysia	Thailand	Mexico
Turkey	Turkey	Hong Kong, SAR	Thailand	China	Philippines
Singapore	Thailand	South Africa	Brazil	Brazil	Thailand
Brazil	Hong Kong, SAR	Malaysia	Indonesia	Mexico	Indonesia
Indonesia	Singapore	Thailand	South Africa	India	Brazil
Pakistan	Malaysia	Turkey	Turkey	Philippines	Hong Kong, SAR
Malaysia	Pakistan	India	India	Turkey	India
Mexico	Brazil	Saudi Arabia	Argentina	Indonesia	Turkey
Macao	Philippines	Indonesia	Philippines	South Africa	Costa Rica
Philippines	Tunisia	Argentina	Saudi Arabia	Argentina	South Africa
Argentina	Morocco	Syria	Hong Kong, SAR	Morocco	Argentina
Tunisia	South Africa	Venezuela	Colombia	Tunisia	Morocco
Bangladesh	Argentina	Morocco	Venezuela	Jordan	Colombia
Morocco	Macao	Philippines	Chile	Guatemala	Tunisia
Syria	Colombia	Tunisia	Tunisia	Chile	Oman

Table A.14 Per capita manufactured exports, by technology group and by region, 1981–2000

	Manufactured exports per capita (current dollars)				
Technology group and regions	*1981*	*1985*	*1990*	*1995*	*2000*
Total exports					
Latin America and the Caribbean	109.49	118.84	143.31	312.70	483.79
East Asia	59.65	69.48	184.15	362.37	489.34
Middle East and North Africa	97.06	107.04	132.26	173.42	211.76
South Asia	8.34	9.14	18.72	31.46	40.32
Sub-Saharan Africa	24.85	15.99	20.94	40.56	47.94
Resource based goods					
Latin America and the Caribbean	62.33	60.62	62.15	104.55	115.02
East Asia	20.68	19.93	30.17	47.87	57.90
Middle East and North Africa	69.53	74.73	60.57	72.60	96.29
South Asia	1.90	2.57	4.39	7.35	9.83
Sub-Saharan Africa	17.04	9.51	10.13	21.55	26.74
Low technology goods					
Latin America and the Caribbean	16.29	19.98	29.72	57.53	85.94
East Asia	29.68	34.74	68.07	106.25	122.23
Middle East and North Africa	17.27	18.61	41.83	59.07	63.89
South Asia	5.01	5.40	11.54	19.19	24.20
Sub-Saharan Africa	3.45	2.89	5.59	7.97	7.50
Medium technology goods					
Latin America and the Caribbean	21.10	29.60	44.10	110.14	170.67
East Asia	14.27	18.88	43.18	86.17	105.17
Middle East and North Africa	8.73	11.90	25.01	34.76	38.02
South Asia	1.19	0.89	2.01	3.64	4.41
Sub-Saharan Africa	3.83	3.20	4.62	9.77	11.71
High technology goods					
Latin America and the Caribbean	9.77	8.44	7.32	40.48	112.14
East Asia	8.21	12.45	42.73	122.08	204.05
Middle East and North Africa	1.39	1.80	4.55	6.48	13.48
South Asia	0.24	0.27	0.77	1.27	1.88
Sub-Saharan Africa	0.53	0.39	0.60	1.27	2.00

Source: UNIDO Scoreboard database.

Table A.15 Components of the CIP index for the core sample, 1980, 1990 and 2000

Country	MVA per capita (dollars)			Manufactured exports per capita (dollars)			Share of medium- and high-tech activities in MVA (percent)			Share of MVA in GDP (percent)			Share of medium- and high-tech goods in manufactured exports (percent)			Share of manufactured goods in total exports (percent)		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Algeria	226	260	182	88	141	419	24.0	35.3	28.7	9.0	10.4	7.5	3.1	5.6	1.1	12.4	31.9	57.6
Argentina	1 634	1 164	1 335	114	198	370	36.7	37.7	46.3	29.0	26.8	23.1	26.8	23.6	38.5	35.0	52.2	52.1
Australia	2 402	2 344	2 497	519	687	1 390	50.6	50.6	49.5	15.3	12.8	13.1	23.3	31.3	41.3	35.1	32.8	43.7
Austria	3 390	4 320	5 174	1 972	5 158	6 477	48.0	50.0	52.9	19.9	20.6	20.6	45.3	53.6	57.3	94.0	95.2	90.1
Bangladesh	34	34	52	7	12	34	25.0	28.3	24.0	15.9	12.7	15.5	1.4	2.4	2.8	85.2	85.6	92.7
Barbados	650	584	564	585	791	656	29.2	24.2	32.2	10.6	8.7	7.5	36.6	25.8	31.5	98.7	95.3	92.1
Belgium	3 171	4 135	4 892	4 486	9 616	15 301	51.4	54.2	55.5	19.4	20.9	20.6	43.7	51.6	56.0	83.0	84.3	85.0
Bolivia	165	126	139	139	79	91	8.6	8.6	11.2	18.4	17.0	16.4	2.3	0.3	28.1	75.9	56.3	55.5
Brazil	880	703	694	75	159	247	47.3	51.6	54.1	27.0	22.5	19.6	30.7	40.0	49.2	62.8	75.1	76.8
Cameroon	106	150	146	2	40	39	18.0	20.7	20.8	10.4	14.2	10.9	5.6	17.1	2.9	21.2	22.5	31.9
Canada	2 906	3 210	4 040	1 858	3 348	7 042	46.4	51.9	57.9	16.4	15.5	16.6	52.7	58.3	59.4	66.7	74.2	78.6
Central African Rep.	39	52	42	15	7	19	18.5	13.5	10.1	6.6	10.4	8.9	0.4	2.8	21.7	31.6	15.5	–
Chile	393	429	578	27	152	398	41.7	42.5	39.0	20.9	18.5	15.3	12.8	15.2	20.0	26.0	24.0	33.8
China	55	113	350	–	42	183	47.4	51.6	57.3	33.0	33.1	34.5	18.5	34.4	45.6	3.1	76.0	92.0
Colombia	211	229	165	33	64	132	27.3	34.1	32.2	20.8	19.9	13.2	19.2	20.6	37.2	31.6	33.1	42.4
Costa Rica	390	363	522	127	161	1 005	21.0	23.7	29.0	19.8	19.4	22.2	33.6	27.2	65.5	27.9	33.8	73.8
Cyprus	837	1 160	1 009	696	606	385	16.0	17.4	21.8	16.9	14.2	9.4	16.3	13.2	30.7	76.1	72.1	77.8
Denmark	3 723	4 038	4 647	2 176	4 819	6 824	47.7	49.3	54.4	16.7	15.6	14.7	47.9	51.5	53.6	71.0	71.2	73.8
Dominica	68	138	147	110	244	432	11.7	12.1	12.4	5.1	5.9	5.3	93.2	72.4	59.3	43.6	32.9	58.1
Ecuador	248	202	201	71	39	95	23.9	20.3	12.7	22.7	19.4	19.9	4.4	4.4	14.6	26.2	14.8	24.9
Egypt, Arab Rep.	98	145	221	15	29	53	32.4	34.0	40.9	15.2	16.9	20.2	2.1	10.2	10.4	20.7	63.3	77.5
El Salvador	250	226	308	64	38	149	21.6	30.6	29.9	21.5	21.7	23.2	30.0	28.2	25.3	30.6	48.0	69.7
Ethiopia	13	12	12	1	1	–	8.1	8.2	9.6	6.8	7.3	6.2	0.2	2.5	0.8	10.2	17.0	12.4
Fiji	189	200	225	319	451	420	12.4	13.8	12.8	10.8	10.5	11.9	1.2	5.9	2.0	96.0	90.5	78.3
Finland	4 254	5 522	8 962	2 732	5 136	8 392	41.3	47.3	55.9	20.2	20.1	27.3	29.2	42.0	55.2	93.2	95.8	95.6
France	3 834	4 021	4 732	1 636	3 240	4 579	51.0	53.9	50.8	21.7	18.8	19.3	54.7	59.2	66.6	87.1	87.7	89.8
French Guiana	1 101	539	519	108	271	–	11.7	12.1	12.4	15.4	5.2	5.4	25.6	21.4	71.4	21.5	37.1	52.0
Germany	5 835	6 618	6 414	2 042	4 665	5 932	60.8	66.5	63.2	32.9	30.6	27.2	65.1	68.7	72.0	91.2	93.2	88.9
Greece	1 275	1 233	1 302	327	593	805	35.3	34.5	33.5	15.7	14.9	13.1	17.7	16.9	26.8	74.2	74.7	77.9
Guatemala	171	132	133	52	55	112	31.2	33.9	35.1	16.6	15.0	13.2	34.4	27.6	31.3	24.7	41.5	47.4
Haiti	88	57	21	16	21	6	6.0	5.1	4.8	18.4	15.8	7.1	10.0	14.5	4.1	55.8	85.8	77.3
Honduras	93	91	100	25	20	54	12.4	16.4	12.6	13.8	14.5	15.3	5.9	7.0	24.7	15.0	18.0	32.4
Hong Kong, SAR	1 702	2 131	1 458	2 739	4 843	3 212	37.4	41.8	58.5	21.5	16.3	8.7	32.4	40.6	36.8	96.5	95.3	94.9
Hungary	733	839	1 377	71	763	2 588	55.9	53.9	52.9	24.6	24.3	35.5	63.1	40.9	72.9	8.7	82.4	91.9
Iceland	3 934	3 522	3 948	503	645	1 072	24.3	24.1	24.6	18.6	14.2	13.7	21.1	46.0	60.6	12.8	10.4	15.7
India	36	60	90	7	17	38	54.5	55.3	58.4	14.2	16.6	17.4	22.7	17.9	19.7	59.2	79.6	85.8
Indonesia	51	130	216	42	82	224	23.3	30.0	43.4	11.9	20.7	26.5	3.6	10.5	31.3	28.3	58.6	76.9
Ireland	2 269	3 409	8 761	1 746	5 575	17 926	41.2	56.5	72.2	23.3	25.3	27.7	43.5	52.2	59.1	76.3	82.4	89.4
Israel	2 320	2 576	3 344	1 270	2 355	4 681	44.1	52.7	56.1	22.6	21.1	22.7	36.2	41.9	52.8	84.4	88.2	90.0
Italy	3 732	4 371	4 951	1 265	2 805	3 970	56.3	56.9	49.4	23.9	22.5	22.1	45.9	50.5	53.4	94.9	94.1	95.0
Jamaica	287	348	264	85	122	162	22.2	21.5	19.0	18.4	19.4	14.5	11.2	7.7	11.2	18.5	26.1	32.9
Japan	4 315	6 559	6 865	1 274	2 264	3 595	60.6	66.5	68.1	24.7	26.5	25.0	78.9	83.9	85.5	98.0	97.5	95.5
Jordan	195	199	237	114	149	143	17.0	29.5	28.8	13.1	16.1	17.7	25.8	59.1	40.5	49.8	52.4	73.2
Kenya	33	37	34	37	22	19	28.9	24.9	22.4	9.6	10.1	10.3	6.2	27.7	15.3	52.7	51.3	37.7
Korea, Rep. of	658	1 699	3 434	519	1 455	3 591	40.8	55.1	64.1	22.8	28.8	35.1	38.9	52.9	70.6	93.4	96.2	98.3
Kuwait	1 163	998	2 961	1 754	221	3 464	16.2	6.4	7.5	6.3	11.6	20.0	57.1	54.6	12.5	3.9	6.9	54.6
Libya	284	459	709	19	538	295	16.3	15.6	16.0	2.8	7.9	12.6	9.9	5.7	9.4	5.3	16.7	25.5

Table A.15 Components of the CIP index for the core sample, 1980, 1990 and 2000 *(continued)*

Country	MVA per capita (dollars)			Manufactured exports per capita (dollars)			Share of medium- and high-tech activities in MVA (percent)			Share of MVA in GDP (percent)			Share of medium- and high-tech goods in manufactured exports (percent)			Share of manufactured goods in total exports (percent)		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Madagascar	42	28	25	6	6	7	13.5	11.2	12.8	13.1	10.9	10.9	6.9	9.8	6.0	17.5	25.4	49.3
Malawi	34	33	25	15	6	6	17.4	32.3	23.3	14.4	17.4	11.1	1.0	10.6	9.1	35.1	13.1	19.1
Malaysia	338	636	1 369	413	1 287	4 121	34.9	52.3	65.1	19.4	26.5	35.9	28.5	50.6	73.3	48.5	78.0	93.3
Mali	17	23	24	2	1	1	6.7	4.7	4.6	5.8	8.1	7.7	0.9	3.2	3.5	4.3	3.0	3.7
Martinique	347	710	459	344	421	–	11.7	12.1	12.4	5.2	7.2	4.5	19.5	27.0	28.5	60.7	54.9	54.3
Mauritius	210	495	784	319	1 129	1 252	20.1	13.4	13.7	13.8	19.8	20.5	3.1	6.2	4.6	97.5	97.8	97.6
Mexico	600	601	781	35	159	1 450	37.6	40.9	42.8	18.5	19.0	20.8	62.0	64.1	76.3	50.7	50.5	86.3
Morocco	161	193	207	49	113	183	29.6	28.7	24.1	17.6	18.4	19.2	9.1	25.9	23.9	41.0	65.8	73.8
Nepal	8	11	24	1	8	22	14.1	12.5	15.6	5.0	5.8	9.6	2.4	0.4	12.1	23.3	85.3	72.4
Netherlands	2 963	3 532	4 087	4 062	6 986	9 937	53.6	56.9	60.0	17.6	17.9	16.6	34.8	47.1	58.8	83.6	79.4	87.6
New Zealand	2 328	2 281	2 546	852	1 476	2 191	35.4	35.0	44.4	20.1	17.8	17.0	11.2	13.8	18.1	49.8	54.8	65.6
Nicaragua	85	49	44	17	21	30	15.5	13.1	15.4	19.5	16.9	14.6	7.0	9.6	12.1	8.9	24.3	25.0
Norway	3 404	3 172	3 560	2 415	3 930	4 679	55.2	55.4	58.0	15.3	11.7	9.9	38.0	44.3	36.1	54.9	48.9	34.9
Oman	36	192	271	211	260	757	12.9	10.0	14.1	0.8	2.9	3.7	79.6	48.7	54.1	5.1	8.4	17.7
Pakistan	37	56	63	26	45	63	26.6	31.9	35.1	14.1	15.5	15.3	4.3	8.1	9.1	76.6	88.8	98.2
Panama	240	209	232	17	57	98	17.0	19.8	19.8	10.1	9.5	8.1	9.0	17.2	10.9	30.5	40.5	36.3
Papua New Guinea	104	77	103	38	60	267	22.8	17.4	12.8	10.8	9.0	9.9	9.5	36.9	3.8	13.1	22.0	53.4
Paraguay	236	216	178	11	31	51	9.1	10.3	11.5	18.9	17.3	15.3	0.2	8.6	5.9	19.9	13.7	32.1
Peru	537	362	434	47	58	79	43.1	36.1	26.3	29.6	14.9	26.0	11.9	7.8	9.8	34.7	37.8	35.4
Philippines	210	180	188	69	70	482	32.7	31.2	38.3	26.9	24.8	24.2	8.9	30.0	81.8	58.0	52.7	96.2
Poland	1 015	743	1 397	260	225	734	49.4	47.9	38.7	22.5	22.5	21.0	63.7	49.5	46.4	69.8	63.0	89.7
Portugal	1 019	1 336	1 652	400	1 557	2 303	33.1	30.7	32.9	19.2	18.7	17.9	24.4	27.3	43.4	93.4	93.8	94.7
Reunion	651	863	862	189	284	–	11.7	12.1	12.4	9.5	10.0	9.0	4.4	11.2	17.4	89.3	92.6	88.7
Saudi Arabia	415	517	555	638	676	761	20.6	52.7	65.3	3.9	7.6	8.7	10.0	16.6	18.7	5.1	23.8	20.0
Senegal	82	102	112	71	65	39	13.5	18.8	34.9	10.9	13.1	13.3	14.9	12.8	21.3	69.8	61.0	59.4
Seychelles	359	532	929	–	149	8	1.4	4.2	4.8	8.6	10.1	15.6	23.0	–	0.1	0.5	75.7	47.2
Singapore	2 277	3 547	5 498	6 971	16 266	33 106	69.5	78.8	87.6	29.7	28.6	28.2	40.5	62.3	78.3	80.3	93.2	96.8
South Africa	729	661	591	139	288	384	51.1	46.4	51.0	21.5	21.5	19.4	32.8	28.8	47.2	19.4	25.7	63.8
Spain	2 502	2 891	3 194	447	1 233	2 469	45.3	49.4	50.4	24.4	22.1	19.3	41.5	54.8	60.8	82.5	87.2	87.0
Sri Lanka	41	63	123	25	57	177	14.1	11.6	19.1	11.1	13.4	17.4	2.3	5.9	6.7	36.2	51.0	78.0
Sweden	4 551	5 366	7 791	3 237	6 357	8 020	55.2	56.5	66.2	19.7	19.3	24.4	54.7	58.1	65.5	94.4	94.9	91.9
Switzerland	7 854	8 166	10 097	3 858	8 464	10 543	55.1	58.1	59.5	26.6	24.4	29.0	63.6	63.8	66.8	91.2	90.8	92.8
Syrian Arab Rep.	275	393	758	66	166	46	10.5	10.5	9.3	12.4	20.4	29.4	8.6	43.3	6.5	27.2	48.9	15.9
Taiwan, Prov. of China	1 450	2 571	3 971	1 207	3 149	6 564	42.9	52.2	58.6	34.5	32.7	29.6	35.2	51.6	71.2	94.9	95.8	98.3
Thailand	197	424	715	101	339	956	20.6	23.7	42.6	22.6	27.2	34.3	13.1	33.3	58.7	68.0	80.6	87.4
Togo	48	47	46	13	14	16	8.0	10.8	17.1	8.2	9.9	11.4	9.3	6.3	12.9	16.4	18.1	37.8
Trinidad and Tobago	450	360	599	1 968	1 053	2 819	11.7	12.1	12.4	7.6	8.6	11.5	7.4	14.8	14.1	56.6	61.5	85.4
Tunisia	242	255	374	164	330	523	31.1	13.4	22.0	11.8	16.9	18.1	25.0	24.0	24.0	42.1	76.9	84.5
Turkey	367	590	746	39	177	366	36.2	35.9	40.3	14.3	22.0	23.3	25.2	22.4	32.7		76.8	88.7
United Kingdom	3 282	3 542	3 696	1 336	2 655	3 976	57.4	60.0	64.3	24.4	20.6	17.9	62.5	67.3	72.2	73.7	82.4	85.5
United States	3 527	4 084	5 306	727	1 182	2 197	60.4	63.0	63.7	19.3	18.1	18.9	73.9	73.4	75.3	74.2	81.1	88.1
Uruguay	983	837	729	124	311	496	23.0	27.3	20.3	25.9	28.0	19.4	7.8	16.3	20.1	47.1	56.9	72.7
Venezuela	465	503	448	33	127	475	28.6	28.3	35.7	15.7	20.2	18.3	3.6	35.4	12.9	29.8	13.8	37.1
Yemen	66	84	81	5	–	1	10.5	10.5	9.3	8.8	9.6	8.6	11.6	5.7	20.4	–	9.9	2.0
Zimbabwe	181	176	130	67	55	58	37.1	34.9	43.5	22.7	20.5	16.0	49.0	49.2	34.3	37.8	38.6	38.4

Source: UNIDO Scoreboard database.

Table A.16 The CIP index and its components for the core sample

	MVA per capia			Manufactured exports per capita			Industrialization intensity			Export quality			CIP Index		
Economy	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
Algeria	0.029	0.032	0.018	0.013	0.009	0.013	0.272	0.337	0.255	0.079	0.195	0.295	0.098	0.143	0.145
Argentina	0.208	0.143	0.132	0.016	0.012	0.011	0.586	0.530	0.547	0.314	0.405	0.486	0.281	0.272	0.294
Australia	0.306	0.287	0.247	0.075	0.042	0.042	0.534	0.460	0.442	0.297	0.353	0.460	0.303	0.285	0.298
Austria	0.432	0.529	0.512	0.283	0.317	0.196	0.566	0.541	0.554	0.709	0.801	0.786	0.497	0.547	0.512
Bangladesh	0.004	0.004	0.005	0.001	0.001	0.001	0.356	0.317	0.326	0.442	0.448	0.480	0.201	0.192	0.203
Barbados	0.083	0.072	0.056	0.084	0.049	0.020	0.328	0.248	0.275	0.689	0.636	0.646	0.296	0.251	0.249
Belgium	0.404	0.506	0.485	0.644	0.591	0.462	0.585	0.571	0.569	0.644	0.734	0.753	0.569	0.601	0.567
Bolivia	0.021	0.015	0.014	0.020	0.005	0.003	0.266	0.239	0.264	0.399	0.287	0.442	0.176	0.136	0.181
Brazil	0.112	0.086	0.069	0.011	0.010	0.007	0.640	0.571	0.548	0.476	0.618	0.672	0.310	0.321	0.324
Cameroon	0.013	0.018	0.014	0.000	0.002	0.001	0.245	0.285	0.252	0.137	0.216	0.176	0.099	0.131	0.111
Canada	0.370	0.393	0.400	0.267	0.206	0.213	0.516	0.497	0.533	0.607	0.723	0.741	0.440	0.455	0.472
Central African Republic	0.005	0.006	0.004	0.002	0.000	0.001	0.206	0.198	0.166	0.163	0.095	0.000	0.094	0.075	0.043
Chile	0.050	0.053	0.057	0.004	0.009	0.012	0.532	0.470	0.410	0.197	0.212	0.286	0.196	0.186	0.191
China	0.007	0.014	0.035	0.000	0.003	0.006	0.707	0.686	0.749	0.254	0.590	0.727	0.242	0.323	0.379
Colombia	0.027	0.028	0.016	0.005	0.004	0.004	0.427	0.432	0.345	0.258	0.290	0.430	0.179	0.189	0.199
Costa Rica	0.050	0.044	0.052	0.018	0.010	0.030	0.371	0.361	0.437	0.312	0.334	0.753	0.188	0.187	0.318
Cyprus	0.107	0.142	0.100	0.100	0.037	0.012	0.302	0.264	0.239	0.471	0.444	0.569	0.245	0.222	0.230
Denmark	0.474	0.494	0.460	0.312	0.296	0.206	0.528	0.482	0.490	0.605	0.667	0.683	0.480	0.485	0.460
Dominica	0.009	0.017	0.015	0.016	0.015	0.013	0.141	0.141	0.136	0.694	0.598	0.638	0.215	0.193	0.200
Ecuador	0.032	0.025	0.020	0.010	0.002	0.003	0.424	0.339	0.316	0.156	0.101	0.210	0.155	0.117	0.137
Egypt Arab Rep.	0.012	0.018	0.022	0.002	0.002	0.002	0.402	0.399	0.480	0.116	0.382	0.449	0.133	0.200	0.238
El Salvador	0.032	0.028	0.031	0.009	0.002	0.004	0.394	0.430	0.454	0.308	0.411	0.497	0.186	0.218	0.247
Ethiopia and Eritrea	0.002	0.001	0.001	0.000	0.000	0.000	0.134	0.131	0.131	0.053	0.101	0.067	0.047	0.058	0.050
Fiji	0.024	0.024	0.022	0.046	0.028	0.013	0.209	0.201	0.219	0.496	0.493	0.404	0.194	0.187	0.164
Finland	0.542	0.676	0.888	0.392	0.316	0.254	0.521	0.518	0.653	0.623	0.735	0.802	0.519	0.561	0.649
France	0.488	0.492	0.469	0.235	0.199	0.138	0.607	0.546	0.526	0.721	0.797	0.839	0.513	0.509	0.493
French Guiana	0.140	0.066	0.051	0.016	0.017	0.000	0.255	0.133	0.137	0.239	0.315	0.678	0.162	0.133	0.216
Germany	0.743	0.810	0.635	0.293	0.287	0.179	0.802	0.754	0.693	0.795	0.881	0.866	0.658	0.683	0.593
Greece	0.162	0.151	0.129	0.047	0.036	0.024	0.428	0.381	0.351	0.468	0.479	0.547	0.276	0.262	0.263
Guatemala	0.022	0.016	0.013	0.008	0.003	0.003	0.408	0.378	0.362	0.300	0.375	0.420	0.184	0.193	0.200
Haiti	0.011	0.007	0.002	0.002	0.001	0.000	0.247	0.204	0.114	0.335	0.521	0.411	0.149	0.183	0.132
Honduras	0.012	0.011	0.010	0.004	0.001	0.002	0.242	0.261	0.259	0.107	0.133	0.306	0.091	0.102	0.144
Hong Kong, SAR	0.217	0.261	0.144	0.393	0.298	0.097	0.507	0.442	0.440	0.656	0.724	0.690	0.443	0.431	0.343
Hungary	0.093	0.103	0.136	0.010	0.047	0.078	0.675	0.606	0.736	0.364	0.661	0.886	0.285	0.354	0.459
Iceland	0.501	0.431	0.391	0.072	0.040	0.032	0.381	0.307	0.308	0.172	0.327	0.433	0.281	0.276	0.291
India	0.005	0.007	0.009	0.001	0.001	0.001	0.550	0.531	0.546	0.417	0.509	0.545	0.243	0.262	0.275
Indonesia	0.006	0.016	0.021	0.006	0.005	0.007	0.300	0.415	0.572	0.162	0.359	0.568	0.119	0.199	0.292
Ireland	0.289	0.417	0.868	0.250	0.343	0.541	0.555	0.633	0.751	0.609	0.728	0.793	0.426	0.530	0.738
Israel	0.295	0.315	0.331	0.182	0.145	0.141	0.568	0.563	0.598	0.614	0.696	0.760	0.415	0.430	0.458
Italy	0.475	0.535	0.490	0.182	0.172	0.120	0.670	0.605	0.552	0.716	0.777	0.788	0.511	0.522	0.488
Jamaica	0.037	0.043	0.026	0.012	0.008	0.005	0.364	0.347	0.286	0.151	0.178	0.230	0.141	0.144	0.137
Japan	0.549	0.803	0.680	0.183	0.139	0.109	0.710	0.709	0.694	0.899	0.994	0.978	0.585	0.661	0.615
Jordan	0.025	0.024	0.023	0.016	0.009	0.004	0.268	0.362	0.381	0.385	0.618	0.604	0.173	0.253	0.253
Kenya	0.004	0.005	0.003	0.005	0.001	0.001	0.314	0.268	0.254	0.300	0.425	0.278	0.156	0.175	0.134
Korea, Republic of	0.084	0.208	0.340	0.074	0.089	0.108	0.546	0.662	0.795	0.673	0.802	0.905	0.344	0.440	0.537
Kuwait	0.148	0.122	0.293	0.252	0.014	0.105	0.186	0.166	0.287	0.308	0.360	0.347	0.224	0.166	0.258
Libyan Arab Republic	0.036	0.056	0.070	0.003	0.033	0.009	0.148	0.185	0.245	0.077	0.119	0.255	0.066	0.098	0.145
Madagascar	0.005	0.003	0.002	0.001	0.000	0.000	0.242	0.189	0.206	0.124	0.187	0.282	0.093	0.095	0.123
Malawi	0.004	0.004	0.002	0.002	0.000	0.000	0.285	0.394	0.269	0.184	0.129	0.149	0.119	0.132	0.105
Malaysia	0.043	0.078	0.136	0.059	0.079	0.124	0.466	0.619	0.810	0.392	0.696	0.896	0.240	0.368	0.492
Mali	0.002	0.003	0.002	0.000	0.000	0.000	0.113	0.118	0.120	0.026	0.034	0.039	0.035	0.039	0.040
Martinique	0.044	0.087	0.045	0.049	0.026	0.000	0.142	0.155	0.126	0.409	0.439	0.439	0.161	0.177	0.152
Mauritius	0.027	0.061	0.078	0.046	0.069	0.038	0.298	0.300	0.329	0.513	0.532	0.515	0.221	0.240	0.240
Mexico	0.076	0.074	0.077	0.005	0.010	0.044	0.476	0.466	0.499	0.572	0.638	0.878	0.282	0.297	0.374
Morocco	0.020	0.024	0.021	0.007	0.007	0.006	0.408	0.382	0.372	0.256	0.488	0.509	0.173	0.225	0.227
Nepal	0.001	0.001	0.002	0.000	0.001	0.001	0.157	0.142	0.206	0.131	0.434	0.433	0.072	0.145	0.161
Netherlands	0.377	0.433	0.405	0.583	0.429	0.300	0.581	0.555	0.545	0.602	0.683	0.782	0.536	0.525	0.508
New Zealand	0.296	0.279	0.252	0.122	0.091	0.066	0.478	0.415	0.461	0.311	0.359	0.434	0.302	0.286	0.303
Nicaragua	0.011	0.006	0.004	0.002	0.001	0.001	0.328	0.266	0.266	0.081	0.180	0.196	0.105	0.114	0.117
Norway	0.433	0.388	0.353	0.346	0.242	0.141	0.567	0.478	0.452	0.472	0.512	0.386	0.455	0.405	0.333
Oman	0.005	0.024	0.027	0.030	0.016	0.023	0.102	0.095	0.126	0.428	0.333	0.405	0.141	0.117	0.145
Pakistan	0.005	0.007	0.006	0.004	0.003	0.002	0.348	0.371	0.387	0.413	0.498	0.545	0.192	0.219	0.235
Panama	0.031	0.026	0.023	0.002	0.004	0.003	0.234	0.229	0.212	0.201	0.308	0.245	0.117	0.141	0.121
Papua New Guinea	0.013	0.009	0.010	0.006	0.004	0.008	0.284	0.208	0.194	0.115	0.332	0.289	0.104	0.138	0.125
Paraguay	0.030	0.026	0.018	0.002	0.002	0.002	0.275	0.253	0.253	0.103	0.121	0.195	0.102	0.101	0.117
Peru	0.068	0.044	0.043	0.007	0.004	0.002	0.638	0.391	0.468	0.237	0.238	0.235	0.238	0.169	0.187
Philippines	0.027	0.022	0.019	0.010	0.004	0.015	0.533	0.467	0.514	0.341	0.446	0.960	0.228	0.235	0.377
Poland	0.129	0.091	0.138	0.037	0.014	0.022	0.605	0.548	0.478	0.678	0.614	0.720	0.362	0.317	0.340
Portugal	0.130	0.164	0.164	0.057	0.096	0.070	0.451	0.398	0.407	0.600	0.637	0.728	0.309	0.324	0.342
Reunion	0.083	0.106	0.085	0.027	0.017	0.000	0.189	0.185	0.181	0.478	0.535	0.546	0.194	0.211	0.203
Saudi Arabia	0.053	0.063	0.055	0.091	0.042	0.023	0.191	0.417	0.479	0.077	0.219	0.209	0.103	0.185	0.192

Table A.16 The CIP index and its components for the core sample *(continued)*

	MVA per capia			Manufactured exports per capita			Industrialization intensity			Export quality			CIP Index		
Economy	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
Senegal	0.010	0.012	0.011	0.010	0.004	0.001	0.218	0.261	0.362	0.431	0.385	0.422	0.167	0.166	0.199
Seychelles	0.046	0.065	0.092	0.000	0.009	0.000	0.105	0.136	0.218	0.119	0.383	0.237	0.067	0.148	0.137
Singapore	0.290	0.434	0.545	1.000	1.000	1.000	0.829	0.810	0.845	0.614	0.843	0.943	0.683	0.772	0.833
South Africa	0.093	0.081	0.059	0.020	0.018	0.012	0.606	0.528	0.528	0.265	0.302	0.596	0.246	0.232	0.299
Spain	0.319	0.354	0.316	0.064	0.076	0.075	0.596	0.553	0.524	0.631	0.767	0.791	0.402	0.438	0.426
Sri Lanka	0.005	0.008	0.012	0.004	0.003	0.005	0.224	0.219	0.322	0.196	0.293	0.430	0.107	0.131	0.192
Saint Lucia	0.014	0.025	0.018	0.026	0.021	0.003	0.151	0.151	0.133	0.338	0.254	0.303	0.132	0.113	0.114
Sweden	0.579	0.657	0.772	0.464	0.391	0.242	0.616	0.568	0.676	0.758	0.827	0.843	0.604	0.611	0.633
Switzerland	1.000	1.000	1.000	0.553	0.520	0.318	0.691	0.633	0.694	0.787	0.840	0.855	0.758	0.748	0.717
Syrian Arab Republic	0.035	0.048	0.075	0.009	0.010	0.001	0.213	0.288	0.412	0.182	0.506	0.118	0.110	0.213	0.152
Taiwan, Province of China	0.185	0.315	0.393	0.173	0.194	0.198	0.691	0.686	0.696	0.662	0.792	0.909	0.428	0.497	0.549
Thailand	0.025	0.052	0.071	0.015	0.021	0.029	0.399	0.445	0.662	0.413	0.606	0.781	0.213	0.281	0.386
Togo	0.006	0.006	0.005	0.002	0.001	0.000	0.148	0.176	0.237	0.131	0.129	0.264	0.072	0.078	0.127
Trinidad and Tobago	0.057	0.044	0.059	0.282	0.065	0.085	0.168	0.170	0.211	0.327	0.400	0.510	0.209	0.170	0.216
Tunisia	0.031	0.031	0.037	0.023	0.020	0.016	0.354	0.268	0.347	0.341	0.532	0.564	0.187	0.213	0.241
Turkey	0.047	0.072	0.074	0.006	0.011	0.011	0.419	0.466	0.515	0.753	0.522	0.635	0.306	0.268	0.309
United Kingdom	0.418	0.434	0.366	0.192	0.163	0.120	0.683	0.604	0.586	0.692	0.818	0.850	0.496	0.505	0.481
United States	0.449	0.500	0.526	0.104	0.073	0.066	0.649	0.596	0.595	0.752	0.848	0.882	0.489	0.504	0.517
Uruguay	0.125	0.102	0.072	0.018	0.019	0.015	0.453	0.477	0.353	0.280	0.385	0.481	0.219	0.246	0.230
Venezuela	0.059	0.062	0.044	0.005	0.008	0.014	0.380	0.399	0.427	0.170	0.280	0.261	0.154	0.187	0.187
Yemen	0.008	0.010	0.008	0.001	0.000	0.000	0.173	0.171	0.158	0.533	0.084	0.130	0.179	0.066	0.074
Zimbabwe	0.023	0.022	0.013	0.010	0.003	0.002	0.519	0.444	0.444	0.441	0.489	0.393	0.248	0.239	0.213

Source: UNIDO Scoreboard database.

Table A.17 CIP index ranks for the full sample in 1990

Rank	*Economy*	*CIP Index*	*Rank*	*Economy*	*CIP Index*	*Rank*	*Economy*	*CIP Index*
1	Singapore	0.772	37	Turkey	0.268	73	Trinidad and Tobago	0.170
2	Switzerland	0.748	38	India	0.262	74	Peru	0.169
3	Germany	0.683	39	Greece	0.262	75	Senegal	0.166
4	Japan	0.661	40	Jordan	0.253	76	Kuwait	0.166
5	Sweden	0.611	41	Barbados	0.251	77	Seychelles	0.148
6	Belgium-Luxembourg	0.601	42	Uruguay	0.246	78	Nepal	0.145
7	Finland	0.561	43	Mauritius	0.240	79	Jamaica	0.144
8	Austria	0.547	44	Zimbabwe	0.239	80	Algeria	0.143
9	Ireland	0.530	45	Philippines	0.235	81	Panama	0.141
10	Netherlands	0.525	46	South Africa	0.232	82	Papua New Guinea	0.138
11	Italy	0.522	47	Morocco	0.225	83	Bolivia	0.136
12	France	0.509	48	Qatar	0.224	84	French Guiana	0.133
13	United Kingdom	0.505	49	Cyprus	0.222	85	Malawi	0.132
14	United States	0.504	50	Pakistan	0.219	86	Sri Lanka	0.131
15	Taiwan, Prov. of China	0.497	51	El Salvador	0.218	87	Cameroon	0.131
16	Denmark	0.485	52	Tunisia	0.213	88	Ecuador	0.117
17	Canada	0.455	53	Syrian Arab Republic	0.213	89	Oman	0.117
18	Korea, Rep. of	0.440	54	Reunion	0.211	90	Bhutan	0.115
19	Malta	0.438	55	Bahrain	0.209	91	Nicaragua	0.114
20	Spain	0.438	56	Egypt, Arab Republic	0.200	92	St. Lucia	0.113
21	Hong Kong, SAR	0.431	57	Indonesia	0.199	93	Honduras	0.102
22	Israel	0.430	58	Guatemala	0.193	94	Paraguay	0.101
23	Norway	0.405	59	Dominica	0.193	95	Libya	0.098
24	Malaysia	0.368	60	Bangladesh	0.192	96	Vanuatu	0.096
25	Romania	0.367	61	Colombia	0.189	97	Madagascar	0.095
26	Hungary	0.354	62	Costa Rica	0.187	98	Nigeria	0.094
27	Portugal	0.324	63	Venezuela	0.187	99	Grenada	0.088
28	China	0.323	64	Fiji	0.187	100	Suriname	0.087
29	Brazil	0.321	65	Chile	0.186	101	Togo	0.078
30	Poland	0.317	66	Saudi Arabia	0.185	102	Samoa	0.077
31	Mexico	0.297	67	Haiti	0.183	103	Central African Republic	0.075
32	New Zealand	0.286	68	Martinique	0.177	104	Yemen	0.066
33	Australia	0.285	69	Kenya	0.175	105	Ethiopia (includes Eritrea)	0.058
34	Thailand	0.281	70	United Arab Emirates	0.173	106	Djibouti	0.051
35	Iceland	0.276	71	Guadeloupe	0.171	107	Mali	0.039
36	Argentina	0.272	72	Belize	0.170	108	Angola	0.027

Source: UNIDO Scoreboard database.

Table A.18 CIP Index ranks for the full sample in 1980

Rank	*Economy*	*CIP Index*	*Rank*	*Economy*	*CIP Index*	*Rank*	*Economy*	*CIP Index*
1	Switzerland	0.758	37	South Africa	0.246	73	Guadeloupe	0.148
2	Singapore	0.683	38	Cyprus	0.245	74	Liberia	0.142
3	Germany	0.658	39	India	0.243	75	Oman	0.141
4	Sweden	0.604	40	Malaysia	0.240	76	Jamaica	0.141
5	Japan	0.585	41	Peru	0.238	77	Egypt Arab Rep.	0.133
6	Belgium Luxembourg	0.569	42	Philippines	0.228	78	Saint Lucia	0.132
7	Netherlands	0.536	43	Kuwait	0.224	79	Burkina-Faso	0.130
8	Finland	0.519	44	Mauritius	0.221	80	Malawi	0.119
9	France	0.513	45	Uruguay	0.219	81	Indonesia	0.119
10	Italy	0.511	46	Dominica	0.215	82	Panama	0.117
11	Austria	0.497	47	Thailand	0.213	83	Gabon	0.115
12	United Kingdom	0.496	48	Trinidad and Tobago	0.209	84	Syrian Arab Republic	0.110
13	United States	0.489	49	China	0.206	85	Sri Lanka	0.107
14	Denmark	0.480	50	Bangladesh	0.201	86	Nicaragua	0.105
15	Norway	0.455	51	Chile	0.196	87	Papua New Guinea	0.104
16	Hong Kong, SAR	0.443	52	Reunion	0.194	88	Saudi Arabia	0.103
17	Canada	0.440	53	Fiji	0.194	89	Paraguay	0.102
18	Taiwan, Province of China	0.428	54	Pakistan	0.192	90	Cape Verde	0.100
19	Ireland	0.426	55	Guyana	0.188	91	Cameroon	0.099
20	Israel	0.415	56	Costa Rica	0.188	92	Algeria	0.098
21	Spain	0.402	57	Tunisia	0.187	93	Central African Republic	0.094
22	Poland	0.362	58	El Salvador	0.186	94	Madagascar	0.093
23	Korea, Rep. of	0.344	59	Guatemala	0.184	95	Honduras	0.091
24	Brazil	0.310	60	Colombia	0.179	96	Zambia	0.088
25	Portugal	0.309	61	Yemen	0.179	97	Nepal	0.072
26	Turkey	0.306	62	Bolivia	0.176	98	Togo	0.072
27	Australia	0.303	63	Jordan	0.173	99	Somalia	0.071
28	New Zealand	0.302	64	Morocco	0.173	100	Seychelles	0.067
29	New Caledonia	0.298	65	Senegal	0.167	101	Libyan Arab Republic	0.066
30	Barbados	0.296	66	French Guiana	0.162	102	Samoa	0.055
31	Hungary	0.285	67	Côte d'Ivore	0.161	103	Congo, Rep. of	0.052
32	Mexico	0.282	68	Martinique	0.161	104	Ethiopia and Eritrea	0.047
33	Iceland	0.281	69	Kenya	0.156	105	Niger	0.046
34	Argentina	0.281	70	Ecuador	0.155	106	Vanuatu	0.042
35	Greece	0.276	71	Venezuela	0.154	107	Mali	0.035
36	Zimbabwe	0.248	72	Haiti	0.149			

Source: UNIDO Scoreboard database.

Table A.19 Components of the CIP index for the full samples of 1980, 1990 and 2000

	MVA per capita (dollar)			*Manufactured exports per capita (dollar)*			*Share of medium- and high-tech activities in MVA (percent)*			*Share of MVA in GDP (percent)*			*Share of medium- and high-tech goods in manufactured exports (percent)*			*Share of manufactured goods in total exports (percent)*		
Country	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
Albania	248	243	84	–	–	74.7	..	..	27.4	34.5	36.9	10.7	..	–	6.6	–	–	89.6
Algeria	226	260	182	87.8	141.4	418.8	24.0	35.3	28.7	9.0	10.4	7.5	3.1	5.6	1.1	12.4	31.9	57.6
Angola	94	54	..	26.7	6.2	..	5.1	6.2	..	8.5	5.0	..	..	–	..	10.1	1.5	..
Antigua and Barbuda	129	203	201	69.0	–	44.4	11.7	12.1	12.4	3.6	3.3	2.4	–	–	1.0	–	–	85.0
Argentina	1 634	1 164	1 335	113.8	198.3	370.1	36.7	37.7	46.3	29.0	26.8	23.1	26.8	23.6	38.5	35.0	52.2	52.1
Armenia	591	654	275	–	–	31.8	52.7	45.3	47.9	35.0	30.3	24.4	–	–	36.0	–	–	61.8
Australia	2 402	2 344	2 497	519.5	687.5	1 389.7	50.6	50.6	49.5	15.3	12.8	13.1	23.3	31.3	41.3	35.1	32.8	43.7
Austria	3 390	4 320	5 174	1 972.4	5 158.0	6 477.4	48.0	50.0	52.9	19.9	20.6	20.6	45.3	53.6	57.3	94.0	95.2	90.1
Azerbaijan	226	230	18	–	–	75.8	..	28.3	35.7	18.6	17.0	6.8	–	–	15.2	–	–	34.9
Bahrain	951	1 367	2 143	538.9	714.2	7 141.2	12.9	10.0	14.1	8.2	16.7	22.1	–	13.0	3.8	–	59.7	74.8
Bangladesh	34	34	52	6.6	12.1	34.1	25.0	28.3	24.0	15.9	12.7	15.5	1.4	2.4	2.8	85.2	85.6	92.7
Barbados	650	584	564	585.2	791.3	656.0	29.2	24.2	32.2	10.6	8.7	7.5	36.6	25.8	31.5	98.7	95.3	92.1
Belarus	726	1 298	1 292	–	–	676.7	..	45.3	47.9	30.9	38.2	30.8	–	–	43.7	–	–	94.0
Belgium	3 171	4 135	4 892	4 486.3	9 616.4	15 300.6	51.4	54.2	55.5	19.4	20.9	20.6	43.7	51.6	56.0	83.0	84.3	85.0
Belize	299	285	361	193.0	491.6	533.5	3.2	4.5	8.7	17.2	13.4	13.3	–	–	0.3	–	87.5	65.0
Benin	37	31	39	2.5	3.1	3.2	8.0	10.8	17.1	9.4	7.8	8.3	–	11.8	19.2	–	–	11.1
Bhutan	4	14	..	1.2	18.5	..	14.1	12.5	..	3.9	8.1	..	–	1.6	..	–	55.1	..
Bolivia	165	126	139	139.3	79.1	91.2	8.6	8.6	11.2	18.4	17.0	16.4	2.3	0.3	28.1	75.9	56.3	55.5
Botswana	85	149	183	–	–	277.1	6.0	11.0	9.4	5.4	4.9	4.7	–	–	9.3	–	–	8.4
Brazil	880	703	694	74.9	159.3	247.4	47.3	51.6	54.1	27.0	22.5	19.6	30.7	40.0	49.2	62.8	75.1	76.8
Bulgaria	640	929	697	–	–	453.6	38.2	41.9	45.8	30.6	39.1	17.4	–	–	30.9	–	–	74.8
Burkina Faso	54	47	66	1.6	–	4.0	6.7	4.7	4.6	15.9	15.3	12.2	41.6	14.0	27.9	15.2	–	25.3
Burundi	19	24	14	1.7	1.0	0.4	4.6	2.8	2.5	10.8	11.8	9.1	–	12.9	5.2	–	–	5.9
Cameroon	106	150	146	2.4	40.3	39.2	18.0	20.7	20.8	10.4	14.2	10.9	5.6	17.1	2.9	21.2	22.5	31.9
Canada	2 906	3 210	4 040	1 857.9	3 347.6	7 041.9	46.4	51.9	57.9	16.4	15.5	16.6	52.7	58.3	59.4	66.7	74.2	78.6
Cape Verde	44	81	94	0.9	–	22.6	21.9	29.1	27.6	6.7	8.2	6.8	5.7	8.7	0.2	26.3	–	98.8
Central African Rep.	39	52	42	14.6	7.3	19.5	18.5	13.5	10.1	6.6	10.4	8.9	0.4	2.8	21.7	31.6	15.5	–
Chile	393	429	578	26.5	152.2	398.0	41.7	42.5	39.0	20.9	18.5	15.3	12.8	15.2	20.0	26.0	24.0	33.8
China	55	113	350	–	41.6	183.0	47.4	51.6	57.3	33.0	33.1	34.5	18.5	34.4	45.6	32.1	76.0	92.0
Colombia	211	229	165	32.8	64.1	132.1	27.3	34.1	32.2	20.8	19.9	13.2	19.2	20.6	37.2	31.6	33.1	42.4
Comoros	17	20	12	6.9	–	0.3	5.1	6.2	4.3	3.5	4.2	3.5	–	–	13.9	–	–	2.6
Congo, Rep. of	66	105	..	34.6	29.3	..	11.1	9.3	..	6.3	8.3	..	3.3	5.5	..	5.3	–	..
Costa Rica	390	363	522	127.0	161.5	1 005.5	21.0	23.7	29.0	19.8	19.4	22.2	33.6	27.2	65.5	27.9	33.8	73.8
Côte d'Ivoire	228	179	183	147.5	–	131.7	12.6	4.7	11.5	19.2	20.9	20.9	7.9	–	8.1	49.2	–	58.7
Croatia	–	–	816	–	902.2	895.1	38.5	40.5	44.2	–	27.7	17.5	–	–	41.9	–	–	94.0
Cuba	287	437	428	26.7	–	77.8	6.0	5.1	4.8	20.3	23.6	28.0	–	–	8.8	–	–	52.0
Cyprus	837	1 160	1 009	695.9	606.5	385.0	16.0	17.4	21.8	16.9	14.2	9.4	16.3	13.2	30.7	76.1	72.1	77.8
Czech Republic	874	834	912	..	1 473.1	2 668.5	55.4	59.0	56.9	33.4	24.6	26.9	65.2	–	56.2	95.1	–	94.4
Denmark	3 723	4 038	4 647	2 175.8	4 819.4	6 823.6	47.7	49.3	54.4	16.7	15.6	14.7	47.9	51.5	53.6	71.0	71.2	73.8
Djibouti	55	39	..	9.1	4.1	..	8.1	8.2	..	4.9	4.6	..	–	9.3	..	–	8.3	..
Dominica	68	138	147	110.3	244.1	431.8	11.7	12.1	12.4	5.1	5.9	5.3	93.2	72.4	59.3	43.6	32.9	58.1
Ecuador	248	202	201	71.4	39.2	95.0	23.9	20.3	12.7	22.7	19.4	19.9	4.4	4.4	14.6	26.2	14.8	24.9
Egypt, Arab Republic	98	145	221	15.3	29.1	53.0	32.4	34.0	40.9	15.2	16.9	20.2	2.1	10.2	10.4	20.7	63.3	77.5
El Salvador	250	226	308	64.1	38.4	148.9	21.6	30.6	29.9	21.5	21.7	23.2	30.0	28.2	25.3	30.6	48.0	69.7
Estonia	1 574	1 667	1 248	–	–	2 428.7	..	46.3	38.9	35.4	35.4	27.7	–	–	47.2	–	–	88.3
Ethiopia (incl. Eritrea)	13	12	12	1.0	1.0	–	8.1	8.2	9.6	6.8	7.3	6.2	0.2	2.5	0.8	10.2	17.0	12.4
Fiji	189	200	225	318.7	450.6	419.8	12.4	13.8	12.8	10.8	10.5	11.9	1.2	5.9	2.0	96.0	90.5	78.3

Table A.19 Components of the CIP index for the full samples of 1980, 1990 and 2000 *(continued)*

Country	MVA per capita (dollar)			Manufactured exports per capita (dollar)			Share of medium- and high-tech activities in MVA (percent)			Share of MVA in GDP (percent)			Share of medium- and high-tech goods in manufactured exports (percent)			Share of manufactured goods in total exports (percent)		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Finland	4 254	5 522	8 962	2 731.7	5 135.8	8 392.4	41.3	47.3	55.9	20.2	20.1	27.3	29.2	42.0	55.2	93.2	95.8	95.6
France	3 834	4 021	4 732	1 636.2	3 239.6	4 578.5	51.0	53.9	50.8	21.7	18.8	19.3	54.7	59.2	66.6	87.1	87.7	89.8
French Guiana	1 101	539	519	108.2	271.4	–	11.7	12.1	12.4	15.4	5.2	5.4	25.6	21.4	71.4	21.5	37.1	52.0
French Polynesia	601	851	1 077	86.1	208.8	215.6	11.7	12.1	12.4	5.5	5.7	6.2	137.6	–	13.1	45.1	54.5	20.6
Gabon	413	356	324	421.6	–	344.0	17.7	23.1	34.3	5.7	5.6	5.3	13.2	16.4	3.2	17.2	–	16.3
Gambia	14	19	15	2.9	–	3.0	5.1	6.2	10.1	3.9	5.5	4.5	–	–	41.9	–	–	23.8
Georgia	361	428	143	–	–	37.7	..	43.5	27.4	21.7	19.2	17.6	–	–	45.7	–	–	60.2
Germany	5 835	6 618	6 414	2 042.1	4 665.1	5 932.0	60.8	66.5	63.2	32.9	30.6	27.2	65.1	68.7	72.0	91.2	93.2	88.9
Ghana	48	38	42	0.6	15.2	27.7	21.9	26.0	27.2	11.1	9.8	9.0	–	10.1	5.7	–	–	50.5
Greece	1 275	1 233	1 302	327.0	592.7	804.7	35.3	34.5	33.5	15.7	14.9	13.1	17.7	16.9	26.8	74.2	74.7	77.9
Grenada	46	127	239	75.3	56.0	532.2	11.7	12.1	12.4	3.2	5.2	7.2	–	13.2	28.4	–	23.9	70.8
Guadeloupe	443	422	..	161.4	195.6	..	11.7	12.1	..	6.8	5.9	..	11.6	26.8	..	57.2	62.9	..
Guatemala	171	132	133	52.3	55.2	112.4	31.2	33.9	35.1	16.6	15.0	13.2	34.4	27.6	31.3	24.7	41.5	47.4
Guinea	17	21	20	–	–	9.2	22.2	21.5	19.0	3.3	4.5	3.9	–	2.2	6.4	–	–	17.7
Guyana	120	49	..	299.2	23.3	..	22.2	21.5	..	16.2	9.1	..	3.7	–	..	65.7	–	..
Haiti	88	57	21	15.5	21.2	5.8	6.0	5.1	4.8	18.4	15.8	7.1	10.0	14.5	4.1	55.8	85.8	77.3
Honduras	93	91	100	24.8	20.5	54.0	12.4	16.4	12.6	13.8	14.5	15.3	5.9	7.0	24.7	15.0	18.0	32.4
Hong Kong, Province of China	1 702	2 131	1 458	2 739.4	4 842.9	3 211.6	37.4	41.8	58.5	21.5	16.3	8.7	32.4	40.6	36.8	96.5	95.3	94.9
Hungary	733	839	1 377	70.8	762.6	2 587.7	55.9	53.9	52.9	24.6	24.3	35.5	63.1	40.9	72.9	8.7	82.4	91.9
Iceland	3 934	3 522	3 948	502.6	644.6	1 072.4	24.3	24.1	24.6	18.6	14.2	13.7	21.1	46.0	60.6	12.8	10.4	15.7
India	36	60	90	6.8	16.8	38.5	54.5	55.3	58.4	14.2	16.6	17.4	22.7	17.9	19.7	59.2	79.6	85.8
Indonesia	51	130	216	41.9	82.0	224.0	23.3	30.0	43.4	11.9	20.7	26.5	3.6	10.5	31.3	28.3	58.6	76.9
Iran	168	192	262	11.9	–	36.9	28.5	25.7	9.3	8.1	12.0	13.3	–	–	21.0	–	–	9.3
Ireland	2 269	3 409	8 761	1 745.8	5 575.1	17 926.3	41.2	56.5	72.2	23.3	25.3	27.7	43.5	52.2	59.1	76.3	82.4	89.4
Israel	2 320	2 576	3 344	1 270.1	2 354.7	4 680.6	44.1	52.7	56.1	22.6	21.1	22.7	36.2	41.9	52.8	84.4	88.2	90.0
Italy	3 732	4 371	4 951	1 265.3	2 804.6	3 969.8	56.3	56.9	49.4	23.9	22.5	22.1	45.9	50.5	53.4	94.9	94.1	95.0
Jamaica	287	348	264	84.5	122.2	161.9	22.2	21.5	19.0	18.4	19.4	14.5	11.2	7.7	11.2	18.5	26.1	32.9
Japan	4 315	6 559	6 865	1 274.0	2 263.9	3 595.2	60.6	66.5	68.1	24.7	26.5	25.0	78.9	83.9	85.5	98.0	97.5	95.5
Jordan	195	199	237	114.1	148.5	142.9	17.0	29.5	28.8	13.1	16.1	17.7	25.8	59.1	40.5	49.8	52.4	73.2
Kazakhstan	383	481	324	–	–	119.3	9.6	43.5	27.4	26.3	20.3	20.3	–	–	44.4	–	–	21.6
Kenya	33	37	34	36.9	22.2	19.2	28.9	24.9	22.4	9.6	10.1	10.3	6.2	27.7	15.3	52.7	51.3	37.7
Korea, Rep. of	658	1 699	3 434	519.2	1 455.4	3 591.1	40.8	55.1	64.1	22.8	28.8	35.1	38.9	52.9	70.6	93.4	96.2	98.3
Kuwait	1 163	998	2 961	1 753.7	221.0	3 463.6	16.2	6.4	7.5	6.3	11.6	20.0	57.1	54.6	12.5	3.9	6.9	54.6
Kyrgyzstan	119	156	35	–	–	22.3	9.6	4.7	5.8	25.0	23.2	8.7	–	–	45.0	–	–	24.1
Latvia	1 071	1 530	690	–	–	691.0	49.7	46.3	38.9	29.7	33.2	21.5	–	–	15.0	–	–	89.5
Lebanon	312	160	156	200.3	–	149.4	10.5	10.5	9.3	15.2	13.1	8.1	–	–	27.7	–	–	78.4
Lesotho	15	38	59	–	–	129.8	31.6	42.2	50.3	4.8	10.1	12.8	..	–	12.0	–	–	94.5
Liberia	46	42	..	199.1	2.9	..	12.6	4.7	..	6.5	6.9	..	1.6	–	..	71.3	–	..
Libyan Arab Jamahiriya	284	459	709	19.0	538.4	295.5	16.3	15.6	16.0	2.8	7.9	12.6	9.9	5.7	9.4	5.3	16.7	25.5
Lithuania	722	997	400	–	–	938.9	..	46.3	38.9	30.0	20.9	17.8	–	–	30.5	–	–	91.1
Luxembourg	4 317	5 860	6 307	–	–	15 929.9	51.4	54.2	55.5	21.8	20.1	14.0	–	–	40.2	–	–	93.5
Macao	..	..	1 128	2 621.1	4 524.5	4 865.6	17.5	7.1	10.5	..	..	8.0	7.7	5.0	4.1	97.3	98.8	99.9
Macedonia	..	–	434	..	..	546.5	31.8	35.7	35.8	..	..	21.7	–	–	22.8	–	–	84.0
Madagascar	42	28	25	6.3	6.2	7.2	13.5	11.2	12.8	13.1	10.9	10.9	6.9	9.8	6.0	17.5	25.4	49.3
Malawi	34	33	25	14.8	5.6	6.2	17.4	32.3	23.3	14.4	17.4	11.1	1.0	10.6	9.1	35.1	13.1	19.1

Table A.19 Components of the CIP index for the full samples of 1980, 1990 and 2000 *(continued)*

Country	MVA per capita (dollar)			Manufactured exports per capita (dollar)			Share of medium- and high-tech activities in MVA (percent)			Share of MVA in GDP (percent)			Share of medium- and high-tech goods in manufactured exports (percent)			Share of manufactured goods in total exports (percent)		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Malaysia	338	636	1 369	413.3	1 286.5	4 120.5	34.9	52.3	65.1	19.4	26.5	35.9	28.5	50.6	73.3	48.5	78.0	93.3
Maldives	13	37	51	4.4	–	158.2	12.4	13.8	12.8	4.2	5.4	5.0	..	–	–	–	–	60.4
Mali	17	23	24	1.7	1.1	1.0	6.7	4.7	4.6	5.8	8.1	7.7	0.9	3.2	3.5	4.3	3.0	3.7
Malta	1 620	1 736	2 549	1 289.4	2 722.1	5 552.8	25.9	35.1	49.2	33.3	27.0	26.8	–	63.3	81.1	–	94.8	97.5
Martinique	347	710	459	343.6	421.2	–	11.7	12.1	12.4	5.2	7.2	4.5	19.5	27.0	28.5	60.7	54.9	54.3
Mauritius	210	495	784	319.2	1 129.5	1 251.9	20.1	13.4	13.7	13.8	19.8	20.5	3.1	6.2	4.6	97.5	97.8	97.6
Mexico	600	601	781	34.9	159.4	1 450.4	37.6	40.9	42.8	18.5	19.0	20.8	62.0	64.1	76.3	50.7	50.5	86.3
Moldova	399	627	135	..	..	75.8	..	43.5	27.4	26.5	27.2	16.7	–	–	10.4	–	–	71.3
Mongolia	174	245	201	–	–	48.0	9.6	4.7	5.8	26.6	29.0	5.4	–	–	4.4	–	–	26.4
Morocco	161	193	207	49.1	113.1	183.4	29.6	28.7	24.1	17.6	18.4	19.2	9.1	25.9	23.9	41.0	65.8	73.8
Namibia	201	211	220	–	–	172.9	22.2	21.5	9.4	8.8	11.5	9.9	–	–	19.0	–	–	23.4
Nepal	8	11	24	1.2	8.5	22.3	14.1	12.5	15.6	5.0	5.8	9.6	2.4	0.4	12.1	23.3	85.3	72.4
Netherlands	2 963	3 532	4 087	4 062.4	6 986.1	9 937.0	53.6	56.9	60.0	17.6	17.9	16.6	34.8	47.1	58.8	83.6	79.4	87.6
New Caledonia	687	657	718	1 267.4	1 571.5	1 818.9	12.4	13.8	12.8	5.8	4.4	4.3	98.9	–	3.2	52.9	–	61.5
New Zealand	2 328	2 281	2 546	851.9	1 475.7	2 191.5	35.4	35.0	44.4	20.1	17.8	17.0	11.2	13.8	18.1	49.8	54.8	65.6
Nicaragua	85	49	44	17.3	20.7	29.9	15.5	13.1	15.4	19.5	16.9	14.6	7.0	9.6	12.1	8.9	24.3	25.0
Niger	13	21	19	5.1	–	0.4	6.7	4.7	4.6	2.7	6.6	6.7	13.8	–	46.8	6.3	–	3.3
Nigeria	23	21	18	0.4	1.0	0.6	45.4	25.5	36.7	5.2	5.5	5.0	–	24.5	58.1	–	1.2	0.2
Norway	3 404	3 172	3 560	2 414.9	3 930.2	4 679.4	55.2	55.4	58.0	15.3	11.7	9.9	38.0	44.3	36.1	54.9	48.9	34.9
Oman	36	192	271	211.1	259.9	756.9	12.9	10.0	14.1	0.8	2.9	3.7	79.6	48.7	54.1	5.1	8.4	17.7
Pakistan	37	56	63	25.8	44.7	63.5	26.6	31.9	35.1	14.1	15.5	15.3	4.3	8.1	9.1	76.6	88.8	98.2
Panama	240	209	232	16.5	57.0	98.1	17.0	19.8	19.8	10.1	9.5	8.1	9.0	17.2	10.9	30.5	40.5	36.3
Papua New Guinea	104	77	103	38.3	60.2	267.3	22.8	17.4	12.8	10.8	9.0	9.9	9.5	36.9	3.8	13.1	22.0	53.4
Paraguay	236	216	178	10.6	31.2	50.9	9.1	10.3	11.5	18.9	17.3	15.3	0.2	8.6	5.9	19.9	13.7	32.1
Peru	537	362	434	46.7	58.1	78.9	43.1	36.1	26.3	29.6	14.9	26.0	11.9	7.8	9.8	34.7	37.8	35.4
Philippines	210	180	188	68.9	69.8	482.4	32.7	31.2	38.3	26.9	24.8	24.2	8.9	30.0	81.8	58.0	52.7	96.2
Poland	1 015	743	1 397	260.1	225.4	734.2	49.4	47.9	38.7	22.5	22.5	21.0	63.7	49.5	46.4	69.8	63.0	89.7
Portugal	1 019	1 336	1 652	399.8	1 556.7	2 303.2	33.1	30.7	32.9	19.2	18.7	17.9	24.4	27.3	43.4	93.4	93.8	94.7
Qatar	2 015	2 093	2 662	1 276.3	1 628.9	5 372.0	12.9	10.0	14.1	7.7	12.9	14.7	–	38.7	12.1	–	20.9	43.0
Reunion	651	863	862	188.6	284.4	–	11.7	12.1	12.4	9.5	10.0	9.0	4.4	11.2	17.4	89.3	92.6	88.7
Romania	660	605	440	–	235.8	418.1	..	43.5	27.4	36.8	36.7	27.0	–	39.4	30.5	–	93.2	90.5
Russian Federation	1 032	1 141	610	–	–	379.3	44.3	46.3	61.0	26.5	27.8	22.2	–	–	26.7	–	–	53.6
Rwanda	72	70	73	0.1	–	0.2	5.1	6.2	4.3	17.6	18.3	11.5	–	–	20.0	–	–	2.2
St. Lucia	107	206	180	184.2	341.3	110.4	11.7	12.1	12.4	6.0	6.8	5.1	9.1	11.1	16.2	57.1	37.2	41.5
St. Vincent and Grenadines	105	135	129	19.0	–	169.9	11.7	12.1	12.4	9.9	7.4	5.5	–	–	4.2	–	–	44.2
Samoa	21	19	..	9.4	17.1	..	12.4	13.8	..	2.2	2.0	..	5.8	4.1	..	14.1	34.2	..
Saudi Arabia	415	517	555	637.6	675.6	760.7	20.6	52.7	65.3	3.9	7.6	8.7	10.0	16.6	18.7	5.1	23.8	20.0
Senegal	82	102	112	70.6	65.1	38.7	13.5	18.8	34.9	10.9	13.1	13.3	14.9	12.8	21.3	69.8	61.0	59.4
Seychelles	359	532	929	0.3	149.5	7.8	1.4	4.2	4.8	8.6	10.1	15.6	23.0	–	0.1	0.5	75.7	47.2
Singapore	2 277	3 547	5 498	6 970.9	16 266.1	33 105.8	69.5	78.8	87.6	29.7	28.6	28.2	40.5	62.3	78.3	80.3	93.2	96.8
Slovakia	–	1 147	726	–	–	2 068.5	52.9	53.8	56.3	–	38.9	22.8	–	–	53.4	–	–	94.0
Slovenia	–	–	2 705	–	3 104.2	4 170.7	42.6	45.3	53.1	–	–	25.8	–	–	53.0	–	–	95.0
Somalia	7	7	..	0.1	0.1	..	14.4	11.3	..	5.1	4.6	..	24.1	–	..	0.6	–	..
South Africa	729	661	591	139.2	287.7	383.7	51.1	46.4	51.0	21.5	21.5	19.4	32.8	28.8	47.2	19.4	25.7	63.8
Spain	2 502	2 891	3 194	446.7	1 233.2	2 468.8	45.3	49.4	50.4	24.4	22.1	19.3	41.5	54.8	60.8	82.5	87.2	87.0
Sri Lanka	41	63	123	24.9	56.6	177.5	14.1	11.6	19.1	11.1	13.4	17.4	2.3	5.9	6.7	36.2	51.0	78.0

Table A.19 Components of the CIP index for the full samples of 1980, 1990 and 2000 *(continued)*

Country	MVA per capita (dollar)			Manufactured exports per capita (dollar)			Share of medium- and high-tech activities in MVA (percent)			Share of MVA in GDP (percent)			Share of medium- and high-tech goods in manufactured exports (percent)			Share of manufactured goods in total exports (percent)		
	1980	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
Sudan	110	85	108	0.3	0.2	46.5	16.3	13.8	19.4	9.9	8.6	6.6	–	0.1	–	–	–	79.3
Suriname	800	518	395	22.4	31.9	40.7	22.2	21.5	19.0	17.0	12.0	7.7	–	0.1	22.7	–	2.7	4.0
Swaziland	136	319	355	–	–	718.0	1.0	0.4	1.4	16.6	29.2	28.3	–	–	17.0	–	–	74.6
Sweden	4 551	5 366	7 791	3 237.3	6 357.4	8 019.7	55.2	56.5	66.2	19.7	19.3	24.4	54.7	58.1	65.5	94.4	94.9	91.9
Switzerland	7 854	8 166	10 097	3 857.5	8 463.5	10 542.8	55.1	58.1	59.5	26.6	24.4	29.0	63.6	63.8	66.8	91.2	90.8	92.8
Syrian Arab Republic	275	393	758	65.8	166.2	45.6	10.5	10.5	9.3	12.4	20.4	29.4	8.6	43.3	6.5	27.2	48.9	15.9
Taiwan, Province of China	1 450	2 571	3 971	1 207.0	3 148.7	6 563.7	42.9	52.2	58.6	34.5	32.7	29.6	35.2	51.6	71.2	94.9	95.8	98.3
Tajikistan	130	130	39	–	–	15.4	9.6	4.7	5.8	16.0	14.8	13.3	–	–	68.0	–	–	14.0
Thailand	197	424	715	101.2	338.6	956.4	20.6	23.7	42.6	22.6	27.2	34.3	13.1	33.3	58.7	68.0	80.6	87.4
Togo	48	47	46	13.5	14.1	16.0	8.0	10.8	17.1	8.2	9.9	11.4	9.3	6.3	12.9	16.4	18.1	37.8
Tonga	27	61	81	5.6	24.5	4.0	12.4	13.8	12.8	2.5	5.1	5.1	..	–	0.2	–	–	4.6
Trinidad and Tobago	450	360	599	1 968.3	1 053.2	2 819.2	11.7	12.1	12.4	7.6	8.6	11.5	7.4	14.8	14.1	56.6	61.5	85.4
Tunisia	242	255	374	163.6	329.7	522.8	31.1	13.4	22.0	11.8	16.9	18.1	25.0	24.0	24.0	42.1	76.9	84.5
Turkey	367	590	746	39.2	177.4	365.7	36.2	35.9	40.3	14.3	22.0	23.3	25.2	22.4	32.7	–	76.8	88.7
Turkmenistan	190	172	106	–	–	411.4	..	28.3	35.7	13.0	9.9	10.4	–	–	1.0	–	–	77.8
Uganda	9	10	23	0.2	–	1.8	8.5	18.4	20.5	5.2	5.3	9.0	–	44.6	34.6	–	–	11.7
Ukraine	750	1 040	410	–	–	237.9	..	45.3	47.9	30.8	34.7	30.2	–	–	49.0	–	–	80.9
UAE	1 168	1 250	..	6 667.4	245.6	..	12.9	10.0	..	3.6	7.5	..	–	17.4	..	–	54.5	..
United Kingdom	3 282	3 542	3 696	1 336.3	2 655.5	3 975.7	57.4	60.0	64.3	24.4	20.6	17.9	62.5	67.3	72.2	73.7	82.4	85.5
Tanzania	21	14	13	3.3	2.4	3.1	21.2	25.0	29.6	12.2	8.5	8.2	–	–	8.8	–	–	20.4
United States	3 527	4 084	5 306	727.0	1 181.8	2 197.1	60.4	63.0	63.7	19.3	18.1	18.9	73.9	73.4	75.3	74.2	81.1	88.1
Uruguay	983	837	729	123.8	310.9	496.2	23.0	27.3	20.3	25.9	28.0	19.4	7.8	16.3	20.1	47.1	56.9	72.7
Vanuatu	19	54	..	2.9	18.4	..	12.4	13.8	..	2.4	5.3	..	8.0	21.6	..	2.1	19.9	..
Venezuela	465	503	448	33.1	127.4	474.6	28.6	28.3	35.7	15.7	20.2	18.3	3.6	35.4	12.9	29.8	13.8	37.1
Yemen	66	84	81	5.4	0.2	1.4	10.5	10.5	9.3	8.8	9.6	8.6	11.6	5.7	20.4	–	9.9	2.0
Zambia	52	58	56	1.6	–	20.4	22.7	23.1	23.7	9.0	12.4	14.7	1.2	16.1	12.5	15.2	–	32.1
Zimbabwe	181	176	130	66.7	55.3	58.4	37.1	34.9	43.5	22.7	20.5	16.0	49.0	49.2	34.3	37.8	38.6	38.4

Source: UNIDO Scoreboard database.

Table A.20 Regression results for MVA per capita

	2000	*1990*
No. of observations	51	35
Independent variables	Adj. R^2 = 0.8972	Adj. R^2 = 0.840
Skills	99.515*	27.090
FDI	–0.015	–8.461*
R&D	7.587**	15.288**
Royalties	3.364**	31.730**
Infrastructure	2.948**	4.991**
Constant	–160.527	499.521

Source: UNIDO Scoreboard database.
Note: * Significant within 10% significance level.
** Significant within 5% significance level.

Table A.21 Regression results for MVA as percentage of GDP

	2000	*1990*
No. of observations	51	35
Independent variables	Adj. R^2 = 0.0556	Adj. R^2 = 0.455
Skills	0.163	0.522**
FDI	0.0001	–0.016
R&D	0.014**	0.051**
Royalties	0.005	0.099*
Infrastructure	–0.017**	–0.028**
Constant	24.434	23.127

Source: UNIDO Scoreboard database.
Note: * Significant within 10% significance level.
** Significant within 5% significance level.

Table A.22 Regression results for manufactured exports per capita

	2000	*1990*
No. of observations	51	35
Independent variables	Adj. R^2 = 0.8524	Adj. R^2 = 0.8206
Skills	107.408	–42.459
FDI	9.597**	–21.738**
R&D	4.553**	0.409
Royalties	7.842**	142.444**
Infrastructure	–1.160	4.455**
Constant	–162.838	602.130

Source: UNIDO Scoreboard database.
Note: * Significant within 10% significance level.
** Significant within 5% significance level.

Table A.23 Regression results for MHT share of MVA

	2000	*1990*
No. of observations	51	35
Independent variables	Adj. R^2 = 0.4505	Adj. R^2 = 0.5013
Skills	–0.205	0.696
FDI	0.008	–0.004
R&D	0.018*	0.080**
Royalties	0.015	0.167
Infrastructure	0.020	0.003
Constant	37.340	38.704

Source: UNIDO Scoreboard database.
Note: * Significant within 10% significance level.
** Significant within 5% significance level.

Table A.24 Regression results for MHT share of manufactured exports

	2000	*1990*
No. of observations	51	35
Independent variables	Adj. R^2 = 0.1932	Adj. R^2 = 0.3666
Skills	0.288	1.101
FDI	0.001	–0.042
R&D	0.037*	0.158*
Royalties	0.008	0.203
Infrastructure	0.011	–0.002
Constant	37.982	32.482

Source: UNIDO Scoreboard database.
Note: * Significant within 5% significance level.

Table A.25 Regression results for share of manufactured exports in total exports

	2000	*1990*
No. of observations	51	35
Independent variables	Adj. R^2 = 0.0195	Adj. R^2 = 0.1371
Skills	–0.904	1.097
FDI	–0.006	–0.153
R&D	0.011	0.050
Royalties	0.013	0.509
Infrastructure	0.029	0.015
Constant	73.394	63.196

Source: UNIDO Scoreboard database.

Second part | **Technical notes**

The UNIDO Scoreboard database

International Trade Data

Data source: UN Commodity Trade Statistics (COMTRADE) database. The technological classification of trade is based on the Standard International Trade Classification (SITC), Revision 2:

Technology classification of exports according to SITC Rev. 2	
Type of exports	*SITC sections, divisions or groups*
Resource based exports	01 (excl. 011), 023, 024, 035, 037, 046, 047, 048, 056, 058, 06, 073, 098, 1 (excl. 121), 233, 247, 248, 25, 264, 265, 269, 323, 334, 335, 4, 51, 512 (excl. 512 and 513), 52 (excl. 524), 53 (excl. 533), 551, 592, 62, 63, 641, 66 (excl. 665 and 666), 68
Low technology exports	61, 642, 65 (excl. 653), 665, 666, 67 (excl. 671, 672 and 678), 69, 82, 83, 84, 85, 89 (excl. 892 and 896)
Medium technology exports	266, 267, 512, 513, 533, 55 (excl. 551), 56, 57, 58, 59 (excl. 592), 653, 671, 672, 678, 711, 713, 714, 72, 73, 74, 762, 763, 772, 773, 775, 78, 79 (excl. 792), 81, 872, 873, 88 (excl. 881), 95
High technology exports	524, 54, 712, 716, 718, 75, 761, 764, 77 (excl. 772, 773 and 775), 792, 871, 874, 881

Value added data

Total manufacturing value added (MVA)

Source: UNIDO database.

Data adjustments: Data for total manufacturing value added (MVA) refer to the three benchmark years 1980, 1990 and 2000. They are based on national accounts statistics from the United Nations Statistics Division, supplemented by national statistics. Missing values were "now cast" using the best econometric model.

Sectoral value added in manufacturing

Source: UNIDO Industrial Statistics database

Data adjustments: Because only some of the sample economies report industrial statistics according to the International Standard Industrial Classification of All Economic Activities, Third Revision (ISIC Rev. 3), data reported according to ISIC Rev. 3 were converted to ISIC Rev. 2. To fill in missing values, the ISIC Rev. 2 series were supplemented with ISIC Rev. 3 series. The data were "now cast" to years 2000 and 2001, respectively, using the best econometric model. The data were then aggregated using the technological classification of ISIC Rev. 2:

Technology classification of manufacturing value added according to ISIC Rev. 2	
Type of activity	*ISIC division, major groups or groups*
Resource based manufacturing	31, 331, 341, 353, 354, 355, 362, 369
Low technology manufacturing	32, 332, 361, 381, 390
Medium and high technology manufacturing	342, 351, 352, 356, 37, 38 (excl. 381)
High technology manufacturing	3522, 3852, 3832, 3845, 3849, 385

Because reporting of data at the group (four-digit) level of ISIC is inadequate to allow separation of medium- and high-tech products, the category "high-tech manufacturing" was not used; instead, medium-and-high-tech (MHT) products were combined in one category. The sectoral shares of value added were then calculated in relation to the total for all manufacturing subsectors.

Note: Because of differences in compilation methods and statistical definition, the (national account) total MVA does not necessarily sum up to the sum of subsectors in industrial statistics.

Data exceptions by index component

MVA per capita

Additional population estimates for Bahamas, Belgium Luxembourg, Ethiopia and Yugoslavia were taken from World Bank sources.

For the countries listed below the following years were substituted for the respective benchmark years:

Manufactured exports per capita

Year 2000: Antigua & Barbuda: 1999; Aruba: 1998; Bangladesh: 1998; Belgium-Luxembourg: 1998; Brunei: 1998; Cape Verde: 1997; Cuba: 1999; Dominican Republic: 1997 value used for 2000; Faeroe Islands: 1999; Haiti: 1997; Kiribati: 1999; Kuwait: 1999; Kyrgyz Republic: 1999; Lesotho: 2001; Libya: 1998; Madagascar: 1999; Mali: 1997; Mozambique: 1999; Netherlands Antilles: 1998; Niger: 1998; Qatar: 1999; Rwanda: 1999; Sri Lanka: 1999; Yemen: 1998.

Additional data for manufactured exports per capita 2000 from the World Bank (using manufactured exports as a percentage of merchandise exports) were used for: Angola; Bermuda, Bhutan, Central African Republic, Congo, Djibouti, Dominican Republic, Guyana, Iraq, Liberia, Mauritania, Samoa, Seychelles, Somalia, United Arab Emirates, Vietnam, Iraq.

Year 1990: Belize: 1992; Benin: 1992; Bhutan: 1991; Central African Republic: 1989; Croatia: 1992; Czechoslovakia: 1988; Dominican Republic: 1992; French Polynesia: 1988; Ghana: 1992; Hungary: 1992; Myanmar: 1992; Nigeria: 1991; Slovenia: 1992; South Africa: 1992; Yemen D.R.: 1989; Yemen: 1991; Yugoslavia: 1992.

Additional data for manufactured exports per capita 1990 from the World Bank (using manufactured exports as a percentage of merchandise exports) were used for: Bahamas, Bahrain, Belgium, Bermuda, Bhutan, Burundi, Central African Republic, Congo Republic, Dominican Republic, French Polynesia, Ghana, Guyana, Hungary, Iraq, Liberia, Mauritania, Netherlands Antilles, New Caledonia, Nigeria, Somalia, South Africa, St. Kitts, Sudan, Tanzania, Tonga, Uganda, Vietnam, Yemen.

Year 1981: Antigua and Barbuda: 1978; Brazil: 1983; Chile: 1983; Czechoslovakia: 1982; Kiribati: 1983; Libya: 1983; Nepal: 1982; Pakistan: 1982; Paraguay: 1983; Sierra Leone: 1983; Uruguay: 1983; Venezuela: 1982; Zambia: 1979.

Additional data for manufactured exports per capita 1981 from the World Bank (using manufactured exports as a percentage of merchandise exports) were used for: Bahamas, Bahrain, Belgium, Belize, Benin, Bermuda, Bhutan, Brunei, Burundi, Cameroon, Cape Verde, Cayman Islands, Central African Chile, Comoros, Congo Democratic Republic, Congo Republic, Costa Rica, Cuba, Djibouti, Dominican Republic, El Salvador, Gambia, Ghana, Grenada, Guatemala, Guinea, Honduras, Iran, Iraq, Kuwait, Lao People's Democratic Republic, Lebanon, Libya, Maldives, Mali, Malta, Mauritania, Mexico, Mozambique, Netherlands Antilles, Nicaragua, Nigeria, Panama, Paraguay, Qatar, Republic, Rwanda, St. Kitts, St. Vincent, Sudan, Suriname, Tanzania, Tonga, Turkey, Uganda, United Arab Emirates, Uruguay, Venezuela, Viet Nam, Zambia, Zimbabwe.

Separate estimates were produced for China's manufactured exports, using official Chinese trade statistics.

Intensity of industrialisation

Share of medium- and high-tech activity in MVA

Year 2000: Use of data from Armenia 2000 for Ukraine and Belarus; Belgium 2000 for Luxembourg; Benin 2000 for Togo; Botswana 2000 for Namibia; Burkina Faso 2000 for Niger, Mali and Mauritania; Central African Republic 2000 for Gambia; Cuba 2000 for Haiti; Dominican Republic 2000 for Aruba, Grenada, St. Kitts, St. Lucia, Dominica, Guadeloupe, Trinidad and Tobago, French Polynesia, St. Vincent, Antigua and Barbuda, French Guiana, Martinique, Reunion, Netherlands Antilles and Montserrat; Ethiopia 2000 for Djibouti; Fiji 2000 for Samoa, Kiribati, Maldives, New Caledonia and Tonga; Georgia 2000 for Albania; Jamaica 2000 for Guinea, Bermuda, Suriname, Guyana and Bahamas; Latvia 2000 for Estonia and Lithuania; Mongolia 2000 for Tajikistan and Kyrgyz Republic; Nepal 2000 for Bhutan; Oman 2000 for Qatar, Brunei, Bahrain and United Arab Emirates; Romania 2000 for Moldova, Georgia and Kazakhstan; Rwanda 2000 for Angola and Comoros; Syria 2000 for Yemen, Lebanon and Iran; Venezuela 2000 for Azerbaijan, Turkmenistan and Uzbekistan.

Year 1990: Use of data from Armenia 1990 for Belarus and Ukraine; Belgium 1990 for Luxembourg; Benin 1990 for Togo; Burkina Faso 1990 for Cote d'Ivoire, Liberia, Mali, Mauritania, Niger and Sierra Leone; Cuba 1990 for Haiti; Dominican Republic 1990 for Antigua and Barbuda, Dominica, French Guiana, French Polynesia, Grenada, Guadeloupe, Martinique, Montserrat, Netherlands Antilles, Reunion, St. Kitts, St. Lucia, St. Vincent and Guadalupe and Trinidad and Tobago; Ethiopia 1990 for Chad and Djibouti; Fiji 1990 for Kiribati, Maldives, New Caledonia, Samoa, Tonga and Vanuatu; Gabon 1990 for Equatorial Guinea; Iraq 1990 for Iran; Jamaica 1990 for Bermuda, Guinea, Guyana, Namibia, Sao Tome and Suriname; Latvia 1990 for Estonia and Lithuania; Macedonia 1990 for Yugoslavia; Mongolia 1990 for Kyrgyz Republic, Tajikistan and Uzbekistan; Nepal 1990 for Bhutan; Oman 1990 for Bahrain, Brunei, Qatar and United Arab Emirates; Romania 1990 for Georgia, Kazakhstan and Moldovan; Rwanda 1990 for Angola, Comoros, Gambia and Guinea-Bissau; Syria 1990 for Yemen and Lebanon; Venezuela 1990 for Azerbaijan and Turkmenistan.

Year 1980: Use of data from Belgium 1980 for Luxembourg; Benin 1980 for Togo; Bolivia 1990 for Bolivia 1980; Burkina Faso 1980 for Niger, Mali, Mauritania and Sierra Leone; Cote

d'Ivoire 1980 for Liberia; Cuba 1980 for Haiti; Dominican Republic 1980 for Antigua and Barbuda, Dominica, French Guiana, French Polynesia, Grenada, Guadeloupe, Martinique, Montserrat, Netherlands Antilles, Reunion, St. Kitts, St. Lucia, St. Vincent and Guadeloupe and Trinidad and Tobago; Ethiopia 1980 for Chad and Djibouti; Fiji 1980 for Kiribati, Maldives, New Caledonia, Samoa, Tonga and Vanuatu; Gabon 1980 for Equatorial Guinea; Iraq 1980 for Iran; Jamaica 1980 for Bermuda, Guinea, Guyana and Namibia; Nepal 1980 for Bhutan; Oman 1980 for Brunei, Bahrain, Qatar and United Arab Emirates; Rwanda 1980 for Angola, Comoros, Gambia, Guinea-Bissau, and Sao Tome; Syria 1990 for Syria 1980; Syria 1990 for Yemen and Lebanon 1980.

Share of MVA in GDP

Year 2000: Additional data for 2000 MVA in GDP from the World Bank (using World Bank estimates for MVA) were used for: Armenia, Australia, Azerbaijan, Belarus, Bosnia, Bulgaria, Burkina Faso, Cameroon, Chad, China, Ireland, Mongolia, Poland, Romania, Rwanda, Uzbekistan.

Year 1990: Additional data for 1990 MVA in GDP from the World Bank (using World Bank estimates for MVA) were used for: Croatia, Lithuania, Peru and Poland.

Year 1980: Additional data for 1980 MVA in GDP from the World Bank (using World Bank estimates for MVA) were used for: Burkina Faso, Poland, Romania, Tunisia, Turkey and Uruguay.

Export quality index

Share of medium- and high-tech exports in manufactured exports

Year 2000: Congo: 1995; Djibouti: 1992; Kiribati: 1995; Lesotho: 2001; Maldives: 1995; Martinique: 1995; Mauritania: 1995; Reunion: 1995; Samoa: 1990; Seychelles: 1995 and United Arab Emirates: 1993.

Year 1990: Angola: 1991; Bahrain: 1994; Belize: 1992; Benin: 1992; Bhutan: 1991; Bulgaria: 1996; Burkina Faso: 1995; Burundi: 1993; Cape Verde: 1995; Central African Rep.: 1989; Congo: 1995; Dominican Rep.: 1992; French Polynesia: 1988; Gabon: 1993; Ghana: 1992; Guinea: 1995; Hungary: 1992; Iran: 1997; Kiribati: 1992; Mauritania: 1995; Nigeria: 1991; Samoa: 1990; Seychelles: 1989; St. Kitts: 1993; Sudan: 1995; Uganda: 1994; Yemen: 1991 data used for 1990 and Zambia: 1993.

Year 1980: Angola: 1980; Brazil: 1983; Cameroon: 1980 data; Cape Verde: 1979 data; Cayman Islands: 1980; Central African Rep.: 1979; Chile: 1983; China: 1985; Congo: 1980; Costa Rica: 1986; Czechoslovakia: 1982 data; Guatemala: 1986; Honduras: 1986; Kuwait: 1987; Libya: 1983; Mali: 1980 data; Mexico: 1986 data used for 1980; Nepal: 1982 data; Nicaragua: 1986 used for 1980; Pakistan: 1982 data; Panama: 1986; Paraguay: 1983; Seychelles: 1980 data; Sierra Leone: 1983; Turkey: 1985; Uruguay: 1983; Venezuela: 1982; Zambia: 1979 data and Zimbabwe: 1984;

Share of manufactured exports in total exports

This share draws on all the above data for manufactured exports, from both the manufactured exports per capita data sets and the data infills (from the World Bank) in the MHT-in-manufactured-exports data sets.

Total trade export data came from WITS, with: French Guiana (1995 value of total exports used for 2000); French Polynesia (1988 value used for 1990); Haiti (1997 value of total exports used for 2000); Libya (1998 value of total exports used for 2000); Mali (1997 value of total exports used for 2000); Martinique (1995 value of total exports used for 2000); Reunion (1995 value of total exports used for 2000); Seychelles (1996 value of total exports used for 2000); Yemen (1998 value of total exports used for 2000) and Zimbabwe (1984 value of total exports used for 1980).

Data on drivers

These data were taken from the previous *Report* (2002/2003).

Research and development financed by productive enterprises

Data sources: Calculated on the basis of data from UNESCO, *Statistical Yearbook 1994* and *Statistical Yearbook 1998;* OECD, *Science, Technology and Industry Scoreboard 1999;* Iberoamerican Network of Science and Technology Indicators (http://www.ricyt.edu.ar); and central banks and other national statistical sources.

Data adjustments: Data refer to 1985 and 1997–1998. Where data were unavailable for those years, values for the closest year available were used.

- Values for OECD countries for 1997–1998 were calculated based on data from OECD, *Science, Technology and Industry Scoreboard 1999.*
- Values for Latin American countries were calculated based on data from the Iberoamerican Network of Science and Technology.
- Data for 1985 were unavailable for Albania, Bahrain, the Czech Republic, the Russian Federation and Slovenia.
- Many countries, particularly in Sub-Saharan Africa, do not report data on R&D financed by productive –enterprises. Because of the weak industrial structures of these countries, R&D per capita was assumed to be –negligible.

Foreign direct investment inflows

Data sources: World Bank, *World Development Indicators 2000;* UNCTAD, *World Investment Report 1995* and *World Investment Report 1999;* and national statistical sources.

Data adjustments: Data refer to average annual inflows of foreign direct investment during 1981–1985 and 1993–1997.

- Data for 1998 for Bahrain, Belgium, Saudi Arabia and South Africa are from UNCTAD, *World Investment Report 1999*. Data from that source may refer to periods that do not correspond exactly with 1981–1985 and 1993–1997.
- Data for Taiwan Province of China are from Taiwan Province of China, Council for Economic Planning and Development, *Taiwan Statistical Data Book 1998*.
- Data for 1985 were unavailable for Albania, Bahrain, the Czech Republic, Hungary, Nicaragua, Romania, the Russian Federation and Slovenia.

Technology licensing payments

Data sources: World Bank, *World Development Indicators 2000;* central banks; and International Monetary Fund, *Balance of Payments Statistics Yearbook 1999*.

Data adjustments: Data refer to 1985 and 1998. Where data were unavailable for those years, values for the closest year available were used.

- Data for 1985 were unavailable for Japan; data for the closest year available (1984) were used instead.
- Countries for which data for 1998 were unavailable and data for the closest year available were used instead are Albania (1994), Algeria (1991), Bahrain (1995), Cameroon (1995), the Central African Republic (1992), Greece (1997), Guatemala (1993), Jordan (1994), Malawi (1994), Mozambique (1992), Pakistan (1997), Senegal (1997), Sri Lanka (1995), Uganda (1997) and Zimbabwe (1994).
- Balance of payments data from the International Monetary Fund's *Balance of Payments Statistics Yearbook 1999* and national central bank reports were used to calculate licensing payments for Denmark, Hong Kong SAR, Switzerland, Taiwan Province of China and Turkey.
- For countries that do not report technology licensing payments in their balance of payments (Indonesia, Malaysia and Singapore), a proxy value was calculated based on the ratio of licensing payments to payments for "other services" for similar economies. For Malaysia and Singapore royalty payments were assumed to be 25 percent of other services (a ratio similar to that for Taiwan Province of China); for Indonesia they were assumed to be 11 percent (the same ratio as that for Thailand).
- For countries reporting data for 1998 but not 1985, the ratio of royalty payments to other services in 1998 was applied to 1985. Data on payments for other services are from the International Monetary Fund's *Balance of Payments Statistics Yearbook 1999*.
- Data for 1985 were unavailable for Albania, the Czech Republic, Hungary, Romania, the Russian Federation, Slovenia and Yemen.

Skills

Data sources: UNESCO, *Statistical Yearbook 1994* and *Statistical Yearbook 1998;* World Bank, *World Development Indicators 2000;* and national statistical sources.

Data adjustments: Data refer to 1985 and 1997–1998 (latest year available). Where data were unavailable for those years, values for the closest year available were used.

- Data for the Harbison-Myers index in 1985 were unavailable for Albania, Bahrain, the Russian Federation and Slovenia.
- Data for tertiary technical enrolments were unavailable for Albania, Bahrain, the Czech Republic, the Russian Federation, Slovenia and Yemen.

Infrastructure

Data sources: Calculated based on data from World Bank, *World Development Indicators 2001;* OECD, *Science, Technology and Industry Statistics* (http://www.oecd.org/statistics); Telecordia Technologies (http://www.netsizer.com); and African Internet Connectivity (http://www.sn.apc.org).

Data adjustments: Data refer to 1985 and 1998. Where data were unavailable for 1998, values for the closest year available were used.

- Countries for which data for telephone mainlines in 1998 were unavailable and data for the closest year available were used instead are Cameroon (1997), Guatemala (1997), Jamaica (1997), Kenya (1997), Yemen (1997) and Zimbabwe (1997).
- Countries for which data for mobile phones in 1998 were unavailable and data for the closest year available were used instead are Cameroon (1997), Ghana (1997), Jamaica (1996) and Kenya (1997).
- Countries for which data for computers in 1998 were unavailable and data for the closest year available were used instead are Algeria (1997), Cameroon (1995), Ghana (1997), Jordan (1997), Kenya (1997), Madagascar (1997), Morocco (1997), Mozambique (1997), Nigeria (1997), Senegal (1997), Sri Lanka (1997), the United Republic of Tanzania (1997), Uganda (1997), Yemen (1997) and Zimbabwe (1997).
- Data for commercial energy use in 1985 were unavailable for Albania, Bahrain, the Russian Federation, Slovenia and Yemen.
- Data on Internet hosts refer to 2001 and are from Telecordia Technologies.
- Data on information and communication technology for Africa not available in the World Bank's *World Development Indicators 2001* are from African Internet Connectivity.
- Data for Taiwan Province of China are from Taiwan Province of China, Council for Economic Planning and Development, *Taiwan Statistical Data Book 1998*.

Industrial Performance Scoreboard

UNIDO's Industrial Performance Scoreboard was developed in four stages.

The first stage consisted of creating the database for as many countries as possible of industrial indicators – both output and input factors – for the benchmark years 1980 (1981), 1990 and 2000. Indicator choice was influenced by data

availability. Four performance indicators – MVA per capita, manufactuered exports per capita, industrialization intensity (the arithmetic mean of the share of MVA in GDP and the share of MHT activities in MVA), and export quality (the arithmetic mean of the share of manufactures in total exports and the share of MHT products in manufactured exports) – were chosen as the components of the CIP index.

In the second stage, individual indices of performance $I_{i,j}$ were obtained through standardization according to the general formula

$$I_{i,j} = \frac{X_{i,j} - \min(X_{i,j})}{\max(X_{i,j}) - \min(X_{i,j})}$$

where $X_{i,j}$ is the j-th country value of the i-th performance indicator. Therefore the highest country in the ranking has a score of 1 and the lowest a score of 0.

The third stage consisted of testing the feasibility of computing a combined index with the performance components selected. Positive and statistically significant correlations between the four performance indices confirmed that a combined index could be constructed as a proxy measure of overall industrial performance.

The CIP index was then constructed as

$$CIP_j(\alpha) = \left(\frac{w_1 I_{1,j}^{\alpha} + w_2 I_{2,j}^{\alpha} + w_3 I_{3,j}^{\alpha} + w_4 I_{4,j}^{\alpha}}{w_1 + w_2 + w_3 + w_4} \right)^{\frac{1}{\alpha}}$$

where w_i are the weights given to the individual indices and α is a parameter to control how variations and weights of the individual indices affect the CIP index.

Initially, a different weight w_i was assigned to each performance indicator $I_{i,j}$. Stability tests confirmed that weights did not significantly affect ranks, so that equal weights could be allocated to the four performance indicators. With $w_1 = w_2 = w_3 = w_4 = 1$, the general formula became:

$$CIP_j(\alpha) = \frac{1}{4}\left(I_{1,j}^{\alpha} + I_{2,j}^{\alpha} + I_{3,j}^{\alpha} + I_{4,j}^{\alpha} \right)^{\frac{1}{\alpha}}$$

To further simplify the procedure, α was set to one, resulting in the CIP index as the simple arithmetic mean of $I_{1,j}$, $I_{2,j}$, $I_{3,j}$ and $I_{4,j}$. Thus, finally

$$CIP_j \equiv CIP_j(1) = \frac{1}{4}\sum_{i=1}^{4} I_{i,j}$$

was established as the definition of the aggregate index.

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The main focus of the *Industrial Development Report 2004* is on the dynamic processes of productivity growth, wealth creation and social advance in Sub-Saharan Africa, analyzed in the context of the internationally agreed development goals and targets of the Millennium Declaration and the national poverty-reduction strategies.

The report pinpoints the opportunities and policy options available for the Sub-Saharan African countries to reduce poverty through structural change, productivity growth and diversification, and by building up the institutional and social capabilities essential to overcome adverse initial conditions.

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The report analyzes forward-looking approaches to industrial development that take advantage of environmentally sound and advanced technologies. It argues that since Sub-Saharan African policymakers must face taxing development challenges while building up social and technological capabilities, it is crucial for the international community to help them meet their capacity-building needs, including those related to trade.

The second part of the report updates and expands the Industrial Development Scoreboard, extending and improving its scope in terms of country coverage and timespan. The Scoreboard provides a global overview of industrial competitiveness in all its diversity, and assesses the main factors affecting it.

About the cover illustration:
The image of the mirrored world maps is inspired by a traditional Inca notion, that of *Pachakutik*, the mythical overturning of the world which is expected to return things to their proper order after a time of disarray. Among the Quechua-speaking peoples of the Andes the belief is widespread that we are now undergoing a time of *Pachakutik* . Dovetailing with the notion of *Pachakutik* is the recurrent observation by geographers that placing the north at the top is a cultural convention, and that turning it around can help provide a fresh view of things; the kind of fresh view needed to tackle apparently intractable problems of poverty and development.

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