Development Centre Seminars
with the IMF and the AERC

# Policies to Promote Competitiveness in Manufacturing in Sub-Saharan Africa

INTERNATIONAL DEVELOPMENT

OECD

Edited by
Augustin Kwasi Fosu,
Saleh M. Nsouli and Aristomène Varoudakis

AERC
CREA

INTERNATIONAL MONETARY FUND

Development Centre Seminars
with the IMF and the AERC

# Policies to Promote Competitiveness in Manufacturing in Sub-Saharan Africa

*Edited by*
Augustin Kwasi Fosu, Saleh M. Nsouli, Aristomène Varoudakis

INTERNATIONAL MONETARY FUND (IMF)
AFRICAN ECONOMIC RESEARCH CONSORTIUM (AERC)
DEVELOPMENT CENTRE
OF THE ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

# ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996), Korea (12th December 1996) and the Slovak Republic (14th December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

*The Development Centre of the Organisation for Economic Co-operation and Development was established by decision of the* OECD *Council on 23rd October* 1962 *and comprises twenty-three Member countries of the* OECD: *Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Korea, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, as well as Argentina and Brazil from March* 1994, *Chile since November* 1998 *and India since February* 2001. *The Commission of the European Communities also takes part in the Centre's Advisory Board.*

*The purpose of the Centre is to bring together the knowledge and experience available in Member countries of both economic development and the formulation and execution of general economic policies; to adapt such knowledge and experience to the actual needs of countries or regions in the process of development and to put the results at the disposal of the countries by appropriate means.*

*The Centre has a special and autonomous position within the* OECD *which enables it to enjoy scientific independence in the execution of its task. Nevertheless, the Centre can draw upon the experience and knowledge available in the* OECD *in the development field.*



*
* *

*Publié en français sous le titre :*
PROMOUVOIR LA COMPÉTITIVITÉ MANUFACTURIÈRE EN AFRIQUE SUBSAHARIENNE

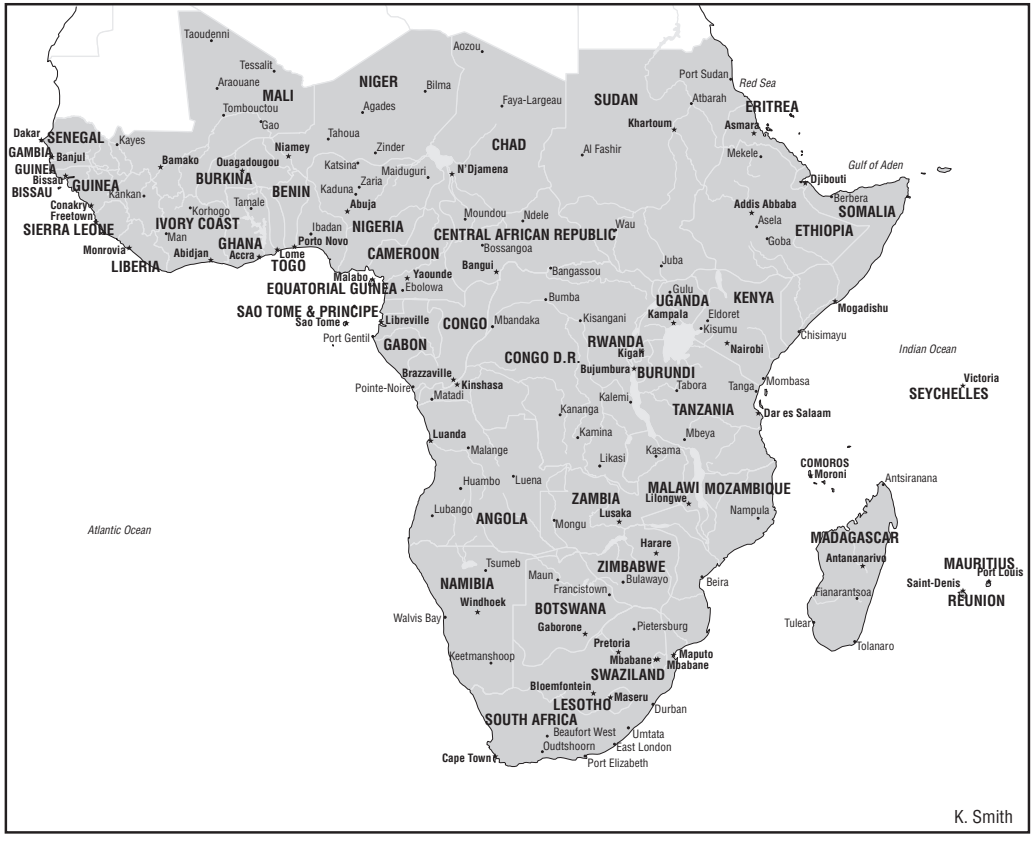
# Foreword

This work was produced following an international conference jointly organised by the International Monetary Fund and the OECD Development Centre in Johannesburg in November 1998. It is published in the context of the Development Centre's research on "Emerging Africa" and precedes a volume of that title, also published in 2001.

# Acknowledgements

The Development Centre would like to express its gratitude to the Government of Switzerland for the financial support given to the project on "Emerging Africa" in the context of which this study was carried out.

## Sub-Saharan Africa




*The boundaries and names shown on this map do not imply official endorsement or acceptance by the OECD.*

# Table of Contents

## PART III
## BUILDING AN APPROPRIATE INSTITUTIONAL ENVIRONMENT TO PROMOTE COMPETITIVENESS



## PART IV
## CONCLUDING COMMENTS

# Preface

The papers in this volume were presented at a conference organised by the African Economic Research Consortium (AERC), the Development Centre of the Organisation for Economic Co-operation and Development (OECD), and the International Monetary Fund, held in Johannesburg, South Africa, on 6-7 November 1998.

The conference focused on what is needed to ensure the sustainability of the recent economic recovery in the region and highlighted the importance of Africa's rapid integration into the global economy. After years of stagnation, many African countries experienced renewed growth in the 1990s, the result, largely, of the broad economic and structural reforms implemented during those years. The region, however, is still heavily dependent on primary commodity exports at a time when such reliance makes these economies particularly vulnerable to swings in the terms of trade and fluctuations in weather conditions. An essential element for integrating the countries into the world economy and reducing their vulnerability to exogenous shocks is to shift away from dependency on primary commodity exports by promoting a more competitive manufacturing sector.

The papers in this volume address three important issues: *i)* the role of exchange-rate policy in enhancing the competitiveness of African manufactured exports; *ii)* the steps that can be taken to improve production efficiency; and *iii)* the role of institutional and structural reforms in promoting competitiveness in manufacturing and in improving Africa's attractiveness to foreign direct investment. An Epilogue, written by Saleh M. Nsouli of the IMF Institute and Aristomène Varoudakis, now of the World Bank, evaluates progress and developments since the conference which gave rise to this volume was held.

It is our hope that the materials in this book will serve both the scholars and the policymakers interested in Africa's continued economic growth and further integration into the global economy.

| | | |
|---|---|---|
| Mohsin S. Khan | Jorge Braga de Macedo | Delphin G. Rwegasira |
| Director | President | Executive Director |
| IMF Institute | OECD Development Centre | AERC |

March 2001

# List of Abbreviations

| | |
|---|---|
| AERC | African Economic Research Consortium |
| CFA | Communauté francophone d'Afrique |
| CMA | Capital Market Authority |
| DTCA | Dynamic theory of comparative advantage |
| EGT | Endogenous growth theory |
| FDI | Foreign direct investment |
| EPZs | Export-processing zones |
| GDP | Gross domestic product |
| GLS | Generalised least squares |
| HIID | Harvard Institute for International Development |
| IIT | Intra-industry trade index |
| IMF | International Monetary Fund |
| LSDV | Least squares dummy variable |
| NSE | Nairobi Stock Exchange |
| OECD | Organisation for Economic Co-operation and Development |
| OLS | Ordinary least squares |
| REER | Real effective exchange rate |
| RER | Real exchange rate |
| SITC | Standard International Trade Classification |
| STCA | Static theory of comparative advantage |
| TFP | Total factor productivity |
| UNDP | United Nations Development Programme |
| VAT | Value-added tax |

*Chapter 1*

# Promoting Competitiveness in Manufacturing in Sub-Saharan Africa

*Saleh M. Nsouli, Augustin Kwasi Fosu and Aristomène Varoudakis*

Can Africa ever hope to have comparative advantage in manufactured exports? This question, posed in the following chapter, becomes a theme that reverberates throughout this volume. The ongoing debate among economists about how to answer it and thus give guidance to policymakers pits two fundamental and opposing theoretical views against one another. This book not only discusses the debate, in which the authors duly take their positions, but also tries to break new ground in empirical tests that would support an answer of "Yes!" to the question. As will become evident, however, such an answer depends heavily on supportive policies, resolutely pursued. The final chapter, one of the two that pull together the various contributions in the book, reminds us that ". . . there is no free lunch".

This conference volume on policies to promote manufacturing competitiveness in sub-Saharan Africa stems from a meeting held in Johannesburg on 6-7 November 1998, jointly organised by the African Economic Research Consortium, the International Monetary Fund and the OECD Development Centre. Participants included policymakers from African countries, academics and experts from international and regional institutions. The papers presented at the conference, of which this book includes a selection, ranged from cross-country comparisons to country case studies.

The conference took place against the backdrop of resurgent economic activity in sub-Saharan Africa. After a long economic decline, countries in the region were achieving higher real per capita incomes, a significant fall in inflation and a substantial strengthening of their fiscal and external positions — all reflecting, to a large extent, the implementation of sound economic and financial policies coupled with much-needed structural reforms. Yet the economic situation remains fragile. The region still depends on primary commodities for some 80 per cent of its total exports. Growth thus remains vulnerable to swings in the terms of trade, a message driven home by the impact of the fall in oil and most commodity prices in the wake of the Asian crisis.

Moreover, perceptions among international investors of higher risks in emerging markets are not good news for Africa. The continent needs to attract more foreign direct investment, for capital formation, to upgrade its technological capabilities and to strengthen its productive capacity.

The sub-Saharan countries face the challenge of consolidating their recent economic gains through rapid integration into the global economy. Promoting the competitiveness of their manufacturing sectors in open economies will help increase incentives for both domestic and foreign investment in manufacturing, contributing to economic growth and reducing their economic vulnerability. Decisive steps to promote competitiveness become even more essential when several large emerging economies in other developing regions have already made steady progress in manufacturing for export. Against this background, the conference papers focus on three critical policy questions.

— What exchange-rate policy will help foster competitiveness in manufacturing?

— How can the efficiency of production factors be enhanced?

— What roles do institutional and structural reforms play in promoting competitiveness?

**Reforming Exchange-Rate Policy**

Elbadawi's cross-country study indicates that substantial misalignments of real effective exchange rates in sub-Saharan Africa have reduced incentives for exporters to increase their penetration of foreign markets. The paper supports a view that competitiveness based on an appropriate real exchange rate is a pre-requisite for a developing country to become a successful exporter of manufactured goods. Econometric work also suggests, however, that high transaction costs — measured by an index of corruption, the length of paved roads, and the number of fax machines — adversely affect manufactured exports. In comparing his results for Africa with East Asia, Elbadawi reaches the conclusion that Africa's marginalisation in world manufactured exports has resulted in large part from its higher transaction costs and different exchange-rate regimes. He thus argues for African countries to redress both their structural and their macroeconomic policies.

Mwega and Ndung'u also examine the effect of exchange-rate policy on manufactured exports, in a study of Kenya in the 1980s and 1990s. They conclude that Kenya's crawling peg during most of the 1980s and more market-based regime in the 1990s limited the misalignment of the real exchange rate. Although they recognise that their results are not very robust, they judge that, after lacklustre export performance in the 1980s, the depreciating trend of the real effective exchange rate in the 1990s had a positive impact on exports. Like Elbadawi, they also point to other factors that affect manufactured export performance — the availability of finance, the quality and extent of infrastructure, access to external markets and the regulatory environment.

## Enhancing the Efficiency of Production Factors

The comparative study by Adenikinju, Söderling, Soludo and Varoudakis examines the structural factors affecting manufacturing competitiveness. Their analysis of Cameroon, Côte d'Ivoire, Nigeria, and Senegal shows that total factor productivity declined in all four countries in the 1980s and the early part of the 1990s. It identifies inadequate investment in infrastructure, external-sector restrictions and insufficient education as important explanations for this poor performance. The authors argue that liberalised trade to foster openness will not suffice without complementary policies, including an appropriate exchange rate, market and price deregulation, a market-oriented wage policy and, most critical, greater investment in infrastructure and human capital.

In their cross-country study, Hakura and Jaumotte show that technology transfers related to foreign trade become considerably stronger when imports take place in sectors closely linked to production and exports (intra-industry trade). The possibility of using foreign technology in production appears to be greater when a country already produces similar goods on a significant scale. This finding implies that developing countries should adopt domestic policies to promote intra-industry trade actively. Such policies could provide key infrastructure or vocational training to enhance production and exports in new sectors. The authors also suggest that governments, when negotiating trade agreements with industrialised countries, should try from the outset to reduce trade barriers in sectors with a high degree of intra-industry trade. This is contrary to common practice in developing countries that embark on trade liberalisation. They usually try to retain protection in exactly such sectors.

## Implementing Institutional and Structural Reforms

The Sievers study examines the institutional factors affecting international competitiveness and foreign direct investment in Africa, based on an index of competitiveness that involves sub-indexes related to openness, government, finance, infrastructure, labour and institutions. Sievers concludes that political and policy stability critically affect investor decisions. Lack of external sector openness and exchange-rate volatility or misalignment influence investors' perceptions of competitiveness, and Sievers notes positive developments in both these factors in Africa in recent years. On institutional reform, she argues that African institutions have not yet become a propelling force for growth and need continued improvement. She also cites public health and corruption as major concerns. While it varies from country to country, good governance in Africa remains a critical challenge.

Bigsten *et al.* examine the performance of manufacturing firms in Cameroon, Kenya, Ghana, and Zimbabwe. They find exporting firms more efficient than non-exporting ones. They emphasise, however, that their analysis does not establish causality, and one cannot know from it whether higher efficiency generates exports or exports generate efficiency gains. Nevertheless, they venture that, because exporting firms appear to have improved their efficiency significantly, an export-oriented strategy is

a good one for promoting economic growth. They underscore the importance of policies that support an open economy, particularly appropriate trade and exchange-rate policies, human capital formation, the build-up of infrastructure and stable, consistent, credible economic policies.

## Pulling the Major Themes Together

A striking consensus emerged during the conference. The two concluding papers by Nsouli and Fosu pull together the major themes. Nsouli points to renewed optimism in sub-Saharan Africa's growth and development prospects, but notes that the path ahead is full of pitfalls. The region's exports fell from 3.8 per cent of world exports in 1960 to 2.1 per cent in 1985 and 1.3 per cent in 1995, a worrisome trend. To reverse it, Nsouli notes that the papers presented at the conference reveal seven key areas in which more progress is needed to promote productivity and competitiveness in manufacturing:

— market-determined exchange-rate regimes;

— trade liberalisation;

— deeper structural reforms, especially human capital accumulation, building infrastructure and redefining the role of government away from direct involvement in production to the provision of essential public services;

— economic security, with better contract enforcement and more effective judicial systems;

— improved governance, with increased transparency and accountability;

— stronger financial sectors, with reinforced bank supervision, more domestic and foreign competition, and privatisation of government-owned banks;

— consistent and comprehensive reform programmes that avoid piecemeal approaches.

Fosu rebuts the view that, in light of Africa's endowments, its comparative advantage lies in exporting primary commodities rather than manufactured goods. Drawing on the conference proceedings, he argues that policies designed to reduce transaction costs, improve the efficiency of factors of production and enhance overall competitiveness could, in fact, shift competitiveness in favour of the manufacturing sector. To reduce transaction costs, he calls for improved infrastructure, particularly transportation, more human capital formation, and streamlined regulatory environments. To enhance the efficiency of factors of production, he points to education, training, and openness of the economies. On competitiveness, he underscores the importance of exchange-rate policy and the regulatory environment. He ends with a focus on the responsibilities of the international community: to reduce the debt overhang, engender the best use of aid funds and foster capacity building, which he views as essential to promote and sustain sound economic policies.

# Part I

# The Role of Exchange-Rate Policy in Promoting Competitiveness

*Chapter 2*

# Can Africa Export Manufactures? Endowments, Exchange Rates and Transaction Costs

*Ibrahim A. Elbadawi*[1]

## Introduction

The key issue of how sub-Saharan Africa might build a strong comparative advantage in exports, especially of labour-intensive manufactures, preoccupies current debates on African development[2]. The concern stems from two turns of events. First, one of the most visible manifestations of the subcontinent's multifaceted development failures during the past 30 years has been its marginalisation in world trade, especially in the global market for manufactures. Second, recent development successes elsewhere have taught that export-oriented policies either have facilitated them, as in Korea and Chinese Taipei, or actually have generated export-led growth, as in Chile, Mauritius, Tunisia and the countries of Southeast Asia[3].

Much recent research has focused on how the globalisation of trade and capital markets has affected Africa's comparative advantage in manufactured exports[4], and on the subcontinent's resource endowments, location and geography[5]. This work — and, more important, the changing landscape of global trade and finance — have pushed the debate towards more specific strategic questions:

— Can Africa ever hope to have comparative advantage in manufactured exports?

— Can globalisation help, if not substitute partially for, traditional and usually complex strategies to achieve export-led economic transformation?

— Do poor African countries have scope, in a world of integrated capital markets, to jump-start their competitiveness in the "old-fashioned" way, with sustained real currency depreciation?

Export performance in many African countries has indeed responded to macroeconomic reforms, especially deep real exchange-rate depreciation in Anglophone Africa in the 1980s and in the CFA franc zone since 1994. Nevertheless, given the partial nature of the reforms and frequent adverse terms-of-trade shocks, the growth of both aggregate exports and especially manufactured exports has been neither deep

nor stable (Rodrik, 1997). Even as Africa still works on regaining lost ground in international markets for its traditional exports, therefore, a consensus has begun to develop (although debate continues) that the ultimate policy goal should be to achieve significant export diversification by building new comparative advantage in non-traditional exports, including labour-intensive manufactures.

Manufactured exports (as well as some other non-traditional exports) can support sustained overall economic growth more effectively than traditional primary exports for at least three reasons. First, they likely will grow faster when the global economy expands, because they have higher income elasticities of demand. Second, with relatively higher price elasticities of both demand and supply, they are less susceptible to price swings. Third, the manufacturing sector offers much greater prospects for dynamic productivity gains. In the medium term and the long run, therefore, traditional primary exports should take the role of facilitating export diversification. In the short run, Africa should continue to consolidate recent gains by avoiding economy-wide indirect taxation of those exports, imposing only moderate and sector-specific taxes to finance export diversification.

This chapter looks closely at manufactured-export performance in a selection of African and other developing countries, taking account of endowments, geography and the potential effects of globalisation. It uses an empirical model to assess the implications of three views on development strategy, called here the *endowment*, *transaction*, and *exchange-rate-led* theories[6].

The *endowment* theory, from Wood and Berge (1997), uses a version of the Hecksher-Ohlin model to argue that, under globalisation, human-capital and natural-resource endowments rather than labour and capital are the main determinants of comparative advantage in manufactured exports. The theory predicts that Africa, with its heavy natural-resource endowment and low stock of human capital, has basically no prospects in manufactured exports.

Taking another tack, and also using a modified Hecksher-Ohlin framework, Collier's (1997) critique of the endowment theory argues that this prediction could be valid only if Africa had a massive Dutch-disease problem because of its rich natural resources, which the evidence does not support. Collier's alternative — the *transaction* theory — proceeds from an observation that manufacturing is one of the most transaction-intensive activities. It asserts that high transaction costs due to a poor policy environment have caused Africa's comparative disadvantage, at least in the short and medium terms. Collier proposes a strategy for building comparative advantage on the basis of increased integration of the African economies into the global trade and capital markets.

Elbadawi and Helleiner (1998) argue that, given Africa's current development levels, comparative advantage in exports should flow from sustained, policy-induced real exchange-rate competitiveness — until economies develop sufficiently to support a productivity-induced secular real appreciation. This *real exchange-rate-led* strategy recognises, following Collier, the dire need for re-capitalisation of the African economies to sustain export expansion and diversification. It suggests, however, that flexible, pragmatic approaches for integration with global capital markets may be needed, both to protect macroeconomic competitiveness and to avoid financial and currency crises.

## Manufactured Exports in Africa and Other Developing Regions

Table 2.1 presents the basic patterns of change in manufactured-export (MNEX) performance in the 1980s and 1990s in a selection of 13 developing countries, of which seven are in sub-Saharan Africa, four in Asia and one each in North Africa and Latin America.

Table 2.1. **Manufactured Exports in a Sample of Developing Countries**
(Amounts in millions of current US dollars; shares and growth rates in per cent)

| | Aggregate Exports[a] | Manufactured Exports[b] | Share of Total Exports in GDP | Share of Mfg. Exports in GDP |
|---|---|---|---|---|
| Burkina Faso | | | | |
| 1994/95 average | 274.95 | 45.90 | 13.10 | 2.19 |
| Avg. annual growth (1984-95) | 8.56 | 18.99 | 1.27 | 9.46 |
| Côte d'Ivoire | | | | |
| 1994/95 average | 3 699.85 | 494.59 | 42.02 | 5.65 |
| Avg. annual growth (1984-95) | 3.22 | 8.20 | 0.34 | 4.70 |
| Kenya | | | | |
| 1994/95 average | 2 815.06 | 432.17 | 36.08 | 6.50 |
| Avg. annual growth (1984-95) | 6.07 | 12.62 | 3.60 | 14.09 |
| Mauritius | | | | |
| 1994/95 average | 2 179.55 | 1 013.45 | 58.41 | 27.18 |
| Avg. annual growth (1984-95) | 15.96 | 22.76 | 2.01 | 7.67 |
| South Africa | | | | |
| 1994/95 average | 31 122.29 | 11 018.45 | 58.41 | 27.18 |
| Avg. annual growth (1984-95) | 5.46 | 12.42 | 0.16 | 8.07 |
| Tanzania | | | | |
| 1994/95 average | 898.37 | 45.87 | 19.51 | 1.31 |
| Avg. annual growth (1984-95) | 15.04 | 3.00 | 16.55 | 10.59 |
| Zimbabwe | | | | |
| 1994/95 average | 2 677.20 | 615.66 | 26.35 | 9.88 |
| Avg. annual growth (1984-95) | 7.86 | 431.00 | 4.57 | 4.76 |
| Tunisia | | | | |
| 1994/95 average | 5 056.54 | 3 925.00 | 44.76 | 23.19 |
| Avg. annual growth (1984-95) | 9.93 | 15.87 | 3.14 | 9.87 |
| Chile | | | | |
| 1994/95 average | 13 814.55 | 2 027.96 | 28.44 | 3.34 |
| Avg. annual growth (1984-95) | 13.52 | 19.34 | 1.86 | 8.33 |
| Republic of Korea | | | | |
| 1994/95 average | 132 762.61 | 101 757.80 | 31.58 | 24.23 |
| Avg. annual growth (1984-95) | 15.61 | 14.68 | -0.47 | -1.27 |
| Malaysia | | | | |
| 1994/95 average | 72 462.51 | 49 200.77 | 92.59 | 62.89 |
| Avg. annual growth (1984-95) | 15.13 | 26.36 | 5.36 | 16.11 |
| Thailand | | | | |
| 1994/95 average | 62 558.62 | 36 892.33 | 40.05 | 23.63 |
| Avg. annual growth (1984-95) | 20.78 | 29.93 | 6.14 | 14.30 |
| Indonesia | | | | |
| 1994/95 average | 49 849.55 | 21 825.38 | 26.37 | 11.55 |
| Avg. annual growth (1984-95) | 8.65 | 24.34 | 0.41 | 15.75 |

*Source:* World Bank data.

*Notes:* *a)* The value of exports of all goods and associated market services provided to the world, including merchandise, freight, insurance, travel and other non-factor services.
*b)* Manufactures include commodities in SITC (rev. 1) sections 5 to 9 — chemicals and related products, basic manufactures, machinery and transport equipment, other manufactured articles and goods not elsewhere classified — but exclude products in division 68, non-ferrous metals.

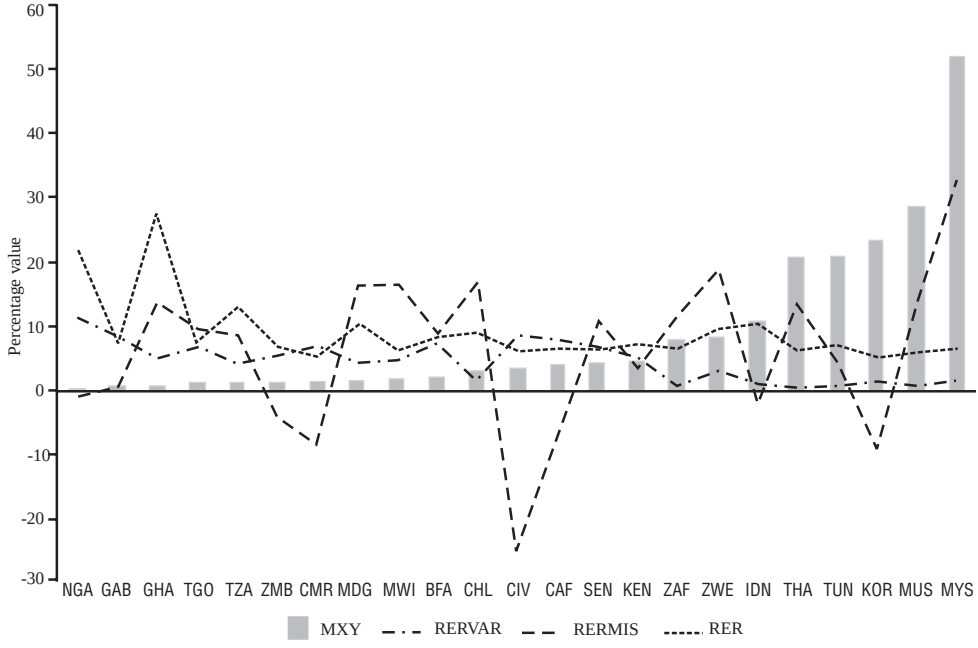
As measured simply by growth in their MNEX/GDP ratios, Kenya, Tanzania, Burkina Faso and South Africa were the best performers among the African countries. Taking levels of MNEX/GDP into account, Mauritius also made an impressive showing, as it maintained average annual growth of MNEX/GDP at 7.7 per cent between 1984 and 1995 with the already high share of MNEX in its economy exceeding 27 per cent in 1994/95. The same point applies, to a lesser extent, to Kenya and South Africa. Burkina Faso and Tanzania, on the other hand, achieved relatively fast growth but started from low levels. Côte d'Ivoire and Zimbabwe saw much slower MNEX growth relative to GDP and began from relatively low to moderate levels as well.

Overall, the sub-Saharan group did not perform as well as the sample countries in other regions. Except for Mauritius, they all have much lower MNEX/GDP ratios than such world-class performers as Tunisia, Indonesia, Thailand, Korea and, especially, Malaysia. Their average MNEX growth rates (not measured relative to GDP) all lay considerably below those in the other countries of the sample. If manufactured exports — especially labour-intensive ones — likely offer the most efficient engine of growth for Africa, as they have for successful development elsewhere, the African countries need both to raise their MNEX growth significantly and to sustain it.

The remainder of this section reviews the extent to which the MNEX performances of countries in the sample co-varied with four sets of potentially determinant variables, to establish their analytical and policy relevance. The four are exchange-rate policy, transaction costs, stocks of skills relative to natural-resource endowments and aggregate investment. The first three correspond to the three strategic views or theories discussed above; the fourth is associated with overall economic performance, including manufactured-goods export growth[7].

Figure 2.1 depicts average MNEX/GDP ratios (MXY in the figure) for 1990-95 for several countries, together with indexes of real exchange rates (RER), RER misalignments (RERMIS) and RER variability (RERVAR). It makes three important points. First, the six countries that maintained the highest ratios — Indonesia, Thailand, Tunisia, Korea, Mauritius and Malaysia — also had uniformly less RER variability. Among the many countries with MNEX/GDP ratios of less than 10 per cent, only Chile and South Africa achieved comparably high RER stability. Second, despite a tendency for national currencies to appreciate in real terms as MNEX/GDP moved to 20 per cent or more (as in Thailand, Tunisia, Korea, Mauritius and Malaysia), no clear pattern of rising appreciation appears as the ratio moves from very low levels to about 10 per cent. This may arise from the large representation in the sample of CFA countries, which have a fixed exchange rate *vis à vis* the French franc[8]. Third, and perhaps for the same reason, no evidence appears of any tendency for real exchange rates to become more overvalued or undervalued (RERMIS) as MNEX/GDP rises.

Figure 2.1. **Real Exchange Rate and Manufactured Exports in Developing Countries, 1990-95**




*Notes:*

1. MXY is the ratio of manufactured exports to GDP, RERVAR is real exchange-rate variability, RERMIS is real exchange-rate misalignment, and RER is the real exchange rate.

2. NGA = Nigeria; GAB = Gabon; GHA = Ghana; TGO = Togo; TZA = Tanzania; ZMB = Zambia; CMR = Cameroon; MDG = Madagascar; MWI = Malawi; BFA = Burkina Faso; CHL = Chile; CIV = Côte d'Ivoire; CAF = Central African Republic; SEN = Senegal; KEN = Kenya; ZAF = South Africa; ZWE = Zimbabwe; IDN = Indonesia; THA = Thailand; TUN = Tunisia; KOR = Korea; MUS = Mauritius; MYS = Malaysia.

3. The index of real exchange-rate misalignment (RERMIS) is computed as (RER-ERER)/ERER*100%, where ERER is a model-based index of the equilibrium real exchange rate. RERMIS is an index of the extent of undervaluation (negative of overvaluation) of the real exchange rate relative to the equilibrium level. Therefore, according to Elbadawi and Helleiner (1998), RERMIS should be positively and robustly associated with manufactured exports. The RERMIS and the ERER indexes are taken from Elbadawi (1998), which constructs these indexes for 63 developing countries, based on a panel-data model of the real exchange rate. Elbadawi's approach for modelling equilibrium real exchange rates is based on estimating RER levels consistent with "sustainable" current-account equilibrium (e.g. Edwards, 1997; Elbadawi, 1994; Williamson, 1994). Williamson (1994: p. 187), for example, recommends an approach for estimating "the set of real effective exchange rates (or paths) needed to achieve simultaneous internal and external balance by some date in the medium-run future, and to maintain balance thereafter". This is the so-called fundamental equilibrium exchange rate (FEER). This concept calls for specifying (or assuming) behavioural specifications for the fundamentals and using the real exchange-rate equations in a bigger model to derive paths for the equilibrium real exchange rate, given the assumed paths of the fundamentals. The approach adopted by Elbadawi (1998) for estimating "sustainable" fundamentals resembles the FEER approach. It obtains the capital-account fundamentals using a model that links sustainable net capital flows and net foreign income to sustainable current account balance (Edwards, 1997), and sustainable change in reserves to long-term import requirements. In addition, it links sustainable foreign-aid ratios to levels judged as consistent with avoiding excessive aid dependency.

Next, consider the relationship between MNEX and aggregate investment. Even ignoring efficiency considerations, the share of gross investment in GDP is a useful broad indicator of an economy's potential to sustain high rates of both export and overall economic growth[9]. On this score, most of the African countries lag badly. Except for the 29 per cent investment ratio in Mauritius, all the others have investment rates lower than 25 per cent (Table 2.2). Investment performance in the four Asian countries in Table 2.2 provides a far superior support for exports. All have investment rates of 30 per cent or much more.

Table 2.2. **Other Determinants of Manufactured Exports for a Sample of Developing Countries**

(See notes for units of measure. Ratios are in percentages, as are the growth rates, which are annual averages for 1984-95)

| | Ratio of Gross Domestic Investment to GDP[a] | Ratio of School Enrolment to Land per Worker[b] | Fax Machines per 1 000 People[c] | Corruption[d] | Paved Roads[e] |
|---|---|---|---|---|---|
| Burkina Faso | | | | | |
| 1994/95 average | 20.87 | 0.61 | n.a. | 4 | 17.35 |
| Average annual growth | 4.29 | 10.12 | n.a. | | -0.47 |
| Côte d'Ivoire | | | | | |
| 1994/95 average | 13.04 | 1.17 | n.a. | 2.79 | 9.50 |
| Average annual growth | 3.42 | -0.04 | n.a. | | 1.99 |
| Kenya | | | | | |
| 1994/95 average | 20.55 | 2.71 | 0.14 | 2.81 | 13.70 |
| Average annual growth | 1.24 | 0.12 | 10.96 | | 1.57 |
| Mauritius | | | | | |
| 1994/95 average | 28.98 | 4.95 | 17.00 | 3.19 | 93.00 |
| Average annual growth | 2.00 | 3.46 | 177.08 | | n.a. |
| South Africa | | | | | |
| 1994/95 average | 17.95 | 1.13 | 2.11 | 5.64 | 41.50 |
| Average annual growth | -1.99 | 3.70 | 24.44 | | n.a. |
| Tanzania | | | | | |
| 1994/95 average | 23.37 | 3.28 | 0.07 | 2.56 | 4.20 |
| Average annual growth | 3.14 | -2.51 | 89.35 | | n.a. |
| Zimbabwe | | | | | |
| 1994/95 average | 23.66 | 1.97 | 0.35 | 2.94 | 51.45 |
| Average annual growth | 3.68 | 6.14 | 27.35 | | 46.09 |
| Tunisia | | | | | |
| 1994/95 average | 24.30 | 1.35 | 2.53 | 2.94 | 78.10 |
| Average annual growth | -2.91 | 5.08 | 58.24 | | 0.71 |
| Chile | | | | | |
| 1994/95 average | 27.07 | 1.15 | 1.55 | | 13.80 |
| Average annual growth | 6.90 | -7.02 | 33.53 | | n.a. |
| Korea | | | | | |
| 1994/95 average | 36.55 | 11.37 | 8.67 | 2.38 | 76.90 |
| Average annual growth | 2.02 | 2.05 | 10.82 | | 1.40 |
| Malaysia | | | | | |
| 1994/95 average | 41.96 | 3.98 | 3.97 | 4.75 | 75.00 |
| Average annual growth | 2.92 | -1.00 | 70.81 | | 1.41 |
| Thailand | | | | | |
| 1994/95 average | 40.94 | 1.77 | 1.48 | 3.19 | 96.05 |
| Average annual growth | 3.5 | 1.17 | 126.29 | | 13.94 |
| Indonesia | | | | | |
| 1994/95 average | 30.50 | 5.84 | 0.36 | 0.56 | 45.85 |
| Average annual growth | 2.02 | 3.96 | 55.49 | | -0.19 |

*Source:* World Bank data.

*Notes:* n.a. = not available.

a) Gross domestic investment consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets cover land improvements (fences, ditches, drains, etc.); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential buildings.

b) Schooling to land per worker is given by the ratio of an index of primary school enrolment divided by the ratio of arable land per 100 workers.

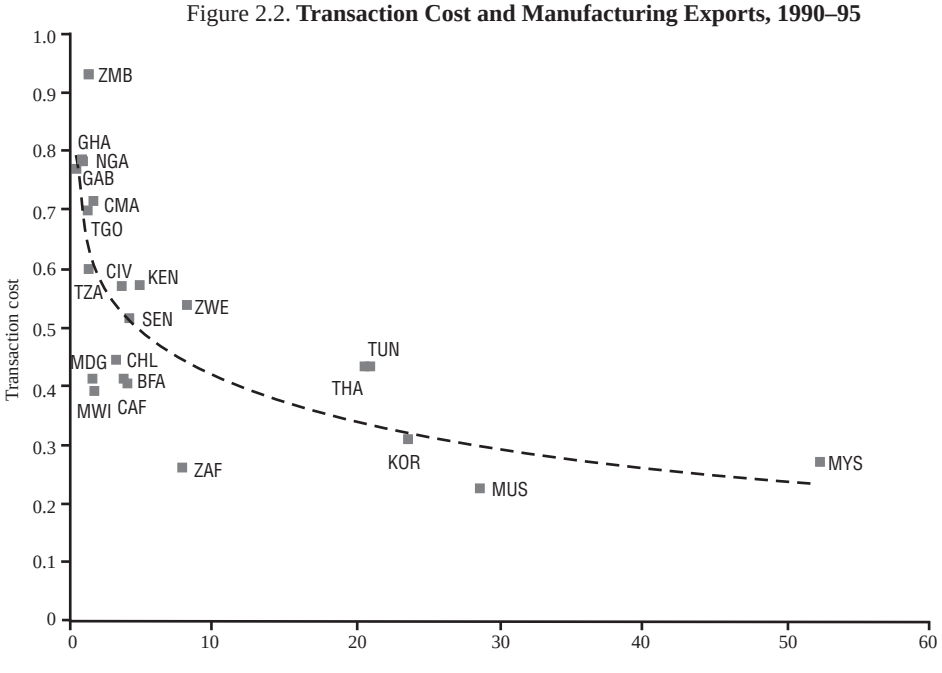
c) The estimated number of facsimile machines connected to the public switched telephone network, per 1 000 people. The growth rate for fax machines refers to 1990–95.

d) An index of corruption around the world published by Transparency International (high index means low corruption).

e) The percentage of paved roads that have been sealed with asphalt or similar road-building material. The growth rate for paved roads refers to 1990–95.

The transaction theory posits a negative relationship between transaction costs and MNEX. Figure 2.2 shows the association between the MNEX/GDP ratio and a composite index of transaction costs. The composite is a weighted index, for each country, of a qualitative indicator of corruption, a measure of paved roads and the number of fax machines. Table 2.2 contains the basic measures, and the weights are the corresponding coefficients from regression 4 in Table 2.3. The note to Figure 2.2 explains how the composite index was calculated. It can range from zero (no costs) to a maximum of one. The scatter fits a negative exponential curve, along which a value of about 0.5 for the transaction-cost index establishes a key threshold. Most countries with higher cost levels have MNEX/GDP values both low and fairly invariant with respect to changes in transaction costs. Eleven countries, all in sub-Saharan Africa, lie above this threshold. A second group has lower transaction costs, but also MNEX shares below the regression line; it includes Madagascar, Malawi, Central African Republic, Burkina Faso, Chile and, notably, South Africa. The dominance of mineral resources clearly contributes importantly to this outcome in both Chile and South Africa. Finally, the evidence from Tunisia, Thailand, Korea, Mauritius and especially Malaysia suggests a strong association between low transaction costs and high shares of manufactured exports in GDP.

Figure 2.2. **Transaction Cost and Manufacturing Exports, 1990–95**




*Note:* The composite index of the transaction cost is calculated as a normalised index of *TC*, where TC is given by: $TC \quad \frac{1}{{}_1\bar{X}1 \quad {}_2\bar{X}2 \quad {}_3\bar{X}3}$ where $\bar{X}$s are the average of LFAX, PROADS and LCORR, and $\beta$s are the estimated coefficients from Table 2.3.

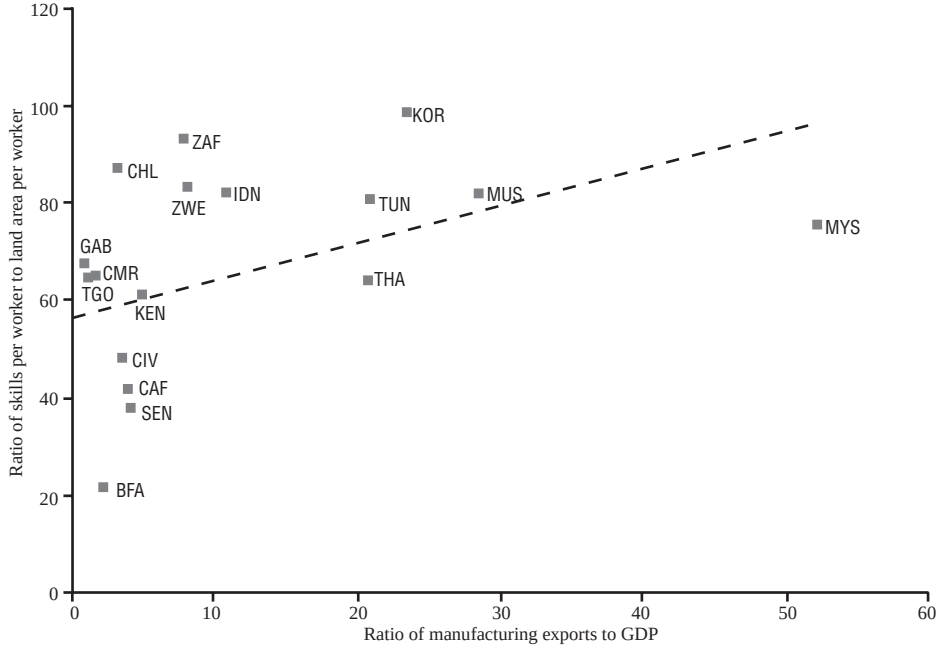
Table 2.3. **An Empirical Model of Manufactured Exports in Developing Countries**

| Dependent Variable: Log (MXY) | Equation 1 Random | | Equation 2 Random | | Equation 3 Random | | Equation 4 Random | |
|---|---|---|---|---|---|---|---|---|
| | Coeff. | *t*-stat. | Coeff. | *t*-stat. | Coeff. | *t*-stat. | Coeff. | *t*-stat. |
| RERMIS | 0.4250 | 2.1749 | 0.4422 | 2.2738 | 0.5820 | 1.6718 | 0.6009 | 1.7469 |
| RERVAR | -17.3195 | -12.8317 | -17.3846 | -13.0912 | -8.2117 | -3.7173 | -8.1503 | -3.7214 |
| Log (INV/GNP) | 0.7266 | 2.2145 | 0.7637 | 2.3502 | | | | |
| Log (TOT) | -0.8786 | -1.7076 | -0.9398 | -1.8566 | -1.1567 | -1.9771 | -1.2207 | -2.1485 |
| TOTVAR | -2.8718 | -3.0116 | -2.8301 | -3.0012 | -1.0635 | -1.1113 | -1.0733 | -1.1308 |
| Log (SCH) | 1.0817 | 4.5445 | | | 0.8851 | 2.7426 | | |
| Log (ARLAR) | -12.6392 | -0.7393 | | | -11.6882 | -0.5641 | | |
| Log (SCHLAR) | | | 1.0715 | 4.4827 | | | 0.8568 | 2.6891 |
| OECYB | 0.00002 | -1.3429 | 0.00002 | -1.2900 | 0.00003 | 1.8980 | 0.00004 | 2.0335 |
| Log (CORR) | | | | | 1.3265 | 5.6388 | 1.3304 | 5.7010 |
| Log (PROAD) | | | | | 0.6333 | 4.7872 | 0.6419 | 4.9033 |
| Log (FAX) | | | | | 0.4640 | 4.0391 | 0.4839 | 4.4217 |
| DSSA | 0.0199 | 0.2374 | 0.0198 | 0.2341 | | | | |
| DEA | 0.1700 | 1.4220 | 0.1839 | 1.5518 | | | | |
| DLAC | 0.7880 | 1.0805 | 0.0878 | 1.2127 | | | | |
| CONSTANT | 0.4427 | 0.3049 | 0.5369 | 0.3737 | 2.8234 | -1.8473 | -2.7415 | |
| Adjusted $R^2$ | 0.8660 | | 0.8722 | | | | | |
| $R^2$ | 0.9504 | | 0.9511 | | 0.945 | | 0.946 | |
| *P* value | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |
| No. observations | 82 | | 82 | | 64 | | 64 | |
| No. countries | 41 | | 41 | | 32 | | 32 | |
| Period of estimation: 1980-81, 1982-83, 1984-85, 1986-89, 1990-95 | | | | | | | | |

*Note:* MXY, manufactured exports to GDP; RERMIS, real exchange rate misalignment; RERVAR, real exchange rate variability; INV/GNP, investment to GNP; TOT, terms of trade; TOTVAR, terms of trade variability; SCH, index of primary school enrolment; ARLAR, arable land to labour ratio; SCHLAR, schooling per land per labour ratio; OECYB, GDP of OECD countries; CORR, index of corruption; PROAD, paved roads; FAX, number of fax machines per 1 000 people; DSSA, dummy for sub-Saharan Africa; DEA, dummy for East Asia; DLAC, dummy for Latin America; *P* value refers to the Hausman test for fixed versus random effects models.

Finally, a version of the endowment thesis (see the first paragraph of the next section) predicts a positive relationship between MNEX/GDP and the stock of skills relative to natural resource endowments. Figure 2.3 indeed shows a strong, positive partial correlation between MNEX/GDP and a skills/resources proxy measure, albeit with a wide distribution around the mean at low levels of MNEX/GDP. The proxy is the ratio of school enrolment to land area, per 100 workers (the SCHLAR variable in Table 2.3).

Figure 2.3. **Manufacturing Exports and Schooling per Land/ Labour Ratio, 1990–95**




*Note:* Schooling rate to land per labour ratio is measured by the index of primary school enrolment ratio to land area per 100 workers.

## Econometric Analysis of Manufactured Exports in Developing Countries

Each of the three theories suggests a pivotal determinant of manufactured exports. First, the endowment hypothesis implies that a combination of high natural resources per worker (measured as land area per 100 workers)[10] and low human capital per worker (measured by schooling per worker) should both be negatively associated with manufactured exports. Another version of the theory assumes that both of these factors have the same quantitative effect on exports, which leads to a restricted model with a single endowment variable, the ratio of human capital to land area per 100 workers. This model predicts that countries with higher human capital per worker relative to their per-worker natural-resource base have a comparative advantage in manufacturing. The analysis below assesses both versions of the theory.

Second, the transaction theory predicts that transaction costs dominate. The analysis uses three variables to account for them: an index of corruption, the length of paved roads and the availability of telephone and fax machines. It tests, at the first level, whether these three components have a stronger effect on manufactured exports than aggregate investment, to make the point that the components of investment which reduce transaction costs relax the most critical constraints that such exports face.

If the data corroborate the prediction of the transaction theory, the next step tests whether reducing transaction costs suffices for policy. A test for the significance of an index of real exchange-rate misalignment both accomplishes this and leads to a look at the third hypothesis, that an export orientation led by real exchange-rate policy can be effective. The test examines whether real exchange-rate misalignment matters for manufactured exports, regardless of whether the analysis controls for aggregate investment or transaction costs. Finally, and in addition to the pivotal variables that the three theories suggest, other variables included account for macroeconomic instability relevant to the export sector (real exchange-rate variability); external shocks (the level and variability of the terms of trade); external demand (per capita GDP in the OECD countries); and regional dummies for East Asia, Latin America and sub-Saharan Africa.

Table 2.3, introduced in the preceding section, provides estimates of manufactured export performance (the ratio of such exports to GDP, in logs to avoid picking up spurious effects) for a panel of 41 developing countries during 1980-95[11]. The first two equations are random-effects regressions, which include aggregate investment rather than transaction-cost variables[12]. The third and fourth regressions exclude aggregate investment and include the three transaction-cost measures[13]. All the right-hand-side variables other than relative prices are expressed relative to appropriate scale variables (see notes to the table).

All the regressions fit the data very well, explaining about 95 per cent of the variations in the MNEX/GDP ratio, MXY. First, regressions 1 and 3 suggest a significant and positive relation between the ratio of schooling per worker and manufactured exports, but land area per worker appears as insignificant. Regressions 2 and 4 reveal a positive and highly significant association using the ratio of schooling per worker to land area per worker as the independent variable. Because the schooling effect obviously drives the significance of this variable, this does not contradict the finding of insignificance for per-worker land area. Thus, *adequately controlling for other relevant determinants, a high ratio of natural-resource endowment per worker does not appear to associate with manufactured-export performance across countries. This empirical evidence does not corroborate the endowment thesis.* The result cannot suffice to reject the thesis formally, however, unless it is assumed, plausibly, that MXY correlates highly with aggregate (or primary) exports.

Second, the first two regressions find aggregate investment to be robustly and positively associated with manufactured exports. The third and fourth equations produce the same results for all three of the transaction-cost measures — and the significance levels for these variables are more than double those for aggregate investment. Regressions (not reported) accounting for the simultaneous effects of aggregate investment and transaction costs find only the latter to be significant. Third, RERMIS, measured as under-valuation of the exchange rate, is positively and significantly associated with exports in both the equations that control for investment and those that control for transaction costs. Therefore the combined results corroborate the basic

prediction of the transaction theory: *transaction costs are major determinants of exports of manufactures, and investment in reducing them generates the highest payoff in capacity to generate such exports.* Moreover, the results support a view that *real exchange-rate-based competitiveness is a pre-requisite for developing countries (especially low-income ones) to become successful exporters of manufactures.*

Finally, all four regressions find real exchange-rate variability and the level of the terms of trade highly significant and negatively associated with manufactured exports. In addition, as expected, terms-of-trade variability has a deleterious effect on manufactured exports, although it was significant only in the aggregate-investment version of the model (regressions 1 and 2). Moreover, a less clear result from a theoretical perspective lies in the negative elasticity of the level of terms of trade. GDP per worker in the OECD countries (a proxy for external demand), however, was only marginally significant in the aggregate-investment version of the model and very insignificant in the transaction version, and it was dropped from regressions 3 and 4. Last, all regional dummies, especially the Africa dummy, were not significant — an important result, which suggests that Africa is on the regression line: *the gap in performance between Africa and other regions, most notably East Asia, should be explained by differences in the global determinants of manufactured exports*.

Why, then, was Africa marginalised in world manufactured exports? In the 1990s, manufactured exports by the four East Asian countries considered (Indonesia, Malaysia, Republic of Korea and Thailand) have accounted for more than 30 per cent of their GDP, while sub-Saharan African countries have managed to export only about 3 per cent of their GDP during the same period. Table 2.4 — based on regression 4 of Table 2.3 — simulates the sources that accounted for this outcome, and Figure 2.4 shows the net contribution of four categories of determinants: endowment, exchange-rate policy, transaction cost, and terms of trade.

Table 2.4. **The Extent and Sources of Africa's Shortfalls in Manufactured Exports Relative to East Asia**

| Variable | East Asia[a] | Sub-Saharan Africa[a] | Difference[b] | Net Contribution[c] |
|---|---|---|---|---|
| MNEX/GDP | -0.5121 | -1.5353 | 1.0232 | 10.55 |
| RER variability | -0.1125 | -0.4238 | 0.3113 | 3.28 |
| RER misalignment | 0.0070 | 0.0489 | -0.0419 | -0.44 |
| Exchange-rate policy | | | | 2.84 |
| Terms of trade | -2.4216 | -2.3919 | -0.0297 | -0.31 |
| Terms-of-trade variability | -0.0196 | -0.0349 | 0.0153 | 0.16 |
| External terms-of-trade effect | | | | -0.15 |
| Corruption | 0.6696 | 0.6224 | 0.0472 | 0.50 |
| Number of fax machines | 0.2189 | -0.2816 | 0.5005 | 5.28 |
| Percentage of paved roads | 0.9024 | 0.6254 | 0.2770 | 2.92 |
| Transaction benefits | | | | 8.70 |
| Skills-to-land ratio | 1.6393 | 1.5109 | 0.1284 | 1.36 |
| Endowments | | | | 1.36 |
| Total predicted (MNEX/GDP) | | | | 12.75 |
| Actual | | | | 10.55 |
| Residual | | | | 2.20 |

*Source:* regression 4 of Table 2.3.

*Notes:* *a)* Columns (1) and (2) are the fitted right-hand-side components of regression 4 of Table 2.3, using averages for East Asia and Africa, respectively.

*b)* Column (3) is the difference between East Asia and Africa, (1) - (2). It is based on the following expression:

$$\log\left(\frac{y_{EA}}{y_{AFR}}\right) = \beta(X_{1_{EA}} - X_{1_{AFR}}) + \beta 2(X_{2_{EA}} - X_{2_{AFR}}) + \ldots$$

Where $y_{EA}(y_{AFR}) = (MNEX/GDP)$ in East Asia (Africa).

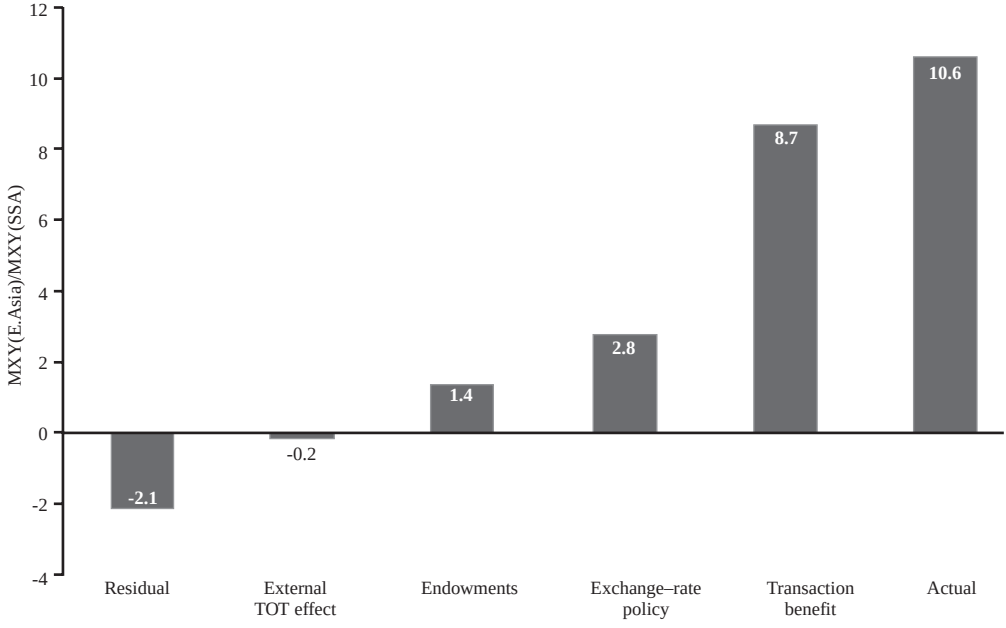
A simple Taylor's expansion of $\log\left(\frac{y_{EA}}{y_{AFR}}\right)$ around 1 leads to the following expression:

$$\left(\frac{y_{EA}}{Y_{AFR}}\right) = \beta_1\left(X_{1_{EA}} - X_{1_{AFR}}\right)\left(\frac{y_{EA}}{y_{AFR}}\right) + \beta_2\left(X_{2_{EA}} - X_{2_{AFR}}\right)\left(\frac{y_{EA}}{y_{AFR}}\right) + \ldots\ldots + Residual$$

*c)* Column (4) gives the components of $\left(\frac{y_{EA}}{y_{AFR}}\right)$ on the basis of the above approximation.

The evidence very strongly corroborates the transaction theory. Lower transaction costs in East Asia relative to sub-Saharan Africa in the 1990s allowed its share of manufactured exports in GDP to reach as high as 8.7 times that in sub-Saharan Africa. The proxy measure of transaction costs, the number of faxes, accounts for half of the difference. One should interpret this result as a proxy for the overall effect on manufactured exports of communication-intensive inputs (such as managerial practices and flow of information). East Asia also outperformed sub-Saharan Africa in real exchange-rate stability, which more than compensated for Africa's advantage in exchange-rate competitiveness. The net effect of exchange-rate policy allowed East Asia to achieve manufactured export shares about 2.8 times those of sub-Saharan Africa. Assuming no differences between East Asia and Africa in other determinants, East Asia's superior performance in these two main sets of policy variables would predict its share of manufactured exports to be about 11.5 times that of sub-Saharan Africa.

Figure 2. 4. **The Extent and Sources of Africa's Shortfall in Manufactured Exports Relative to East Asia, 1990–95**




*Source:* Table 2.4.

Conversely, East Asia's advantage relative to Africa in terms of the ratio of skills per worker to land per 100 workers (the endowment thesis) predicts the share of Asian manufactured exports to be about 1.4 times that of sub-Saharan Africa. The results also show that terms-of-trade effects favoured Africa, but the net effect was too small to make any measurable impact.

## Conclusions

This chapter has analysed the determinants of manufactured exports in the countries of sub-Saharan Africa and other developing countries, guided by three pivotal views on the prospects for Africa in manufactured exports. First, according to Wood and Berge (1997), Africa cannot have a comparative advantage in exporting labour-intensive manufactures — even defining them broadly to include processed raw materials — because of its high endowment of natural resources relative to human capital. This thesis has implications for Africa's development dramatically different from the other two. Second, Collier (1997) argues that, for most of Africa, unusually high, policy-induced transaction costs are the main cause of its comparative disadvantage in manufactured exports. Both approaches flow directly from a specific

interpretation of the Hecksher-Ohlin model, which makes the fundamental prediction that comparative advantage will reflect differences in relative endowments. The third view emphasises the necessity of stable and competitive real exchange rates for export profitability. The impact of globalisation heavily influences all three views.

The empirical results — based on a panel of 41 developing countries, with 11 in sub-Saharan Africa — suggest five important conclusions. First, after adequately controlling for other relevant determinants, a high relative natural-resource endowment does not associate robustly with the ratio of manufactured exports to GDP across developing countries. To the extent that GDP correlates strongly with aggregate (or primary) exports, this finding permits the conclusion that the empirical evidence does not corroborate the "endowment thesis". Second, the results do support the basic prediction of the "transaction theory", that transaction costs act as major determinants of manufactured exports and that investing in reducing them generates the highest payoff in capacity to export manufactures. Third, the results also lend support to the view that real exchange-rate competitiveness is a pre-requisite for a developing country (especially a low-income one) to become a successful exporter of manufactures. Fourth, Africa is *not* different. It lies on the regression line, which suggests that the gap between its performance and that of other regions, most notably East Asia, should be explained by differences in the global determinants of manufactured exports.

Fifth, the simulation exercise gives useful insight into why Africa is marginalised in world manufactured exports, with its shares of such exports to GDP in the 1990s at under one-tenth of the comparable East Asian share. Simulations of the net contribution of four categories of determinants — endowment, exchange-rate policy, transaction costs, and the terms of trade — provide very strong support for the transaction theory. The evidence suggests that bad policy, especially that affecting transaction costs, rather than adverse endowments, remains the most serious hurdle for Africa to leap before it can build comparative advantage in the international market for manufactured exports.

# Notes

1. The author acknowledges, without imputation of responsibility, helpful comments from Mustapha Nabli and other participants at the workshop sponsored by the OECD, AERC and IMF, where this chapter was first presented. He also acknowledges research assistance by John Randa and Rajal Upadhyaya.

2. See, for example, World Bank (1998*a* and 1998*b*), Elbadawi (1998) and Sekkat and Varoudakis (1998).

3. Rodrik (1994, 1995) has shown that, perhaps unlike in many other recent development successes, sustained investment booms have driven both overall growth and phenomenal export expansion in Korea and Chinese Taipei; export orientation has helped to sustain high investment productivity.

4. See, for example, Collier (1997), Elbadawi and Helleiner (1998) and World Bank (1998*b*)

5. Examples here include Wood (1997), Wood and Berge (1997), Wood and Owens (1997) and Wood and Mayer (1998).

6. The analysis does not test these views directly, because the model estimates performance equations based on the ratio of manufactured exports to GDP, rather than comparative-advantage equations that would use, for example, shares of manufactured exports in aggregate exports as the dependent variable. For a detailed discussion and direct testing of the three views, see Elbadawi and Randa (1999).

7. Rodrik (1999) argues that a sustained rise in private returns to capital made possible the phenomenal export expansion of Korea and Chinese Taipei. The two economies engineered them using a range of strategic interventions, including investment subsidies, administrative guidance and the use of public enterprises. The same theme appears in his explanation of Africa's marginalisation in world trade (Rodrik, 1997), although he does not suggest that Africa should pursue similar strategies.

8. These countries (Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, Gabon, Senegal and Togo) have seen substantial real appreciation as well as RER overvaluation for most of the period since 1985 (Baffes, Elbadawi and O'Connell, 1997).

9. According to robust evidence drawn from a vast set of developing countries, a 6 per cent real GDP growth rate would require about a 28 per cent rate of investment (Williamson, 1997).

10. This is a variant of population density, which also has been shown to be closely associated with the composition of exports (Perkins and Syrquin, 1989).

11. Data on manufactured exports and other related variables came from the World Bank's *World Development Indicators*. They allow estimation for a 41-country panel in regressions 1 and 2 and for 32 countries in regressions 3 and 4, for five periods: 1980-81, 1982-83, 1984-85, 1986-89 and 1990-95.

12. Hausman specification tests (reported in the table) suggest that random-effects results are superior to those based on fixed-effects regressions.

13. Because the number of telephones turned out to be consistently insignificant, it was dropped from the third of these measures, which retains only the number of fax machines.

# Bibliography


BAFFES, J., I. ELBADAWI and S. O'CONNELL (1997), "Single-Equation Estimation of the Equilibrium Real Exchange Rate", *Policy Research Working Paper* 1800, World Bank, Washington, D.C.

COLLIER, P. (1997), *Globalization: What Should Be the African Policy Response?*, Centre for the Study of African Economies, University of Oxford, Oxford.

EDWARDS, S. (1997), "Exchange Rate Issues in Developing and Transition Economies", *in* I. ELBADAWI and R. SOTO (eds.), "Foreign Exchange Markets and Exchange Rate Policies in Sub-Saharan Africa", *Journal of African Economies*, Supplement to Vol. 6, No. 3.

ELBADAWI, I. (1994), "Estimating Long Run Equilibrium Real Exchange Rates", *in Estimating Equilibrium Exchange Rates*, J. WILLIAMSON (ed.), Institute for International Economics, Washington, D.C.

ELBADAWI, I. (1998), "Real Exchange Rate Policy and Non-Traditional Exports in Developing Countries", *Research for Action*, No. 46, WIDER, Helsinki.

ELBADAWI, I. and G. HELLEINER (1998), "African Development in the Context of New World Trade and Financial Regimes: The Role of WTO and Its Relationship to the World Bank and the IMF", paper presented at AERC Workshop on Africa and the New World Trade System, Mombasa, Kenya, April.

ELBADAWI, I. and J. RANDA (1999), "Can Africa Export Manufactures? A Tale of Three Views", World Bank, Washington, D.C.

PERKINS, D. and M. SYRQUIN (1989), "Large Countries: The Influence of Size", *in* H. CHENERY and T.N. SRINIVASAN (eds.), *Handbook of Development Economics*, North-Holland, Amsterdam.

RODRIK, D. (1994), "Getting Interventions Right: How South Korea and Taiwan Grew Rich", *NBER Working Paper* No. 4964, National Bureau of Economic Research, Cambridge, Massachusetts.

RODRIK, D. (1995), "Trade Strategy, Exports and Investment: Another Look at East Asia", Institute of Policy Reform Discussion Paper, Institute of Policy Reform, Washington, D.C.

RODRIK, D. (1997), "Trade Policy and Economic Performance in Sub-Saharan Africa", paper prepared for the Swedish Ministry for Foreign Affairs, Stockholm, November.

RODRIK, D. (1999), "The New Global Economy and Developing Countries: Making Openness Work", *ODC Policy Essay* No. 24, Johns Hopkins University Press, Baltimore.

SEKKAT, K. and A. VAROUDAKIS (1998*)*, *Exchange Rate Management and Manufactured Exports in Sub-Saharan Africa*, Technical Paper No. 134, OECD Development Centre, Paris.

WILLIAMSON, J. (1994), "Estimating the FEERs", *in* J. WILLIAMSON (ed.), *Estimating Equilibrium Exchange Rates*, Institute for International Economics, Washington, D.C.

WILLIAMSON, J. (1997), "The Washington Consensus Revisited", *in* L. EMMERIJ (ed.), *Economic and Social Development in the XXI Century*, Inter-American Development Bank and Johns Hopkins University Press, Washington, D.C.

WOOD, A. (1997), "Openness and Wage Inequality in Developing Countries: The Latin American Challenge to East Asian Conventional Wisdom", *World Bank Economic Review*, Vol. 11.

WOOD, A. and K. BERGE (1997), "Exporting Manufactures: Human Resources, Natural Resources and Trade Policy", *Journal of Development Studies*, Vol. 34, October.

WOOD, A. and J. MAYER (1998), "Africa's Export Structure in Comparative Perspective", *in Economic Development and Regional Dynamics in Africa: Lessons from the East Asian Experience*, UNCTAD, Geneva.

WOOD, A. and T. OWENS (1997), "Export-Oriented Industrialization Through Primary Processing?", *World Development*, Vol. 25, September.

WORLD BANK (1998*a*), "Africa Can Compete! A Framework for World Bank Group Support for Private Sector Development in Sub-Saharan Africa", Private Sector Finance Group, Africa Region, World Bank, Washington, D.C.

WORLD BANK (1998*b*), "The Challenges of Globalization for Africa: Paper for Dakar Leaders Forum", World Bank, Washington, D.C.

*Chapter 3*

# Kenya's Recent Exchange-Rate Policy and Manufactured Export Performance

*Francis M. Mwega and Njuguna S. Ndung'u*

Trade liberalisation has formed a major component of the several structural adjustment programmes that Kenya has implemented since the mid-1970s. It has involved a reduction in tariffs and their variance as well as the tariffication of quantitative restrictions. Efforts to implement compatible macroeconomic and institutional reforms have accompanied it, along with direct export-promotion policies that, as explained below, have not had much success. This chapter analyses how, within this context, the real exchange rate (RER) has influenced the performance of Kenyan manufactured exports during the 1980s and 1990s.

The exchange rate plays an important incentive role in promoting manufactured exports. Nearly all countries that have become successful exporters of manufactures have had a stable and well-aligned real exchange rate. A good exchange-rate policy, however, cannot be sustained without both compatible fiscal and monetary policies and supportive non-price policies. If macroeconomic and trade policies are mismanaged, an appreciation in the real exchange rate and an increase in its volatility are likely, along with adverse effects on export performance caused by reduced profitability and the increased uncertainty of producing for export.

Diversifying a country's export basket has several advantages. First, it reduces vulnerability to changes in the external economy and the commercial risks arising from reliance on a few exports. Second, it should contribute to increasing export earnings and reducing their instability, thereby enhancing economic growth. Third, the potential for learning-induced productivity improvements may also increase with the number and variety of export products. According to Mayer (1996), the primary objective of an export-diversification policy should be to upgrade a country's production and export patterns by helping it to move successfully up the technological and skill ladder, consistent with its human and physical resource endowments, while tapping

the dynamic demand potential of world markets. Indeed, recent studies indicate that the impact of exports on growth increases markedly with the share of manufactures in exports, and that the effect of non-fuel primary exports is very nominal (Fosu, 1990, 1996).

## Export-Promotion Policies and Incentive Measures

This section puts the export-promotion efforts into a perspective that includes the nexus of trade liberalisation and institutional reform. Most direct export-promotion schemes, largely unsuccessful, became increasingly irrelevant as trade liberalisation and market reforms proceeded.

### *Direct Export-Promotion Policies*

*The Export Compensation Scheme*. The Local Manufactures (Export Compensation) Act of 1974 provided for cash compensation to offset import duties paid on inputs used to produce certain qualifying manufactured exports. It tried to encourage production of non-traditional exports, specifically manufactured ones.

Was it an effective tool to offset the anti-export bias? By the early 1980s, general agreement emerged that the export subsidy had quite limited impact. The rate, at 10 per cent of the f.o.b. value of goods manufactured in Kenya with a local value added of at least 30 per cent, was fairly low. Payments encountered much delay. In the 1980s, one-third to two-thirds of the total subsidy payments accrued to four firms, while the payments covered only about 5 per cent of manufactured exports. Hence, the subsidy had minimal incentive value (World Bank, 1990), and its impact on Kenyan manufactured-export performance was at best marginal. In effect, the few firms that received the subsidy treated it as a windfall rather than as an incentive to increase exporting. The programme had several inadequacies, such as definitional ambiguities regarding eligible export goods, a lack of sufficient incentive value, restrictive eligibility requirements, and excessive paperwork and procedural requirements. These inadequacies — especially the poor definitions — created large loopholes and led to fraud.

A *Duty and Value-Added Tax (VAT) Drawback* scheme for intermediate inputs replaced it definitively in 1993. Drawback had been established in 1990 to provide incentives to manufacturers whose exports were not eligible for export compensation and whose imports attracted duty and VAT. Under the scheme, the Export Promotion Programmes Office at the Treasury provides full refunds on duties and valued-added taxes paid on raw materials by exporting firms. The scheme covers more than 300 firms selling a wide range of goods and services. Yet it too has problems, such as limited public knowledge of the scheme's existence and its procedures, too much documentation, unclear eligibility criteria and a non-transparent bureaucracy. It takes too long to obtain refunds, which involve cumbersome audit procedures and expensive bonds that block capital in an environment where credit is very expensive.

*The Manufacturing-Under-Bond Scheme*, started in 1988, is implemented jointly by the Investment Promotion Centre and the Customs Department. Designed for firms producing entirely for export, it offers incentives such as waivers on import duties and taxes on imports used to produce export goods. A firm wishing to be licensed under it must show evidence of a market for its products, access to adequate technology and know-how, and sufficient financial backing. Its problems also include expensive security bonds. It requires a bewildering array of multiple bonds — for warehouse imports, removal of goods for manufacture and export, duty and import cover for imports cleared at the Inland Container Terminal in Nairobi and import cover for goods cleared through the airport in Nairobi and another at Mombasa. These bonds tend to block funds needed for company operations because production is wholly for export. Serious administrative problems in the Customs Department entail additional costs to firms. At its peak in 1989, the scheme included almost 40 firms. The number fell to 21 in 1994, 11 in 1996, operating at 50 per cent of capacity, and only eight in 1998, mainly subcontractors of large firms. Judged a failure, the scheme's impact on export promotion has been marginal.

*Export-Processing Zones (EPZs)* facilitate the processing, manufacture and assembly of goods and services destined primarily for export markets. Transactions in EPZs are not subject to import restrictions and tariffs, and thus they escape the delays and administrative costs often associated with other "partial-export" regimes. Established in 1991, the EPZ scheme provides a package of benefits to export-oriented firms within designated zones. By 1995, Kenya had 12 EPZs at various stages of development. They had an accumulated total investment of Ksh. 3.9 million. In 1998, 22 companies operated in EPZs.

The EPZ firms receive various benefits, such as exemption from corporate tax for the first ten years of operation, from duty and VAT on all their inputs and from stamp duty, rent and tenancy controls, industrial and statistics registration requirements and the Factories Act. They are granted work permits for expatriate staff and get on-site customs inspection and high-quality infrastructure. These incentives are intended to lower production costs compared with those of firms operating outside the EPZs. Yet the EPZs' contribution to total exports in the economy has not reached 1 per cent on average, and they touched only 1.1 per cent of total exports in 1997[1].

Products from EPZs do not get preferential treatment in regional trade, where rules of origin seem to apply effectively. In the Common Market for Eastern and Southern Africa, exports from EPZ companies are treated as foreign products. Because of the incentives granted to them, these companies do not operate on an equal footing with firms from other member countries. This defeats the whole intent of EPZs, namely to promote export expansion in regional trade, and it may explain why EPZs have stagnated and the number of firms has not increased. It has been a major drawback to investing in EPZs.

Since liberalisation, the environment for EPZs has changed. Some of the incentives provided to EPZ firms would better encompass the whole economy, instead of an enclave of foreign firms assembling for export and adding no significant value to the domestic economy. In a liberalised economy, EPZs are not particularly necessary. The same incentive structure (or variants of it) should extend to all exporters.

### *Trade Liberalisation and Institutional Reform Policies*

Policies, notably trade liberalisation, to enhance competitiveness in both domestic and external markets made up the first category of reforms. Institutional reform policies, the second category, touch on domestic markets, including the labour market.

*External Trade Liberalisation*. Liberalisation of external trade received great attention in Kenya's reform programme. A number of measures implemented under the Fourth Development Plan (1979-84) had the overall objective of making the industrial sector more efficient and outward-oriented. They included removing quantitative restrictions, reducing tariff levels, introducing additional direct export-promotion measures and allowing a flexible exchange-rate regime. The first two were adopted between 1980 and 1984.

Import liberalisation has made considerable progress since the early 1980s. Between 1980 and 1985, the share of items that could be imported without restrictions rose from 24 per cent to 48 per cent of the total value of imports. The average tariff rate fell by about 8 per cent (Swamy, 1994). An improved import-licensing system established at that time, with restricted and unrestricted schedules, underwent significant improvement in 1988. The new system created five schedules to increase strictness in licensing requirements. Unrestricted licensing gradually extended to certain schedules, and several items moved from one schedule to another over the years; by July 1991 the only imports still under licensing were those restricted largely on health, security, and environmental grounds. Further changes occurred between 1991 and 1993, when the Foreign Exchange Allocation Committee, the Import Management Committee, and the requirement for a foreign-exchange allocation licence were abolished.

By November 1993, all administrative controls on international trade — including import licensing and foreign-exchange allocation, together with their institutional infrastructures — had been abolished. Tariff reform also progressed, with tariff rates gradually lowered and tariff bands reduced. Between 1989/90 and 1991/92, for instance, overall production-weighted tariffs declined from 62 per cent to 48.5 per cent (Swamy, 1994). The maximum tariff rate dropped from 135 per cent in the 1980s to 45 per cent by 1994. The number of non-zero bands narrowed from 25 to six during the same period, and since 1987/88 this has reduced tariff dispersion (Table 3.1).

Table 3.1. **Distribution of Goods by Tariff Band**
(percentages)

| Tariff | 1987/88 | 1988/89 | 1989/90 | 1990/91 | 1991/92 | 1992/93 | 1993/94 | 1994/95 | 1995/96 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 6.9 | 7 | 5.8 | 6.1 | 3.7 | 2.9 | 3.1 | 3.2 | 3.3 |
| 1-10 | 0.3 | 6.9 | 1.6 | 1.6 | 4 | 4.6 | 5.2 | 4.9 | 1.8 |
| 11-30 | 30.7 | 29.6 | 37.6 | 37.4 | 47.6 | 47.6 | 56.5 | 67.8 | 71.8 |
| 31-50 | 45.4 | 43.7 | 23.8 | 21.6 | 17.6 | 20.8 | 35.3 | 24.1 | 23.1 |
| 51-60 | 3.9 | 5.6 | 6.0 | 6.3 | 3.0 | 24.0 | — | — | — |
| 61-70 | 3.8 | 4.1 | — | — | 24.0 | — | — | — | — |
| 71 | 9 | 9.2 | 25.2 | 27.1 | — | — | — | — | — |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Source:* Kenyan Ministry of Finance.

Tariff harmonisation has also gone forward. Average tariff rates declined significantly by the 1990s, but two factors disturbed the general downward trend. First, average tariffs reached their highest level in 1989/90 as equivalent tariffs replaced quotas. Second, temporarily raised tariffs covered a government revenue shortfall in 1993/94. Table 3.1 shows a clustering of goods around the tariff level of 11-30 per cent and a slightly smaller one at 31-50 per cent. Average tariffs rates fell drastically, however (Table 3.2). The only trade protection remaining in Kenya by the end of 1995 was the provision to impose countervailing duties, aimed at curbing unfair competition from exports subsidised by other countries.

Table 3.2. **Average Tariff Rates**
(percentages)

| Tariff Rate | 1987/88 | 1988/89 | 1989/90 | 1990/91 | 1991/92 | 1992/93 | 1993/94 | 1994/95 |
|---|---|---|---|---|---|---|---|---|
| Average | 42.5 | 44.38 | 49.17 | 47.17 | 39.39 | 36.56 | 40.48 | 27.27 |
| Weighted | NA | NA | NA | 31.78 | 27.17 | 27.25 | 30.90 | 22.21 |

*Source:* Kenyan Ministry of Finance.
NA = not available.

*Domestic Trade Liberalisation*. Price controls extended to most Kenyan manufactured and agricultural products at the end of the 1970s. Their origin traced back to the Price Control Ordinance of 1956. Price controls on staple commodities tried to protect low-income wage earners, whereas those on manufactured products sought to prevent monopolistic pricing practices (Swamy, 1994).

From 1986 to 1995, price controls for nearly all commodities were dismantled. Between 1983 and 1991, the number of commodities with prices subject to control under the general order dropped from 56 to six, while those controlled under specific order fell from 87 to 29 (Swamy, 1994). By September 1993, only the prices of petroleum products and some pharmaceuticals remained controlled under the general order, while only three items remained under specific order. By July 1995, even the maize market (hitherto the most resistant to reform and the central focus of donors) and the petroleum/oil sector had been completely liberalised.

*Marketing Support*. The Kenyan authorities have also attempted to strengthen the government departments responsible for promoting exports and supporting regional and multilateral trade arrangements. The establishment of the Export Promotion Council (EPC) in 1993 improved the environment in which private exporters operate by helping them to overcome bottlenecks. Its main objectives include formulating market strategies and identifying export opportunities; promoting an "export culture" to enhance export-led growth; and co-ordinating and harmonising export-promotion activities.

*Reducing Barriers to Foreign Ownership and Investment*. A free exchange regime has facilitated the repatriation of dividends by foreign investors. Together with the removal of barriers to foreign commercial private borrowing, it has provided a more enabling environment for foreign investors. Furthermore, the establishment of EPZs has allowed unrestricted foreign ownership and employment of expatriates as well as control over foreign exchange earnings, in addition to extensive tax advantages.

Financial-sector reforms — particularly the amendment of the Capital Markets Authority (CMA) Act — have further eased restraints on foreign ownership. The CMA, established in 1990, has attempted to liberalise Kenya's financial and capital markets. As one result, trading on the Nairobi Stock Exchange (NSE) was opened to foreign investors on a limited scale in January 1995. In June 1995, the limit on portfolio investment in Kenyan companies quoted on the NSE by foreigners was raised from 20 per cent to 40 per cent for corporate investors and from 2.5 per cent to 5.0 per cent for individual portfolio holders.

*Labour Market Reforms*. The labour market has undergone considerable liberalisation since 1993. In July 1994, the Industrial Court allowed trade unions to seek full compensation for price increases without hindrance from wage guidelines. Various laws have been amended to allow firms to discharge redundant workers more easily when necessary. The removal of wage guidelines made it possible for firms to negotiate and change the level of wages on the basis of productivity and performance rather than, as hitherto, on the basis of cost-of-living indices. All these reform measures have a direct bearing on the performance of the export sector.

## Performance of Manufactured and Other Exports in the 1980s and 1990s

The performance of Kenya's export sector in the 1980s was lacklustre; exports grew less than GDP (Table 3.3), with their value falling at an average of 2.6 per cent per year. Recovery occurred in the 1990s, however, and they increased by 15 per cent per year on average, to reach 26.1 per cent of GDP by 1996. Exports can be categorised as traditional and non-traditional, with the latter further subdivided into primary and manufactured products. Defining traditional exports broadly to include the Standard International Trade Classification (SITC) three-digit categories accounting for more than 3 per cent of total exports in a base year (1980), they include for Kenya coffee (SITC 071), tea and mate (SITC 074), petroleum products (SITC 334) and crude vegetable materials (SITC 292). Table 3.3 shows how the share of these traditional exports in GDP declined between 1980 and 1989, then rose through 1996. Their share of total exports followed a similar pattern, but in both cases the 1996 levels remained well below the highs of 1980. The export basket has indeed become more diversified. Table 3.4 shows a significant decline in the ratio of the top three exports as a group to total exports between 1980-84 and 1995-96.

Coffee, tea, and petroleum are by far the dominant traditional exports, although petroleum products make only a small contribution to foreign-exchange earnings because Kenya mainly re-exports them after processing. While export volumes of coffee and tea expanded [coffee from 86 994 metric tons (mt) a year in 1979-83 on average to 94 976 mt in 1994-96, and tea from 84 905 mt to 218 336 mt], their prices either remained stagnant or generally declined. The price of coffee, for example, averaged $2.95 in 1979-83 and $2.90 in 1994-95, while that of tea dropped from $1.81 to $1.64. Petroleum export prices also declined (from $0.23 to $0.19 per litre), as did

the volume exported (from an average of 814 mt per year in 1979-83 to 444 mt in 1994-96). Tea and crude vegetable products increased their shares relative to those of coffee and petroleum products.

Table 3.3. **Total Export Performance**

| | Total Exports | | Traditional Exports | | |
|---|---|---|---|---|---|
| Year | $ Million | % of GDP | $ Million | % of GDP | % of Exports |
| 1980 | 1 318.0 | 21.8 | 930.75 | 15.4 | 70.6 |
| 1981 | 1 388.8 | 19.8 | 936.33 | 13.3 | 67.4 |
| 1982 | 992.2 | 18.5 | 703.81 | 13.1 | 70.9 |
| 1983 | 994.8 | 19.1 | 650.9 | 13.1 | 68.9 |
| 1984 | 1 041.2 | 19.6 | 766.17 | 14.4 | 73.6 |
| 1985 | 957.4 | 17.9 | 694.69 | 13.0 | 72.5 |
| 1986 | 1 182.6 | 18.8 | 858.48 | 13.7 | 72.6 |
| 1987 | 913.2 | 13.3 | 591.68 | 8.6 | 64.8 |
| 1988 | 986.8 | 14.2 | 626.16 | 9.0 | 63.5 |
| 1989 | 925.8 | 13.4 | 364.65 | 5.3 | 39.4 |
| 1990 | 1 022.8 | 14.7 | 634.09 | 9.1 | 52.4 |
| 1991 | 1 091.6 | 16.1 | 671.14 | 9.9 | 61.5 |
| 1992 | 943.6 | 15.0 | 564.19 | 9.0 | 59.8 |
| 1993 | 1 063.2 | 25.6 | 499.40 | 12.0 | 47.0 |
| 1994 | 1 162.0 | 24.7 | 886.05 | 11.7 | 46.9 |
| 1995 | 1 674.8 | 24.2 | 794.46 | 11.6 | 47.7 |
| 1996 | 2 071.2 | 26.1 | 971.84 | 12.2 | 46.9 |

*Source:* Government of Kenya, *Economic Survey* and *Annual Trade Report*, various issues.

Table 3.4. **Composition of Exports**

| SITC Article | | 1980-84 | 1985-89 | 1990-94 | 1995-96 |
|---|---|---|---|---|---|
| Percentage Composition of Traditional Exports | | | | | |
| 71 | Coffee | 34.7 | 43.2 | 27.5 | 32.2 |
| 74 | Tea and Mate | 23.4 | 32.3 | 45.6 | 42.4 |
| 292 | Crude Vegetable Materials | 4.0 | 5.2 | 9.3 | 12.5 |
| 334 | Refined Petroleum Products | 37.8 | 19.3 | 17.6 | 13.0 |
| | Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Top Three Exports as Percentage of Total Exports | | | | | |
| 71 | Coffee | 24.8 | 29.7 | 14.5 | 15.2 |
| 74 | Tea and Mate | 16.8 | 22.0 | 24.0 | 19.9 |
| 334 | Refined Petroleum Products | 26.8 | 13.2 | 9.6 | 6.1 |
| | Total | 68.4 | 64.9 | 48.0 | 41.2 |

*Source:* Government of Kenya, *Annual Trade Report*, various issues.

Exports of manufactures are relatively unimportant. The import-substitution industrialisation strategy pursued until the early 1980s did not successfully increase them. Their value generally declined in the 1980s but increased in the 1990s. Manufactured exports made up about 11.7 per cent of total exports and about 36.9 per cent of non-traditional exports in the 1980s (Table 3.5), and, except for beverages and tobacco, the proportion of output exported by Kenyan industries declined (Table 3.6). Industrial goods then rose in the 1990s to about 27 per cent of total exports and 60 per cent of non-traditional exports; hence, some diversification towards manufactures has occurred.

Table 3.5. **Shares of Manufactures in Total and Non-Traditional Exports**
(percentages)

| SITC | Type of Export | 1980-84 | | 1985-89 | | 1990-94 | | 1995-96 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total | N-T* | Total | N-T* | Total | N-T* | Total | N-T* |
| 5 | Chemicals and Related Products | 3.1 | 18.7 | 3.2 | 7.5 | 4.2 | 10.9 | 6.5 | 15.2 |
| 6 | Manufactured Goods, classified by material | 6.7 | 22.1 | 6.2 | 10.1 | 11.4 | 25.7 | 15.0 | 30.0 |
| 7 | Machinery and Transport Equipment | 0.5 | 3.0 | 0.7 | 1.4 | 0.6 | 1.6 | 1.3 | 2.9 |
| 8 | Miscellaneous Manufactured Articles | 1.2 | 7.3 | 1.7 | 3.8 | 10.4 | 24.9 | 5.2 | 12.0 |
| | Total | 11.5 | 51.0 | 11.9 | 22.8 | 26.5 | 63.1 | 27.9 | 60.0 |

*Note:* * N-T = non-traditional.
*Source:* Government of Kenya, *Annual Trade Report*, various issues.

Table 3.6. **Shares of Manufacturing Output Exported in the 1980s**
(Annual averages, in percentages)

| | 1979-83 | 1984-88 |
|---|---|---|
| Food Products | 5.7 | 2.7 |
| Beverages and Tobacco (excluding coffee and tea) | 2.0 | 2.4 |
| Chemicals (including petroleum products) | 7.3 | 4.6 |
| Machinery and Transport Equipment | 1.5 | 1.3 |
| Other Manufactures | 7.5 | 5.7 |
| Total, Manufacturing Sector | 5.9 | 3.8 |

*Source:* World Bank (1990).

The United Nations Development Programme (UNDP) and the World Bank (UNDP/World Bank, 1993) attribute Kenya's poor performance in both traditional and non-traditional exports in the 1980s to domestic policies rather than external constraints, with incentives biased against exports, especially manufactured ones. Landell-Mills and Katz (1991) postulate that restrictive trade policies during the first half of the 1980s were responsible. Quantitative import restrictions imposed in 1980 and 1982 raised effective rates of protection, which shielded inefficient activities and tended to discriminate against products for which Kenya had a comparative advantage, such as food-based manufacturing. This discretionary and non-transparent system made costs, competition in domestic markets, and access to inputs difficult to predict[2]. Other factors often cited include a decrease in exports to neighbouring countries, especially Tanzania, where the volume of imports from Kenya has still not recovered from the break-up of the East African Community in 1977; growth in domestic demand for such products as paper; and supply constraints, especially intermittent shortages of foreign exchange to purchase intermediate inputs (Sharpley and Lewis, 1988).

The Kenyan authorities attribute the good performance in the 1990s to trade reforms and the depreciation of the Kenyan shilling. In addition, rescue activities arising from turmoil in neighbouring countries, particularly Somalia and Rwanda, boosted production and exports of manufactures to the region. In general, the performance of manufactured exports has reflected that of the manufacturing sector,

where growth slowed to 4-5 per cent per annum in the 1980s after advances in the 1960s and 1970s. Manufacturing investment and its productivity declined. Until the reforms of the early 1990s, this arose from increased political instability, cumbersome bureaucracy, price controls, constraints on repatriation of dividends, and shortages of foreign exchange, which made acquisition of imported inputs uncertain or irregular (Friedrich-Naumann-Stiftung, 1992). Reduced opportunities for easy import substitution in consumer goods also played a role.

To recapitulate, exports have not only increased significantly in the 1990s after a very poor performance in the 1980s, but also have diversified somewhat from traditional to non-traditional products and, within non-traditional exports, from primary to manufactured goods. The Gini-Hirschman concentration index, for example, declined steadily from 0.43 in 1980 to 0.28 in 1996[3].

Yet an anti-export bias persists. Table 3.7 measures it, in a formulation based on effective import-tariff and export-tax rates. Any form of import barrier also is an implicit tax on exports. For example, exchange controls forced exporters to surrender their export proceeds at grossly overvalued exchange rates, thus reducing profit margins measured in local currency[4]. Export taxes reduce the profitability of exports and bias the production structure towards non-tradable goods. The index of anti-export bias in Table 3.7 approached the level of one (no bias) only in 1991-92. It was highest in 1987, at 23 per cent, and lowest in 1992, at 8 per cent. The index captures only observable tax policies. Other administrative biases are difficult to observe and quantify. Dismantling marketing monopolies and liberalising exchange-rate regimes are important avenues for raising the profitability of export activities and encouraging outward-oriented production. With further liberalisation and reduction of tariffs and taxes, the anti-export bias should be eliminated. As a complementary measure, the administrative machinery for imports and exports should be fine-tuned.

Table 3.7. **Indicators of the Anti-Export Bias**

| Year | $1 + t_m$ | $1 - t_x$ | Anti-Export Bias* |
|---|---|---|---|
| 1980 | 1.13 | 0.985 | 1.14 |
| 1981 | 1.16 | 0.994 | 1.17 |
| 1982 | 1.18 | 0.990 | 1.19 |
| 1983 | 1.17 | 0.988 | 1.18 |
| 1984 | 1.17 | 0.987 | 1.19 |
| 1985 | 1.14 | 0.966 | 1.18 |
| 1986 | 1.17 | 0.959 | 1.22 |
| 1987 | 1.18 | 0.959 | 1.23 |
| 1988 | 1.16 | 0.983 | 1.18 |
| 1989 | 1.14 | 0.973 | 1.17 |
| 1990 | 1.12 | 0.999 | 1.13 |
| 1991 | 1.11 | 1.00 | 1.11 |
| 1992 | 1.08 | 1.00 | 1.08 |
| 1993 | 1.13 | 1.00 | 1.13 |
| 1994 | 1.16 | 1.00 | 1.16 |

*Note:* * The bias is calculated from the effective import-tariff rate, $t_m$ = (total value of tariff revenue/total value of imports)*100, and the computed effective export-tax rate, $t_x$ = (total value of export taxes/total value of exports)*100. The index emerges as $(1+t_m)/(1-t_x)$. It measures bias in terms of deviations from a value of one.

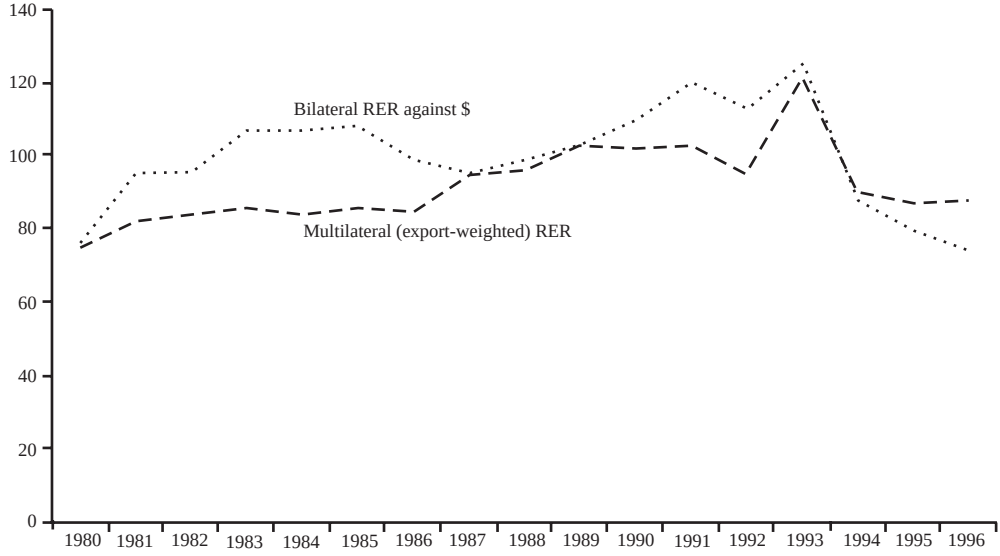
**Foreign Exchange Reforms, the Real Exchange Rate and Misalignment**

The implementation of competitiveness-enhancing reforms benefited from the liberalisation of foreign-exchange operations, which included the removal of controls and freeing of the exchange rate that led to a large devaluation of the shilling, especially in 1992-93. Other moves introduced Foreign Exchange Bearer Certificates (Forex Cs) in October 1991, started export-earnings retention schemes for exporters in 1992, merged the official rate of exchange with the inter-bank rate in 1993, removed exchange controls from current-account transactions and nearly all capital-account transactions, and scrapped the 90-day Forex surrender limit. These reforms made the foreign-exchange market much less restrictive. In the 1994 Budget Speech, all regulations pertaining to the Exchange Control Act were suspended, and in December 1995 Parliament finally repealed it. A move to allow legalisation of foreign exchange bureaux also came in 1995.

These reforms considerably eased the constraints on Kenya's productive sectors — especially manufacturing and agriculture — from acute shortages of imported inputs, which had occurred whenever foreign exchange was not available when required. They had resulted not only in frequent interruptions of many firms' production schedules but also in chronic under-use of installed capacity. As long as foreign-exchange controls persisted, the availability of imported inputs depended on available foreign-exchange allocations. Once they were removed, the determination of import demand reverted to its fundamentals, with foreign-exchange availability no longer a significant determinant. Reform may also have helped to improve hitherto prohibitive transaction costs.

One objective of these reforms has been to reduce RER misalignment, defined as sustained deviations of the actual real exchange rate from its long-run "equilibrium" rate (ERER)[5]. RER is formally defined as the price of tradables in terms of non-tradables ($P_t/P_{nt}$). It is difficult to find an exact empirical measure for this definition, and various proxies for RER have been adopted in the literature. It usually is approximated by the product of an index of the nominal exchange rate (NER) and an index of wholesale foreign prices (WPI) divided by an index of domestic consumer prices (CPI). Figure 3.1 shows the evolution of a bilateral RER measured against the US dollar and a multilateral RER, which are fairly successful in reproducing the salient episodes in the macroeconomic history of Kenya in the 1980s and 1990s[6].

Figure 3.1. **Changes in RER, 1980–96 (1987=100)**




Between October 1975 and December 1982, the Kenyan shilling was pegged to the SDR, which, calculated from a basket of currencies, was considered to be relatively more stable than a single-currency peg, especially following the floating of the US dollar in 1973. During the SDR peg, the shilling underwent a number of discretionary devaluations.

Kenya implemented a crawling peg in 1983-91, adjusting the exchange rate daily against a composite basket of currencies of the country's main trading partners to reflect inflation differentials. It considered the abandoned SDR peg inadequate to maintain the competitiveness of the Kenyan shilling because the weights used did not reflect Kenya's trade pattern (which was more diversified, with the currencies included in the SDR accounting for only 40 per cent of the country's combined exports and imports). In this period, the RER held relatively stable.

Since 1991, the authorities have used a more market-based regime; the shilling has been made convertible by fully liberalising the current and capital accounts, with a stable and "realistic" rate to be maintained through prudent fiscal and monetary policies. In June 1994 the government said it would abide by the requirements of Article III of the IMF's Articles of Agreement to promote the full convertibility of the Kenyan shilling, at least for current-account transactions. A massive depreciation of the RER in 1993 followed the introduction of the inter-bank market in August 1992. The RER subsequently appreciated in 1994-96. Because ERER is not observable, RER misalignment is proxied in various ways. One method, suggested by Ghura and Grennes (1993), estimates the time path of ERER from a co-integration equation and normalises it, so that it starts from a common base with the actual RER during a period when the economy was to a large extent in internal and external balance[7].

Taking 1970 as a year when Kenya had both internal and external balances (Elbadawi and Soto, 1995), Figure 3.2 shows the evolution of RER misalignment. The country registered average misalignment of 6.8 per cent in the 1980s and 11 per cent in 1990-96, supporting the contention that Kenya has on average maintained a fairly good exchange-rate policy (Takahasi, 1997).

Figure 3.2. **The Evolution of RER Misalignment, 1980–96 (1987=100)**


## Impact of the RER and Its Misalignment on Manufactured Exports

A wide range of policies and factors can influence manufactured exports. Kenya's 1997-2001 Development Plan calls for more outward-oriented policies to increase the volume of exports and thus improve the balance of payments. Liberalisation of the trade regime through a reduction of tariffs and their variance as well as the tariffication of quantitative restrictions is usually expected to lead to export diversification, with new markets discovered and new products becoming exportable. Dynamic effects during the liberalisation process, caused by resource flows into new exporting firms, may increase creativity and innovation, which in turn result in further diversification. The impact of trade liberalisation, however, will likely depend as well on accompanying factors, particularly a high and stable real exchange rate, compatible fiscal and monetary policies, and low distortions in factor markets (Nogues and Gulati, 1994).

One can employ a standard analysis to investigate the extent to which manufactured exports have responded to the real exchange rate and its misalignment, using annual panel data for 1980-95 with the derivation of data on RER and RERMIS as reported above. It postulates the supply of exports to be a function of domestic capacity to produce (usually measured by real GDP) and the price of exports relative to domestic prices (usually proxied by the real exchange rate). It assumes that Kenya is a small economy, so that exporters take external demand conditions as given. In this case, a simple dynamic panel model was estimated for the 170 three-digit manufactured-export categories (SITCs 5-8) in Kenya's annual trade reports:

$$RX_t = f(RGDP_t , RER_t , RERMIS_t , RX_{t-1})$$

where $RX_t$ is nominal manufactured exports deflated by their one-digit SITC export price indices, *RGDP* is aggregate real manufacturing GDP, *RER* is the bilateral RER, and *RERMIS* is RER misalignment.

The first equation in Table 3.8 shows the random-effects results from estimating the model for manufactured exports. The table also shows the results from estimating the model using the generalised method of moments (GMM), as significant feedback effects from manufactured exports to manufacturing GDP are likely when the lagged dependent variable is correlated with the residuals. These variables were therefore replaced by instrumental variables using the GMM estimator proposed by White (1982) — lagged values of the endogenous variables, with RER and RERMIS taken to be exogenous. This follows the proposal by Holtz-Eakin, Newey, and Rosen (1988) and Allerano and Bond (1991) that one can use the orthogonal restrictions implied in the data dynamics to achieve efficiency if the error terms are serially uncorrelated[8].

Table 3.8. **Panel Regression Model Estimates for Aggregate Manufactured Exports**

| | Random Effects | | GMM-IV | | GMM-IV | |
|---|---|---|---|---|---|---|
| Variable | Coeff. | *t*-stat. | Coeff. | *t*-stat. | Coeff. | *t*-stat. |
| Constant | -0.296 | -0.097 | 1.188 | 0.306 | -16.178 | -3.335 |
| Ln*RGDP* | 0.854 | 5.070 | 0.676 | 3.421 | 0.978 | 4.732 |
| Ln*RER* | -0.816 | -1.482 | -0.966 | -1.499 | | |
| Trend in RER | | | | | 2.316 | 2.774 |
| Transitory in RER | | | | | -0.465 | -0.711 |
| *RERMIS* | -0.011 | -2.560 | -0.012 | -2.596 | -0.003 | -0.710 |
| Log$RX_{t-1}$ | 0.857 | 78.165 | 0.902 | 46.873 | 0.910 | 46.652 |
| Sample | 2.207 | | 1.992 | | 1.992 | |
| Adjusted $R^2$ | 0.710 | | 0.700 | | 0.700 | |
| Standard Error | 1.480 | | 1.472 | | 1.462 | |

The results show the following. First, manufactured exports increase consistently with capacity to produce, with the GDP coefficient positive and significant in both equations. A 1 per cent increase in real manufacturing GDP increases real manufactured exports by 0.68-0.97 percentage points. Second, the first two equations show RER to

have a non-significant coefficient, which suggests that it has not played an important role in the promotion of manufactured exports in Kenya. RER misalignment, conversely, has a negative and significant impact on manufactured exports, which suggests that what has mattered is not the level of the RER but the extent to which it deviates from the equilibrium real exchange rate. As Table 3.9 reveals, however, RER and RERMIS are highly correlated (-0.78), making it difficult to separate their individual effects with confidence.

Table 3.9. **Correlation Coefficients**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| 1. Ln*RX* | 1.000 | | | | | |
| 2. Ln*RGDP* | 0.169 | 1.000 | | | | |
| 3. Ln*RER* | -0.100 | -0.030 | 1.000 | | | |
| 4. Trend in *RER* | -0.005 | 0.278 | 0.470 | 1.000 | | |
| 5. Transitory in *RER* | -0.087 | -0.308 | 0.466 | -0.561 | 1.000 | |
| 6. *RERMIS* | 0.059 | 0.011 | -0.777 | -0.320 | -0.407 | 1.000 |

The third equation in Table 3.8 decomposes RER into trend and transitory RERs[9]. In these GMM-IV results, which control for feedback effects from manufactured exports to real manufacturing GDP as well as the lagged dependent variable, the trend RER has a positive and significant coefficient, while both the transitory RER and RERMIS have negative but non-significant coefficients[10]. This suggests that depreciating the trend RER has a positive impact on manufactured exports. Yet Table 3.10 shows that this result is not very robust and is reproduced only for machinery and transport equipment (SITC 7), with trend RER non-significant for the other manufactured export categories (although it has a consistently positive coefficient). Last, lagged real manufactured exports have the most significant coefficient, suggesting the presence of strong persistence effects in export behaviour.

Table 3.10. **GMM-IV Estimates for Manufactured Exports by the Various SITC Categories**

| | SITC 5 | | SITC 6 | | SITC 7 | | SITC 8 | |
|---|---|---|---|---|---|---|---|---|
| Variable | Coeff. | *t*-stat. | Coeff. | *t*-stat. | Coeff. | *t*-stat. | Coeff. | *t*-stat. |
| Constant | -5.126 | -0.609 | -10.054 | -1.251 | -31.475 | -2.600 | -16.040 | -1.653 |
| Log*RGDP* | 0.590 | 1.645 | 0.693 | 2.057 | 1.194 | 2.346 | 1.636 | 3.835 |
| Trend Log *RER* | 0.457 | 0.311 | 1.380 | 1.007 | 5.290 | 2.515 | 1.453 | 0.886 |
| Transitory Log *RER* | -0.409 | -0.330 | -0.048 | -0.044 | -2.018 | -1.296 | 0.616 | 0.490 |
| *RERMIS* | 0.003 | 0.363 | -0.002 | -0.268 | -0.013 | -1.108 | -0.002 | -0.180 |
| Log $RX_{t-1}$ | 0.915 | 26.209 | 0.920 | 22.003 | 0.905 | 14.962 | 0.883 | 24.753 |
| Sample | 377 | | 697 | | 513 | | 405 | |
| Adjusted $R^2$ | 0.760 | | 0.670 | | 0.460 | | 0.790 | |
| Standard Error | 1.213 | | 1.489 | | 1.665 | | 1.285 | |

Several factors constrain the responsiveness of manufactured exports to exchange-rate policies. The effectiveness of the real exchange rate in influencing their growth depends crucially on accompanying policies. Trade policies in Kenya have not been very supportive. Reversals and lack of credibility characterised trade-liberalisation

efforts in the 1980s (Reinikka, 1994). Although some such efforts were implemented in the early and mid-1980s, mainly as part of the policy conditionality of the World Bank, they faced problems of macroeconomic incompatibility and probably timing because a new government had just taken over in 1978. Those in 1988-89 were perceived as macroeconomically incompatible, as aid flows contracted with compensating devaluation delayed. Loopholes in the tariff law, import-duty avoidance and illegal imports undermined tariffication of quantitative restrictions and tariff reduction.

Unlike Southeast Asia, where foreign direct investment (FDI) played a crucial role as an "engine" of growth by strengthening export capabilities, it has been relatively unimportant in Kenya. FDI and net long-term capital inflows have both declined as a proportion of GDP. The ratio of FDI to GDP fell from 1.37 per cent in 1980 to 0.03 per cent in 1993.

Long-term net capital inflows declined from 8 per cent of GDP in 1980 to negative average net flows in the 1990s, obviously unable to cover the current-account deficit. The rate of investment also declined, from 29.3 per cent in 1980 to 16.9 per cent in 1992, before partially recovering to 21.1 per cent in 1996.

Collier (1996) argues that economic reforms implemented in African countries are a necessary but not sufficient condition for achieving rapid export-growth rates. Investors view Africa as a high-risk area. The perceived high probability of policy reversals acts as a major deterrent to investment. It partly reflects the long history of economic controls in the region, compounded by poor dissemination of information to potential investors on the conditions in individual African countries and the region in general. In addition, dismantling of controls has progressed along lines dictated by pressure groups, which gain by extracting illegal rents in the process.

A reforming government should accordingly place a high priority on accelerating the reduction of the perceived risks. It can establish and use policy lock-in mechanisms or "agents of restraint", both domestic and external. The domestic options include export lobby groups, an independent central bank, use of a cash budget, and balanced-budget constitutional amendments. The external ones might involve the World Trade Organisation, reciprocal trade arrangements, the Multilateral Insurance and Guarantee Agency and associated insurance agents, and currency convertibility. Governments need to signal their determination to implement reforms by extending and deepening them even when foreign aid is not forthcoming, in order to establish the reputation and credibility of their policies.

The ability of exporters to respond to exchange-rate policy will also depend on non-price variables. Jebuni *et al.*, (1992) identify several of these. The first is the availability of finance, which respondents in field surveys usually identify as one of the most important constraints on exporting. Producing for export requires access to finance for working capital and pre-shipment activities, as well as to capitalise production to enhance export capabilities. Export-credit insurance helps exporters gain confidence in tapping new markets. Kenya does not provide either export-credit or insurance guarantees. Despite several recommendations, the argument has held that

as long as the government will cover political risks, a consortium of private firms or their trade organisations would combine efforts to cover commercial ones. The government has lacked a firm commitment.

In Kenya's RPED survey, 80 per cent of the respondent firms mentioned lack of financing for their operation and expansion, or the cost of financing, as a moderate to major obstacle. They ranked lack of credit ahead of slow demand, poor infrastructure, and inadequate business-support services as a key constraint on expansion. An analysis of this survey concludes that collateral borrowing does not work well, and access to debt is restricted for nearly all groups of firms, particularly the very small ones (Gothenburg University and University of Nairobi, 1994). One analyst recommends stronger, expanded property rights, to allow owners to transfer real property without the consent of the Land Control Boards. These boards can veto the transfer of land to banks after borrowers fail to repay loans, creating uncertainty in the loan-recovery process.

A second barrier lies in infrastructural inadequacies — in transport, water supply, electric power, waste disposal, security and telephones, as well as the availability of secure, reasonably priced storage and warehousing facilities at ports. In the RPED survey, only 31 per cent of the firms felt unaffected by infrastructural problems. In the face of poor delivery of these services, many firms must themselves provide some of them, which reduces their competitiveness.

Third, poor access to external markets arises from ignorance, lack of agents abroad, the high cost of operating in foreign markets, insufficient interest and experience in selling abroad given a fairly protected domestic market, and poor product quality. Fourth, and notwithstanding its rapid reform throughout the 1990s, an adverse regulatory environment still affects ownership of firms, tax structures, investment, labour regulations, licensing and registration procedures, obstacles to exit and price controls (Gothenburg University and University of Nairobi, 1994).

## Conclusions

This chapter has analysed the role that the real exchange rate (RER) and its misalignment have played in influencing Kenyan manufactured export performance in the 1980s and 1990s. It has looked at the performance of manufactured exports in the context of the country's overall export performance, discussed the evolution of the RER and its misalignment, and assessed their impact on manufactured exports.

Kenya's export sector performed poorly in the 1980s and exports grew less than GDP. The value of exports declined by 2.6 per cent per year in the 1980s but recovered somewhat in the 1990s, with an average growth rate of 15 per cent in 1990-96. Traditional, non-traditional, and manufactured exports all evolved similarly, with some diversification from traditional to non-traditional exports and, within the non-traditional category, from primary to manufactured exports.

Between October 1975 and December 1982, the Kenyan shilling was pegged to the SDR. The country adopted a crawling peg exchange-rate regime in 1983-91. In this period, the RERs were relatively stable and on average depreciated. A more market-based exchange-rate regime has developed since 1991. A massive depreciation of the RER in 1993 followed the introduction of the interbank market in August 1992. The RERs subsequently appreciated in 1994-96. Kenya registered average misalignment of 6.8 per cent in the 1980s and 11 per cent in 1990-96, supporting the contention it has on average maintained a fairly good foreign exchange-rate policy.

The empirical results suggest the following conclusions. First, manufactured exports increase with productive capacity, proxied by GDP in manufacturing. A 1 per cent increase in real manufacturing GDP increases real manufactured exports by 0.68 to 0.97 percentage points. Second, depreciating the trend RER has a positive impact on manufactured exports, although this not very robust result appears only for machinery and transport equipment (SITC 7), in a more detailed sub-sector analysis based on GMM-IV estimates. Third, lagged real exports have the most significant coefficient, suggesting the presence of strong persistence effects in export behaviour.

Besides the exchange rate, non-price factors are likely to be important for manufactured export performance. These include the availability of finance, infrastructure, access to external markets, and a conducive regulatory environment.

# Notes

1. EPZ export earnings between 1993 and 1997 show the following (with the shilling values in nominal terms): 1993, KSh. 900 million, or 0.7 per cent of total exports; 1994, KSh. 1.2 billion, or 0.8 per cent of total exports; 1995, KSh. 1.5 billion, or 0.9 per cent of total exports; 1996, KSh. 1.6 billion, or 0.9 per cent of total exports; and 1997, KSh. 2.0 billion, or 1.1 per cent of total exports.

2. The same authors also note a massive increase in the volume of horticultural exports in 1986-88.

3. The Gini-Hirschman concentration for exports moved as follows from 1980 to 1996:

| 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.43 | 0.41 | 0.42 | 0.40 | 0.43 | 0.42 | 0.47 | 0.38 | 0.37 | 0.38 | 0.36 | 0.34 | 0.35 | 0.33 | 0.29 | 0.28 | 0.28 |

4. This explains why the parallel-market exchange-rate premium could measure the extent of export taxation by way of income transfers to the government.

5. The equilibrium RER is defined as the rate at which the economy would be at internal and external balance for given sustainable levels of the other variables such as taxes, international prices and technology (Edwards, 1989). The equilibrium RER therefore varies continuously in response to changes in actual and expected economic fundamentals.

6. The multilateral RER was estimated as: $RER_t = NER_t/(\sum W_{jt}*CPI_t/WPI_{jt})$, with *NER* measured by $NER_t = \sum W_{jt}*R_t*E_{jt}$, where $W_{jt}$ is the export shares of Kenya's six major partner countries at time $t$; $WPI_{jt}$ is the wholesale price index; $R_t$ is the value of one US dollar in terms of Kenyan shillings; and $E_{jt}$ is the value of one unit of currency of trading partner $j$ in terms of the US dollar.

7. The following co-integration RER equations, estimated by Mwega and Ndung'u (1996), were used (*t*-values in parentheses):

| | *CONST* | log *TOT* | *OPEN* | *GEXPE* | *GROWTH* | *KFLOW* | *R5* |
|---|---|---|---|---|---|---|---|
| log *RER* | 1.025 | -0.452 | -0.322 | -1.782 | -4.931 | 1.646 | 0.69 |
| | (1.39) | (1.951) | (0.38) | (1.76) | (1.44) | (0.54) | |
| log *RER* | 0.537 | -0.306 | | -1.025 | -2.890 | | 0.58 |
| | (2.81) | (2.54) | | (2.45) | (1.94) | | |

where *TOT* is the terms of trade, *OPEN* is the trade ratio (exports plus imports divided by GDP), *GEXPE* is the share of government expenditures in GDP, *GROWTH* is real economic growth, and *KFLOW* is the proportion of net capital inflows to GDP.

8. GMM exploits the idea that disturbances in the equations are uncorrelated with the instruments and minimises the correlation between the instruments and disturbances according to a criterion given by a weighting matrix. According to this approach, suppose the theoretical model gives the condition that $E[f(Z, \beta)]=0$, where $f$ is a known function, Z is a vector of endogenous and instrumental variables, and $\beta$ is a vector of parameters. GMM minimises the following criteria function:

$$\hat{f}_T\left(Z_T, \hat{\beta}\right)' \hat{A}_T\left(Z_T, \hat{\beta}\right) \hat{f}_T\left(Z_T, \hat{\beta}\right)$$

where:

$$\hat{f}_T\left(Z_T, \hat{\beta}\right)$$

is a vector of realisations of the function, and

$$\hat{A}_T\left(Z_T, \hat{\beta}\right)$$

is an estimate of the inverse of their covariance matrix.

The methods used to take account of the correlations among the disturbance terms define the weighting matrix and compute the covariance matrix of the resulting estimators. To exploit the cross-section variability of data, White's (1980) covariance matrix estimator is used to derive both the weighting matrix and the covariance matrix of the estimators.

9. The trend log RER was derived by smoothing the log RER series using the Holt-Winters method. The method computes recursive estimates of the constant and the trend components that minimise the sum of the squared forecasting errors.

10. Bigsten *et al.,* (1998) find the RER to have an insignificant effect on industrial exports using firm-level data from the 1991-93 RPED survey. They attribute this to the short period covered, while movements in the RER may not adequately capture changes in the relative price incentives facing Kenyan exporters. They argue that sunk costs are important in determining firms' responses to export incentives, implying that even if the exchange rate were to increase profitability, the response may be limited unless profitability crosses the threshold at which firms are willing to invest in exporting.

# Bibliography


ALLERANO, M. and S. BOND (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equation", *Review of Economic Studies*, Vol. 58, April.

BIGSTEN, A. *et al*. (1998), "Exports of African Manufactures: Macro Policy and Firm Behaviour", Centre for the Study of African Economies, Oxford.

COLLIER, P. (1996), "The Role of the State in Economic Development: Cross-Regional Experiences", paper presented at the African Economic Research Consortium Plenary, Nairobi, December.

EDWARDS, S. (1989), *Real Exchange Rates, Devaluation and Adjustment*, MIT Press, Cambridge, Massachusetts.

ELBADAWI, I.A. and R. SOTO (1995), "Real Exchange Rate and Macroeconomic Adjustment in Sub-Saharan Africa and Other Developing Countries", paper presented at an African Economic Research Consortium Workshop, Johannesburg, December.

FOSU, A.K. (1990), "Export Composition and the Impact of Exports on Economic Growth of Developing Economies", *Economic Letters*, Vol. 34, No. 1.

FOSU, A.K. (1996), "Primary Exports and Economic Growth in Developing Economies", *The World Economy*, Vol. 19, No. 4.

FRIEDRICH-NAUMANN-STIFTUNG (1992), *Blueprint for a New Kenya: Post Election Programme*, Nairobi.

GHURA, D. and T.J. GRENNES (1993), "The Real Exchange Rate and Macroeconomic Performance in Sub-Saharan Africa", *Journal of Development Economics*, Vol. 42, October.

GOTHENBURG UNIVERSITY and UNIVERSITY OF NAIROBI (1994), *Limitations and Rewards in Kenya's Manufacturing*, Gothenburg, Sweden, and Nairobi, Kenya.

GOTHENBURG UNIVERSITY and UNIVERSITY OF NAIROBI (1995), *Manufacturing in Kenya Under Adjustment*, Gothenburg, Sweden, and Nairobi, Kenya.

HANSEN, L.P. (1982), "Large Sample Properties of Generalized Method of Moments Estimation", *Econometrica*, Vol. 50, July.

HOLTZ-EAKIN, D., W. NEWEY and H.S. ROSEN (1988), "Estimating Vector Autoregressions with Panel Data", *Econometrica*, Vol. 56, No. 6.

JEBUNI, C.D., A. ODURO, Y. ASANTE and G.K. TSIKATA (1992), *Diversifying Exports: The Supply Response of Non-Traditional Exports to Ghana's Economic Recovery Programme*, ODI Research Reports, Washington, D.C.

LANDELL-MILLS, J. and M. KATZ (1991), *Kenya — The Evolution of the External Competitiveness of the Tradeable Goods Sector Since 1922*, World Bank, Washington, D.C.

MAYER, J. (1996), *Implications of the New Trade and Endogenous Growth Theories for Diversification Policies of Commodity-Dependent Countries*, UNCTAD, Geneva.

MWEGA, F.M. and N.S. NDUNG'U (1996), *Macroeconomic Policies and Exchange Rate Management: The Kenya Case*, University of Nairobi, Nairobi.

NOGUES, J. and S. GULATI (1994), *Economic Policies and Performance Under Alternative Trade Regimes: Latin America During the 1980s*, World Bank, Washington, D.C.

REINIKKA, R. (1994), "How to Identify Trade Liberalization Episodes: An Empirical Study on Kenya", Working Paper Series/94.10, Centre for the Study of African Economies, Oxford.

SHARPLEY, J. and S.R. LEWIS (1988), "Kenya's Industrialization, 1964-84", discussion paper No. 242, Institute of Development Studies, University of Sussex, Brighton.

SWAMY, G. (1994), "Kenya: Patchy, Intermittent Commitment", *in* I. HUSAIN and R. FARUQEE (eds.), *Adjustment in Africa: Lessons from Country Case Studies*, World Bank, Washington, D.C.

TAKAHASI, M. (1997), "Changing Rules of the Game in a Multi-Ethnic Sub-Saharan African Country: Economic Resource Mechanism in Kenya", paper presented at a World Bank Workshop on the Political Economy of Rural Development Strategy, Washington, D.C., May.

UNDP/WORLD BANK (1993), *Kenya: The Challenge of Promoting Exports*, World Bank, Washington, D.C.

WHITE, H. (1980), "A Heteroskedasticity-Consistent Covariance Matrix and a Direct Test for Heteroskedasticity", *Econometrica*, Vol. 48.

WHITE, H. (1982), "Instrumental Variables Regression with Independent Observations", *Econometrica*, Vol. 50.

WORLD BANK (1987), *Kenya: Industrial Sector Policies for Investment and Export Growth*, Washington, D.C.

WORLD BANK (1990), *Kenya: Stabilization and Adjustment: Towards Accelerated Growth*, Washington, D.C.

# Part II

# Enhancing the Effectiveness of Production Factors

*Chapter 4*

# Structural Factors Affecting Manufacturing Competitiveness: Comparative Results from Cameroon, Côte d'Ivoire, Nigeria and Senegal

*Adeola Adenikinju, Ludvig Söderling, Charles Soludo and Aristomène Varoudakis*

The economic situation of sub-Saharan Africa has improved markedly in recent years. Increased stability — macroeconomic and political — and market liberalisation in many countries enhance the opportunities for economic development led by the private sector. Previous examples from, for instance, Mauritius and Tunisia as well as Southeast Asia, point to the potential of manufacturing exports for making sustained growth possible. The advantages of manufacturing exports include spillover effects, such as competitive pressure, economies of scale and technology transfer. Several studies provide empirical and theoretical indications that manufacturing exports have a beneficial impact on total factor productivity; a few of them include Edwards (1997), de Melo and Robinson (1990), Biggs, Shah and Srivastava (1995), Tybout (1992), Bigsten *et al.* (1997) and Lucas (1993).

The income elasticity of demand for manufactured goods is higher than for primary goods. If foreign income increases, countries specialised in manufacturing can expect higher growth than those dependent predominantly on exports of primary goods. Moreover, the price elasticity of both demand and supply is higher for manufactured goods than for primary goods, which has a stabilising effect on volatility in the terms of trade and has particular importance given Africa's heavy dependence on exports of primary products.

African entrepreneurs can integrate into the global economy only if they can compete on international terms. Nehru and Dhareshwar (1994) concluded that sub-Saharan Africa is the only region with productivity growth, hence competitiveness, significantly lower than its initial levels of human capital, GDP per capita and political stability would indicate. The World Economic Forum (1998) recently published its first *African Competitiveness Report*, which points to a number of structural policies

necessary to promote competitiveness. Besides political and economic stability, they include openness to trade, human development and investment in infrastructure. This study focuses on the determinants of productivity growth in Cameroon, Côte d'Ivoire, Nigeria and Senegal. It draws on findings from previous work carried out at the OECD Development Centre, including both sectoral and firm-level studies and microeconomic surveys done by the Development Centre in Cameroon, Côte d'Ivoire and Senegal. The studies include Adenikinju and Soludo (1997), Berthélemy *et al.* (1996), Berthélemy and Bourgignon (1996), Latreille and Söderling (1997), Latreille and Varoudakis (1996) Sekkat and Varoudakis (1998) and Söderling (1999). The four countries studied show several similarities. Except for Senegal, all have suffered from severe terms-of-trade shocks and had a clear pattern of responses to them. Initially, substantial improvement in the terms of trade induced an excessive surge in investment. Its poor quality translated into declining productivity. The revenues generated during the boom years thus helped little when luck turned and commodity prices plummeted. To make things worse, all four countries had highly protected and inward-looking manufacturing industries. Labour markets were rigid and regulated. Attempts at reform were largely unsuccessful. The devaluation of the CFA franc may have been a turning point for Cameroon, Côte d'Ivoire and Senegal. Nigeria's policy reversal in the early 1990s is more worrisome.

## Structure of the Manufacturing Sector

Table 4.1 on the following page begins the analysis with a look at detailed information available for manufacturing sub-sectors in the four countries. Food processing generally dominates. It accounts for about half of manufacturing value added in Côte d'Ivoire and Senegal and somewhat more in Cameroon. For the most part, this industry transforms or packages locally produced agricultural products (and fish, in Senegal), with relatively low value added. It is still important but significantly less prominent in Nigeria, at about 30 per cent of total manufacturing. This reflects the more advanced development of manufacturing in Nigeria, the most industrialised country in West Africa.

The food industries in Côte d'Ivoire and Cameroon primarily transform cocoa and coffee for export. Cameroon also has a relatively important beverage industry serving the domestic market. Manufacturing in Cameroon suffered severely from the economic crisis induced by falling oil prices in the mid-1980s. Falling cocoa and coffee prices at about the same time compounded it and caused a particularly severe food-industry decline.

In Senegal, canning fish and agricultural products and processing groundnuts are the chief food-manufacturing activities. The groundnut industry is declining and is no longer an engine of growth. The fish-canning industry, one of the fastest growing until the late 1980s, contracted in the early 1990s. The products of the Senegalese

food-processing industry are less sensitive to international commodity prices than those of Cameroon and Côte d'Ivoire, and the industry has felt fewer effects from variations in the terms of trade.

The chemical industry is important in Senegal, Nigeria and to some extent Côte d'Ivoire. In Senegal, phosphate fertiliser plants predominate. This industry saw a boom in the mid to late 1980s, when international phosphate prices were high. Employment in the chemical industry grew by almost 20 per cent per year in 1974-84, but its growth slowed significantly during the past decade. The chemical industry in Nigeria produces mainly soap and detergents, as well as rubber. Despite the country's large oil reserves, refineries are negligible. In Côte d'Ivoire, however, petroleum refining is an important part of the chemical industry. The country imports crude-oil feedstock and exports refinery products. Since 1995, it has also produced its own crude oil, but the impact on refining remains doubtful because the characteristics of domestic oil appear to make it inappropriate for refineries built to handle imported crude. Côte d'Ivoire also has a relatively advanced rubber industry. The chemical industry in Cameroon has only limited importance. It produces primarily pharmaceuticals and cosmetics, including perfume and soap.

Table 4.1. **Industry Structure**
(Average percentages of total value added in manufacturing for the periods covered)

| Sector | Sub-sector | Cameroon 1980-95 | Côte d'Ivoire 1975-94 | Nigeria 1962-92 | Senegal 1974-94 |
|---|---|---|---|---|---|
| Food | | 63.0 | 45.5 | 30.0 | 51.0 |
| | Fish canning | | | | 9.0 |
| | Oil-seeds and fats | | | | 10.3 |
| | Other food products | | | | 31.7 |
| Chemicals | | 5.7 | 17.2 | 30.4 | 24.7 |
| | Rubber | | | 5.6 | |
| | Other chemicals | | | 24.8 | |
| Textile and Leather Products | | 1.4 | 16.9 | 15.4 | 8.4 |
| | Textile products | | | 13.6 | 7.0 |
| | Leather-working | | | 1.8 | 1.4 |
| Wood and Paper Products | | 16.2 | 9.5 | 8.2 | 3.5 |
| | Wood processing | 13.9 | | 3.1 | 0.6 |
| | Paper/printing | 2.3 | | 5.1 | 2.9 |
| Mechanical (mostly metalworking) | | 4.4 | 5.7 | 7.6 | 7.0 |
| Other | | 9.4 | 5.2 | 8.4 | 5.4 |
| | Electrical machinery | | | 2.7 | |
| | Transport equipment | | 2.2 | 5.7 | |
| | Construction | 9.4 | | | 5.4 |
| | Miscellaneous | | 3.0 | | |

*Sources:*
The data for Senegal come both from sectoral sources, such as the CUCI (Centre unique de collecte de l'information) and microeconomic surveys carried out by the OECD Development Centre. Such surveys also provided data for Cameroon and Côte d'Ivoire, although some additional sectoral data were used for Côte d'Ivoire. The data for Cameroon and to some extent Côte d'Ivoire cover only a subset of manufacturing, but for Senegal and Nigeria they cover the entire sector.

The textile industry, often mentioned as a potential driving force for manufacturing in Africa, plays an important role in Côte d'Ivoire, Nigeria and Senegal. Textiles began expanding in Côte d'Ivoire and Senegal during the 1970s but declined in the 1980s. The development of a synthetic fabric industry in Nigeria has to some extent offset the more disappointing record of cotton textiles in the past 15 years.

Except in Senegal, wood processing is another important industry although its future is less than bright. It contributes only a relatively moderate share of Cameroon's industrial output, despite the country's rich endowment of tropical rainforests. Only about 10 per cent of the forest area licensed for exploitation is actually used, and only a minor share of the wood is transformed locally. Environmental concerns threaten the industry. In Côte d'Ivoire, wood processing is in crisis due to forest depletion.

**Determinants of Total Factor Productivity**

International competitiveness arises from both price factors (e.g. the exchange rate, wage costs or the costs of inputs) and more structural elements, linked largely to productivity gains, on which this section focuses. To look at variations in TFP, separate production functions have been estimated for each of the countries under study (Table 4.2)[1]. The poor TFP performance of the four countries is striking. All experienced negative productivity growth on average[2], with the most obvious declines in the textile, leather-working and food industries. Senegal had positive productivity growth only in construction materials, chemicals and "other food". Cameroon and Côte d'Ivoire showed the most disappointing record, with average annual productivity declines of 3.1 and 4 per cent, respectively. In Cameroon, only the mechanical industry saw gains. They have been significant since the devaluation of the CFA franc, and the industry has managed to increase production, particularly for exports. The economic crisis in Cameroon hit its food industry the hardest, but an exceptionally strong performance during the boom years at the beginning of the 1980s offset the losses to some extent. In Nigeria, only two sub-sectors, rubber and transport equipment, showed positive TFP growth. The consumer-goods industries (food processing, textiles, leather working, wood processing and papermaking) performed significantly worse than the capital-goods industries (transport equipment and electrical machinery). The capital-goods branch enjoys substantially less protection than the import-substituting consumer-goods industries, which points to the importance of trade liberalisation.

Table 4.2. **Total Factor Productivity**
(Average annual change in percentage in the periods covered)

| Sector | Sub-sector | Cameroon 1980-95 | Côte d'Ivoire 1975-94 | Nigeria 1962-92 | Senegal 1974-94 |
|---|---|---|---|---|---|
| Food | | -2.8 | -4.6 | -4.4 | -1.6 |
| | Fish canning | | | | -3.0 |
| | Oil-seeds and fats | | | | 5.9 |
| | Other food products | | | | 0.2 |
| Chemicals | | -4.3 | -1.0 | -3.2 | 1.1 |
| | Rubber | | | 0.5 | |
| | Other chemicals | | | -4.0 | |
| Textile and Leather Products | | 0.1 | -6.4 | -2.2 | -10.0 |
| | Textile products | | | -2.0 | -10.2 |
| | Leather working | | | -3.7 | -9.2 |
| Wood and Paper Products | | -5.2 | -1.6 | -2.4 | -2.2 |
| | Wood | -5.0 | | -2.3 | -5.3 |
| | Paper/printing | -5.5 | | -2.4 | -1.6 |
| Mechanical (mostly metalworking) | | 5.6 | -2.4 | -3.3 | -1.4 |
| Other | | -5.2 | -4.5 | 0.0 | 6.9 |
| | Electrical machinery | | | -1.1 | |
| | Transport equipment | | -5.0 | 0.5 | |
| | Construction | -5.2 | | | 6.9 |
| | Miscellaneous | -4.2 | | | |
| Total | | -3.1 | -4.0 | -2.3 | -1.1 |

*Source:* Authors' calculations.

Weak productivity performance has put a severe strain on competitiveness in all four countries. This merits attention to the determinants of TFP. They can be grouped (Table 4.3) as follows:

— human capital development or skilled labour availability;

— external trade and openness of the economy;

— infrastructure.

Table 4.3. **Overview of Factors Affecting Productivity**
(+ and – indicate positive or negative effects)

| Factors | Cameroon | Côte d'Ivoire | Nigeria | Senegal |
|---|---|---|---|---|
| Variables relating to human capital | | | | |
| Skilled labour availability | + | | + | + |
| Investment in health and education | | | + | |
| Firms' capacity to innovate | | + | | + |
| Firms' propensity to train workers | | + | | + |
| Variables relating to openness | | | | |
| Export performance | + | + | | + |
| Import tariffs | | | - | - |
| Variables relating to infrastructure | | | | |
| Availability of general infrastructure | | | | + |
| Availability of telephone lines | | | + | |

### *The Role of Human Capital*

Several studies indicate the importance of human capital for productivity. As one of their main contributions, Nehru and Dhareshwar (1994) elevated the role of human capital accumulation as a source of TFP growth. Edwards (1997) points out that the availability of skilled labour can facilitate technology transfer, because trained personnel can adapt new technology more easily. Imitation of new technology is likely to be important for productivity gains in African countries. Lucas (1993) suggests that human capital accumulation is the most important element in TFP growth. He emphasises the effect of learning by doing. According to his model, certain more sophisticated products induce greater technology spillover effects than other, simpler ones. The best TFP growth occurs when firms produce goods that demand technology close to their maximum technical capacity and when they constantly introduce new, higher-quality goods. The studies of all four countries provide evidence that human capital or skilled labour is important for productivity growth. The estimated production function for Senegal examines the impact of the quality of labour on productivity by including a proxy for the availability of skilled labour (Table 4.4), formulated as the ratio between actual salary levels and minimum salaries by sector. The regression confirms that skilled labour has a beneficial impact on TFP growth, as indicated by the positive and significant coefficient for this variable. The coefficient is rather high, underlining the importance of human capital for productivity gains.

Table 4.4. **Production Function Estimates, Senegal**
(Sectoral data)

| Dependent variable: log (value added) | | | Dependent variable: dLog (value added) | | |
|---|---|---|---|---|---|
| Variable | Coefficient | *t*-statistic | Variable | Coefficient | *t*-statistic |
| Constant | 0.72 | 1.17 | Constant | 0.39 | 2.46 |
| Log (capital stock) | 0.35 | 5.47 | *dx* | 0.44 | 6.26 |
| Log (labour) | 0.66 | 10.20 | *dX* | -1.50 | -2.93 |
| Productivity trends: | | | *dX * (Kp/K)* | 0.54 | 3.25 |
| Textiles | -0.089 | 8.30 | *dlog(H)* | 0.45 | 3.22 |
| Leather | -0.083 | 6.20 | *d*Log *(Kp/K)* | 1.00 | 1.93 |
| Wood | -0.063 | 5.00 | *d*Log*(E)* | 0.17 | 1.19 |
| Paper | -0.011 | 1.20 | *T* | -0.02 | 2.78 |
| Chemicals | 0.012 | 1.10 | Adjusted $R^2$ | 0.59 | |
| Construction | 0.06 | 5.60 | No. of observations | 197 | |
| Mechanical | -0.015 | 1.50 | Estimation method | Ordinary least squares | |
| Canning | -0.043 | 3.90 | Definitions of indep. variables (in first differences) in the expression $dx - \alpha^* d\log L_i + (1 - \alpha)^* d\log K_i$ : | | |
| Oil-seeds | -0.039 | 3.60 | | | |
| Other foods | -0.01 | 0.80 | $L_i$ = labour for the sector. | | |
| Adjusted $R^2$ | 0.921 | | $K_i$ = capital stock for the sector. | | |
| No. of observations | 207 | | $\alpha$ = the estimated capital coefficient from the regression at left (= 0.35). | | |
| Hausman test | $\gamma 2(6) = 10.08$ | | *dX* = the equivalent of *dx* for all manufacturing. | | |
| Estimation method | Random effects | | *dX*(Kp/K)* = interactive variable, the size of the total manufacturing sector multiplied by the ratio of private to public capital. | | |
| | | | *d*log*(H)* = proxy for skilled labour availability. | | |
| | | | *d*log*(E)* = production of electricity. | | |
| | | | *T* = import taxation. | | |

Both skilled labour and investment in the educational system emerged as important, with positive and significant coefficients, in the estimated production function for Nigeria (Table 4.5). The finding for Cameroon (Box 4.1) that the ratio of highly skilled workers to total labour had a positive and significant effect on TFP further confirms these results.

Table 4.5. **Estimation of a Production Function for Nigeria**
(Sectoral data)

| Dependent variable: log (value added) | | | |
|---|---|---|---|
| Variable | Coefficient | *t*-statistic | Definitions of independent variables |
| Constant | 0.59 | 0.22 | FOROWN = the share of foreign ownership |
| Log (capital stock) | 0.19 | 2.41 | in each sector's capital structure. |
| Log (labour) | 0.82 | 15.18 | HEDU = the ratio of public capital in health |
| Log (FOROWN) | 0.15 | 1.98 | and education to total capital stock. |
| Log (HEDU) | 0.32 | 1.80 | PHONE = the number of telephone lines. |
| Log (PHONE) | 0.31 | 1.58 | EFLAB = labour, defined in efficiency |
| Log (EFLAB) | 0.68 | 5.90 | units, as an indicator of human capital in |
| ATR | -0.004 | -1.58 | each sector, weighted by sectoral labour |
| $R^2$ | 0.70 | | units. |
| No. of observations | 231 | | ATR = the average tariff rate, by sector. |
| Estimation method | Ordinary least squares | | |

In the OECD Development Centre's survey of manufacturing firms in Senegal and Côte d'Ivoire, respondents were asked to what degree they considered themselves as having a disadvantage in innovation *vis-à-vis* their competitors. They also were asked to what extent they offer training to their employees. Analysis of the responses established a statistically significant relation between both of these variables and TFP growth, with the expected signs (Table 4.6). This highlights the importance of vocational training of employees, as well as the need to innovate continuously in manufacturing. It may be difficult to think about technological innovation in its proper sense in an African context, but imitation in the form of technology transfer can be assumed to depend on employee skill levels. This suggests that governments can help promote manufacturing competitiveness by financing and co-ordinating private initiatives for industry-specific training. Such training is particularly important for smaller enterprises, given their limited resources. Another, longer-term objective must be to focus on the educational system in a larger sense, to prepare the younger generation for continuous training. Enterprises are more willing to invest in training for employees who have already attained higher educational levels.

## Box 4.1. The Dynamics between Exports and Productivity: Cameroon

This chapter argues that exports are important for productivity gains, but one would expect the reverse to hold true as well — i.e. higher levels of productivity allow producers to set more competitive prices, which enhance their export potential. An analysis for Cameroon demonstrates this. By definition, if such a mutually reinforcing relation exists, so does endogeneity. Applying an instrumental variable method will avoid biased results.

To study the dynamics between productivity and export performance, one can estimate a production function and an export function. The production function is a value-added function:

$$\log(VA) = a*\log(K) + (1-a)*\log(L) + g*\log(X/L) + d*\log(skill) + e*T_i + c*D_i \quad (1)$$

where *VA* is value added, *K* is the capital stock, *L* is labour, *X* is exports (instrumented; see below), *skill* is skilled labour as percentage of total labour, $T_i$ is a sector-specific time trend and $D_i$ is a sectoral dummy. Assume an export function of the following type:

$$\log(X/L) = l*\log(VA/L) \quad (2)$$

where *X*, *L*, and *VA* are defined as above, and *l* is a function determining the ratio of exports to value added. Assume further that *l* depends on the level of TFP, firm size, the real effective exchange rate (REER), and the sector itself. Sector-specific time trends are also included to capture time-variable effects. To separate the indirect influence of TFP on exports, stemming from the effect on production volume, and to avoid simultaneity bias, rearrange the equation and instrument TFP (see below). Restrict log (*VA*/*L*) to equal log (TFP, instrumented), + *a**log (*K*/*L*), where *a* is estimated at 0.3 from the production function. All this produces the following relation:

$$\log(ExpEmpl) = b_1*\log(TFP, \text{instrumented}) + b_2*size + b_3*REER + b_4*T_i + b_5*D_i \quad (3)$$

where *ExpEmpl* is defined as [log (*X*/*L*) - log (*TFP*, instrumented) - 0.3*log (*K*/*L*)]; *size* is a dummy for small, medium-sized, and large firms; *REER* is the real effective exchange rate; $T_i$ is a sectoral trend, and $D_i$ is a sectoral dummy. The estimates combine equations (1) and (3), and instrument the TFP level and exports with all exogenous variables from the two equations. The pooling technique is applied, which is justified by the inclusion of sectoral dummies assumed to capture the existing fixed effects common to the firms of each sector.

The following results emerge (sectoral dummies and trends not reported, *t*-values in parentheses):

$$\log(VA) = \underset{(9.24)}{0.27}*\log(K) + \underset{(14.48)}{0.68}*\log(L) + \underset{(3.78)}{0.18}*\log(X/L, \text{instrumented}) + \underset{(3.10)}{0.17}*\log(skill) \quad (4)$$

$$\log(ExpEmpl) = \underset{(1.95)}{0.73}*\log(TFP, \text{instrumented}) - \underset{(-3.23)}{0.94}*small + \underset{(2.05)}{0.51}*medium + \underset{(2.82)}{1.90}*REER \quad (5)$$

The estimates confirm that productivity has a direct effect on exports aside from its indirect effect on production volume. This strengthens the argument that African governments should continue the current trend of trade liberalisation. The beneficial impact of export growth on productivity produces a feedback effect on exports, which further enhances productivity. Note that exports came out highly significant for productivity, whether measured by exports per employee, a dummy variable for exports for each year or a dummy variable for firms exporting throughout the period. This underlines the robustness of the relation. Equation (4) indicates that a 10 per cent increase in exports per employee would increase productivity by approximately 1.8 per cent. Note also that imports turn out positive and significant (not reported here), implying that firms can improve their productivity by importing better-quality intermediate goods. There is also a probable effect of technology transfer induced by imports.

The estimate shows a positive and significant impact of REER on exports. A 10 per cent REER depreciation would boost exports by about 19 per cent, keeping the number of employees constant. Moreover, a secondary effect arises through the impact of exports on productivity, which would further affect exports.

Some claim that firm size plays an important role in export performance. This argument is based on the high initial fixed costs of exporting — for setting up a distribution network, gathering market information, retooling equipment for production for exports and training personnel, for example. This study shows that medium-sized firms export more per employee than do small ones.

Table 4.6. **Estimation of the Determinants of TFP Growth: Senegal and Côte d'Ivoire**
(Firm-level data)

| Dependent variable: TFP growth rate | | | |
|---|---|---|---|
| Variable | Coeff. | *t*-stat. | Definitions of Independent Variables |
| ADVINNOV | -0.48 | -2.29 | ADVINNOV: a qualitative variable indicating the degree to |
| VFINVA | 0.90 | 8.48 | which survey respondent firms consider they have |
| EMPFORM | 0.28 | 3.00 | weaknesses in innovation *vis à vis* competitors. |
| PLUS15 | 0.36 | 2.37 | VFINVA: the average annual growth of financial costs as a |
| OBCOFIN | -0.11 | -1.58 | percentage of value added. Its unexpected positive and |
| INFRASEN | -0.11 | -1.64 | significant value may suggest that it is better viewed as a |
| INFRACIV | -0.01 | -0.22 | proxy for investment rather than an indication of financial |
| TFP92 | -0.06 | -1.53 | distress. This ambiguity demands cautious interpretation of |
| | | | the estimate results. |
| Adjusted $R^2$ | 0.60 | | EMPFORM: a measure of the extent to which firms offer |
| No. observations | 50 | | training to employees. |
| Estimation method | Ordinary least squares (on averages) | | PLUS15: a dummy variable indicating firms that export more than 15% of output. |
| | | | OBCOFIN: a qualitative variable indicating financial problems as an obstacle to competitiveness. |
| | | | INFRASEN and INFRACIV indicate the degree to which firms encounter infrastructure problems in Senegal and Côte d'Ivoire respectively. Based on principal-component analysis, each is a global measure of responses to 18 survey questions relating to various aspects of electricity, water, transport and telephone problems. |
| | | | TFP92: the level of TFP in 1992. It captures TFP convergence. |

### *Commercial Openness and Exports*

The influence of external trade on TFP is also partly linked to the issue of human capital. Several studies give theoretical and empirical support to the idea that productivity gains come through factors induced by commercial openness. Tybout *et al.* (1997) concluded that exporters had better productivity growth than non-exporting firms in Cameroon. Edwards (1997) claimed that international trade facilitates technology transfer and hence the ability to imitate existing production techniques. Lucas (1993) developed the notion that an increasingly sophisticated product mix induces productivity gains through the effects on employees of learning by doing. A high-growth product mix, however, may not be compatible with the domestically consumed one, and domestic markets in developing countries are seldom, if ever, large enough to support full-fledged industrialisation. For both of these reasons, large-scale exports become crucial for continued productivity growth. Nishimizu and Robinson (1986) argued that openness promotes TFP growth, mainly for three additional reasons. First, trade liberalisation increases competitive pressures, which force companies to improve their productivity. Second, market expansion through exports may bring economies of scale. Third, import liberalisation facilitates imports of capital goods and non-substitutable intermediate inputs. De Melo and Robinson (1990) demonstrated models in which openness promotes productivity growth through all these types of externalities.

This chapter's firm-level studies of Cameroon (see Box 4.1) and of Senegal and Côte d'Ivoire provide evidence that exports affect productivity positively. The Nigeria and Senegal studies demonstrate the negative influence of commercial restrictions, measured by import tariffs. The Senegal/Côte d'Ivoire study revealed a positive and significant coefficient for the dummy variable representing companies exporting at least 15 per cent of their production (Table 4.6). These exporting firms saw annual productivity improvement in 1992-95 more than 30 per cent higher, on average, than did non-exporting firms. The sectoral studies of Senegal (Table 4.4) and Nigeria (Table 4.5) showed results pointing in the same direction. In both cases, negative and significant coefficients for import tariffs, a proxy for trade restrictiveness, demonstrated the importance of openness for productivity — although the elasticity of productivity to trade protection was rather small in Nigeria (Table 4.5). According to these results, a complete liberalisation of Nigerian imports would imply less than a 1 per cent productivity gain. This probably understates the importance of trade liberalisation, given the connection between openness and the real effective exchange rate (REER). Sekkat and Varoudakis (1998) showed in a recent study that protectionism tends to lead to an appreciation of REER. In Cameroon (see Box 4.1), REER emerges as one of the most important factors determining export performance, which in turn affects productivity. Given Nigeria's high level of protection during the period studied, one would expect higher potential gains from trade liberalisation.

### *Infrastructure*

Physical infrastructure — such as roads, ports, energy-production facilities and telephone lines — also potentially affects TFP growth. The existence or lack of it

may influence investment decisions and future productivity growth. By affecting productivity, poor infrastructure may, thus, indirectly impair competitiveness and exports. A well-functioning infrastructure network likely will improve communication, enhance production efficiency and decrease costs, thus promoting competitiveness. Deficient infrastructure also has more direct repercussions on exports and commercial openness. It will increase shipment costs, impeding exports as well as imports. The study of Senegal and Côte d'Ivoire, which asked firms to identify obstacles to exporting and rank them in importance, underlined this (Box 4.2). Figures 4.1 and 4.2 show the frequency of these obstacles in the two countries (in less detail than in Box 4.2), weighted by the importance attached to the obstacle and described by export destination.

## Box 4.2. What Types of Infrastructure Should Be Prioritised to Improve Productivity? Some Indications from Senegal and Côte d'Ivoire

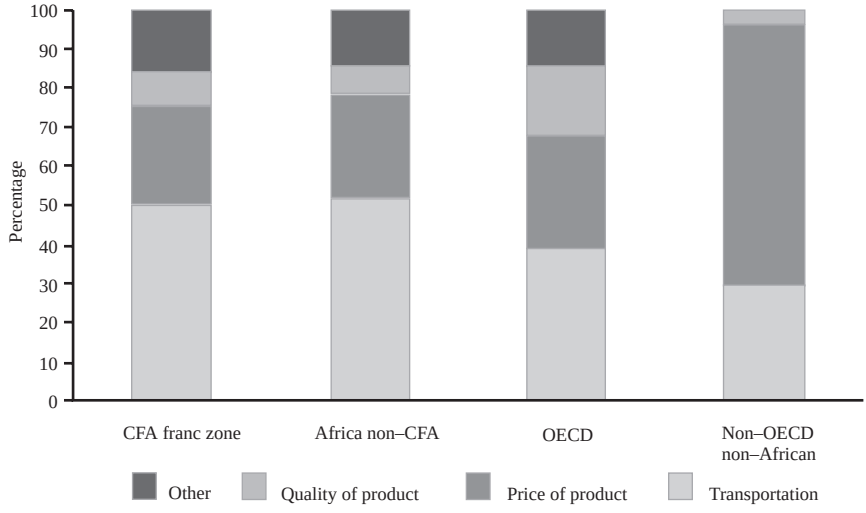
What kinds of infrastructure deficiencies throw up the greatest impediments to efficiency? The studies for this chapter indicate that the answer may vary substantially from country to country. To direct infrastructure investment to areas likely to yield the highest returns requires detailed study. This box suggests priorities for such investment in Senegal and Côte d'Ivoire.

The firm-level survey asked respondents to identify the types of infrastructure with which they encounter problems. Participants in Senegal cited electricity supply as by far the most frequently encountered problem. Nearly 80 per cent of the surveyed firms reported electricity cuts, and about 45 per cent reported electricity quality as a key difficulty, followed by road quality and — much further down on the scale of concern — telephone costs and the state of ports and airports. The privatisation and restructuring of the inefficient public electric utility, Senelec, could well improve power production, but the transition years will be difficult.

In Côte d'Ivoire, however, almost all firms complained about poor telephone services, not electricity. The problems probably stem from either poor technological standards or mismanagement, because Côte d'Ivoire compares well with other sub-Saharan countries in terms of main telephone lines per capita. Unlike Senegal, Côte d'Ivoire privatised the production and distribution of electricity in 1989. The main weaknesses of this sector have disappeared, although many surveyed firms mentioned the price of electricity as another obstacle.

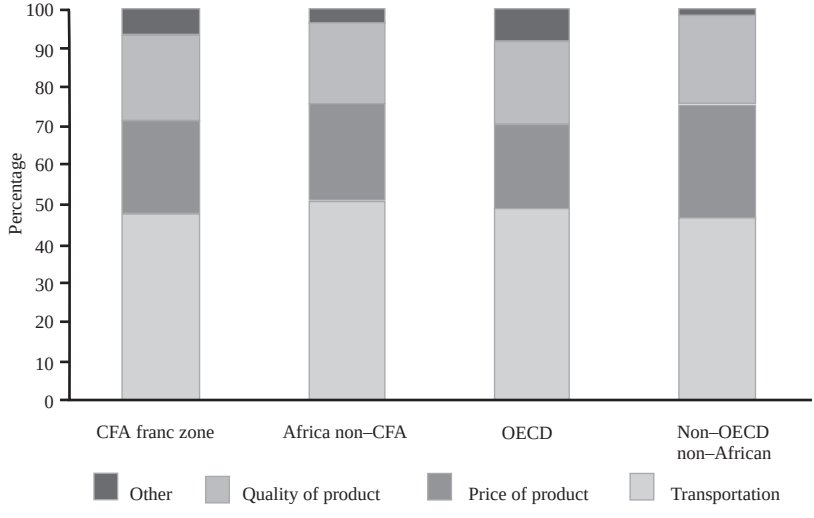
Econometric analysis of the survey data shows infrastructure weaknesses as having a negative and significant impact on TFP growth in Senegal but an insignificant one in Côte d'Ivoire (Table 4.6). That these results differ comes as no surprise, given the great difference in the types of issues that respondents cited. The responses to the survey suggest that Senegal has more serious infrastructure weaknesses than Côte d'Ivoire.

Figure 4.1. **Senegal: Obstacles to Exports by Destination**
(Percentage of firms, weighted by importance of the obstacles as cited by firms)




*Source:* OECD Development Centre.

Figure 4.2. **Côte d'Ivoire: Obstacles to Exports by Destination**
(Percentage of firms, weighted by importance of the obstacles as cited by firms)




*Source:* OECD Development Centre.

Firms consistently report transportation-related issues (cost, availability and quality) as dominant in both Senegal and Côte d'Ivoire. In Senegal, they perceive them as a greater obstacle to exports within Africa than outside it, a likely consequence of the poor quality of roads and other transportation networks, but in Côte d'Ivoire perceived differences between export destinations are much less clear.

The sectoral study of Senegal suggests that, although the infrastructure indicator alone was not significant (Table 4.4), infrastructure plays an important role for externalities related to economy size. A large manufacturing sector may bring productivity gains through spillover effects derived from, for instance, reduced transaction costs due to a greater concentration of firms, enhanced access to suppliers of primary or intermediate inputs or improved labour quality resulting from the effects of learning by doing. Poor infrastructure could jeopardise such positive externalities. In fact, it is possible that a growing manufacturing sector could have negative external effects on productivity, due to congestion, if the quality of infrastructure lies below a certain level. To study the effects of externalities in conjunction with the quality of infrastructure, the regression reported on the right-hand side of Table 4.4 introduced a variable for the size of manufacturing and an interactive variable capturing the dynamic between it and the infrastructure network. This interactive variable uses a measure of the availability of infrastructure multiplied by the total size of manufacturing — namely the ratio of public capital to total private capital in the manufacturing sector. Public capital is taken in the widest sense, to include physical, educational and social infrastructure. The results show that lack of infrastructure has the effect of congesting economic activities, while externalities are in fact positive and increasing with the level of infrastructure.

## Conclusions and Policy Implications

The results for all four countries have pointed to the importance of commercial openness for the development of a competitive manufacturing sector. They demonstrate that trade restrictions hamper TFP growth but exports improve productivity. Further, indications also suggest the reverse, that productivity improves exports. It therefore becomes important not only to liberalise trade but also to implement complementary policies that increase incentives to pursue it. Such policies include good management of the exchange rate, market deregulation to eliminate price distortions between tradables and nontradables, and avoidance of unrealistic increases in real wages. Nigeria and Senegal have certainly lost out by pursuing inward-looking, import-substituting policies for their manufacturing.

Investment in infrastructure and human capital seems crucial to improving competitiveness. Building trade capacity in the form of adequate infrastructure and a more highly skilled workforce helps the economy to respond better to reforms, such as trade liberalisation and improved exchange-rate management. While the analysis

here found evidence for the importance of the availability of skilled labour for productivity growth in all four countries, the impact of infrastructure was significant only in Senegal and Nigeria.

The devaluation of the CFA franc in 1994 did induce some gains in both exports and productivity. It appears mostly to have benefited firms already exporting or sectors generally more prone to be involved in trade. This tells us that more needs to be done to convince economic players of the viability of trade. Nigeria, apart from managing its political instability, needs to put itself back on the liberalising, outward-looking track it followed before the policy reversals of the 1990s.

## Notes

1. The level of TFP is defined as the exponential of log ($Y/L$) - $a$*log ($K/L$), where $Y$ is value added, $L$ is labour, $K$ is the capital stock, and $a$ is the estimated capital coefficient. The estimated production functions appear in Tables 4.4-4.6. The capital coefficient is not estimated for Côte d'Ivoire. Instead, the value for Senegal (0.35) is applied.

2. This downward trend in TFP in the CFA franc zone countries could have been the origin of a fall in the equilibrium real exchange rate and hence partly responsible for the overvalued CFA franc before its devaluation.

# Bibliography


ADENIKINJU, A. and C. SOLUDO (1997), *Economic Policy and Total Factor Productivity in Nigeria's Manufacturing Sector*, mimeo, OECD Development Centre, Paris.

AITKEN, B., G. HANSON and A. HARRISON (1994), "Spillovers, Foreign Investment and Export Behavior", *NBER Working Paper* No. 4967, National Bureau of Economic Research, Cambridge, Massachusetts.

BERTHÉLEMY, J.-C. and F. BOURGUIGNON (1996), *Growth and Crisis in Côte d'Ivoire*, World Bank, Washington, D.C.

BERTHÉLEMY, J.-C., A. SECK and A. VOURC'H (1996), *Growth in Senegal: A Lost Opportunity?* OECD Development Centre, Paris.

BIGGS, T., M. SHAH and P. SRIVASTAVA (1995), "Training and Productivity in African Manufacturing Enterprises", World Bank Discussion Paper, World Bank, Washington, D.C.

BIGSTEN, A. *et al.* (1997), "The Export Orientation of African Manufacturing: A Firm-Level Analysis", paper presented at the Centre for the Study of African Economies' 10th Anniversary Conference, Centre for the Study of African Economies, Oxford.

DE MELO, J. and S. ROBINSON (1990), "Productivity and Externalities: Models of Export-Led Growth", *PRE Working Papers*, World Bank, Washington, D.C.

ECONOMIST INTELLIGENCE UNIT (1997), *Cameroon Country Profile 1996-97*, London.

ECONOMIST INTELLIGENCE UNIT (1998), *Nigeria Country Profile 1997-98*, London.

EDWARDS, S. (1997), "Openness, Productivity and Growth: What Do We Really Know?" *NBER Working Paper* No. 5978, National Bureau of Economic Research, Cambridge, Massachusetts.

LATREILLE, T. and L. SÖDERLING (1997), *Manufacturing Competitiveness and Export Performance in Senegal and Côte d'Ivoire 1992-1995*, mimeo, OECD Development Centre, Paris.

LATREILLE, T. and A. VAROUDAKIS (1996), *Croissance et compétitivité de l'industrie manufacturière au Sénégal*, Technical Paper No. 118, OECD Development Centre, Paris.

LUCAS, R.E. (1993), "Making a Miracle", *Econometrica*, Vol. 61, No. 2.

NDULU, B. and J. SEMBOJA (1995), "The Development of Manufacturing for Exports in Tanzania", *in* G.K. HELLEINER (ed.), *Manufacturing for Export in the Developing World: Problems and Possibilities*, Routledge, London.

NEHRU, V. and A. DHARESHWAR (1994), "New Estimates of Total Factor Productivity Growth for Developing and Industrial Countries", World Bank Research Working Paper 1313, Washington, D.C.

NISHIMIZU, M. and J. PAGE (1982), "Total Factor Productivity Growth, Technological Progress and Technical Efficiency Change: Dimensions of Productivity Change in Yugoslavia, 1965-78", *Economic Journal*, Vol. 92, December.

NISHIMIZU, M. and S. ROBINSON (1986), "Productivity Growth in Manufacturing", *in* H. CHENERY, S. ROBINSON and M. SYRQUIN (eds.), *Industrialization and Growth: A Comparative Study*, Oxford University Press, New York, N.Y.

RIDDEL, R. (1990), "Manufacturing Africa", ODI, London, unpublished.

SEKKAT, K. and A. VAROUDAKIS (1998), *Exchange Rate Management and Manufactured Exports in Sub-Saharan Africa*, Technical Paper No. 134, OECD Development Centre, Paris.

SÖDERLING, L. (1999), *Structural Policies for International Competitiveness in Manufacturing: The Case of Cameroon*, Technical Paper No. 146, OECD Development Centre, Paris.

TYBOUT, J.R. (1992), "Linking Trade and Productivity: New Research Directions", *World Bank Economic Review*, Vol. 6, No. 2.

TYBOUT, J., B. GAUTHIER, G. NAVARETTI and J. DE MELO (1997), "Firm-Level Responses to the CFA Devaluation in Cameroon", *Journal of African Economies*, Vol. 6, No. 1.

WORLD BANK (1990), *Nigeria: Industrial Sector Report: Restructuring Policies for Competitiveness and Export Growth*, Vol. 2, Marc Report No. 8868, Washington, D.C.

WORLD BANK (1996), *Republic of Cameroon: The Challenge— Harnessing Unrealized Potential*, Washington, D.C.

WORLD ECONOMIC FORUM (1998), *The African Competitiveness Report 1998*, Geneva.

*Chapter 5*

# The Role of Trade in Technology Diffusion

*Dalia Hakura and Florence Jaumotte*

Trade is considered a major channel of international technology transfer. This chapter investigates its role in transferring technology from industrial to developing countries[1]. Defined broadly, technology covers production methods, product design and organisational methods. According to Grossman and Helpman (1991), trade can foster technology transfer through two main channels: production and information. Through trade with countries that are technological leaders, developing countries can gain access to intermediate products and capital equipment of higher quality (vertical differentiation) and broader variety (horizontal differentiation). They can also gain access to more open channels of communication about production methods, product design, organisational methods and market conditions. Finally, they can adapt to their use the foreign technologies used in their imported products, often at lower cost than innovation would require.

Recent research has tested empirically the role of trade in cross-country technology transfer. Coe, Helpman and Hoffmaister (1997) and Jaumotte (1998), for example, confirm its significance. Building on that evidence, this chapter investigates which type of trade — intra-industry or inter-industry — operates more effectively in the transfer process. Intra-industry trade refers to two-way trade in a given sector, while inter-industry trade refers to one-way trade in a sector. The chapter tests the hypothesis that intra-industry trade is more effective for technology transfer because countries are more likely to absorb foreign technologies when their imports are from the same sectors as the products they produce and export. Indeed, the possibility of using foreign technology in domestic production will likely be greater when the country already is a large producer of the same types of goods as it imports, particularly if it is to maintain its competitiveness in international markets.

The chapter extends the theoretical framework used in Jaumotte (1998), where growth of total factor productivity (TFP)[2], a proxy for absorption of technology, is specified as a function of the technological gap of the country, weighted by the country's

degree of exposure to foreign technologies. That exposure is captured by the ratio of imports to GDP. The Grubel-Lloyd intra-industry trade index (IIT) is calculated to determine each sector's involvement in intra-industry trade.

The chapter estimates both linear and non-linear regression specifications. In the linear regression, the ratios of imports to GDP are split into intra- and inter-industry components on the basis of a specific cut-off for IIT. The import shares are then aggregated separately for the two components in order to estimate separately the effect of each sector's openness on growth of TFP. The robustness of the results is tested by excluding sectors that are net exporters from those classified as having inter-industry trade. Indeed, net exporters could bias the results to show that inter-industry trade is less efficient in transferring technologies, because they are presumably technologically advanced and thus less likely to learn from the technologies inherent in their imports. In the non-linear specification, each sector's imports are weighted by some function of its IIT index.

The data sample covers intra- and inter-industry trade in 87 countries during 1970-93. The tests yield three findings. First, they confirm that trade with industrial countries enhances the technological development of developing countries. Second, in both the linear and non-linear regression specifications, intra-industry trade had a stronger effect on TFP growth than did inter-industry trade. Finally, certain country-specific factors could, if unchanged, keep developing countries from reaching the steady-state level of technology that OECD countries have reached. Evidence for sub-Saharan Africa confirms this conclusion.

## Methodology

### *Framework of Analysis*

Technology is measured by TFP, defined as the residual part of output once the contributions of factor inputs have been accounted for. The relationship between the TFP growth of a country and its degree of openness to the technological leader is modelled as follows:

$$g_i = g_l + \mu * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i \qquad (1)$$

where

$$\mu = f(\frac{m_{il}}{y_i})$$

and where *l* denotes the technological leader, *i* the importing country, *g* the growth rate of TFP, *m* imports and *y* output. The first part of the model, derived from Barro and Sala-i-Martin (1995), relates the deviation of the importing country's TFP growth from that of the leader to the technological gap between the two countries. The

specification embodies two important assumptions. First, it assumes, all else equal, that technologically backward countries tend to have faster TFP growth than technological leaders. Indeed, $g_i > g_l$ if and only if $TFP_i < TFP_l$, because the cost of imitation is less than the cost of innovation. Second, the specification assumes that the discrepancy between the TFP growth of the backward country and that of the leader is increasing the technological gap. This would be the case if, for example, the costs of imitation declined as the technological gap grew larger. Intuitively, it makes sense that, as the technological gap expands and the pool of innovations to imitate increases, the cost of imitation falls.

The parameter μ denotes the speed of convergence of country *i* towards the leader. In accordance with the theoretical literature that emphasises trade as a major channel of technology transfer across countries, Jaumotte (1998) specifies μ as a function of the country's degree of openness to trading with the leader. She finds empirical evidence that trade plays a significant role in the technological catch-up of follower countries.

***Linear Regression Specification***

The distinction between intra- and inter-industry trade is based on the Grubel-Lloyd intra-industry trade index, defined as

$$IIT_s = \frac{(X_s + M_s) - |X_s - M_s|}{(X_s + M_s)}$$

where *s* denotes sector *s*, *X* denotes exports and *M* denotes imports. The index measures the share of intra-industry trade in sector *s*. If there is no intra-industry trade — i.e. if the country imports or exports exclusively — the IIT index is zero. Conversely, if all trade is intra-industry — if $X_s = M_s$ — the IIT index takes a value of one.

In the linear approach, the sectors of each country are classified as intra- or inter-industry trade sectors, depending on the value of their IIT indexes. Let *b* denote a cut-off, *IR* the set of inter-industry trade sectors and *IA* the set of intra-industry trade sectors.

$$s \in IR \text{ if } IIT_s \leq b$$

$$s \in IA \text{ if } IIT_s > b$$

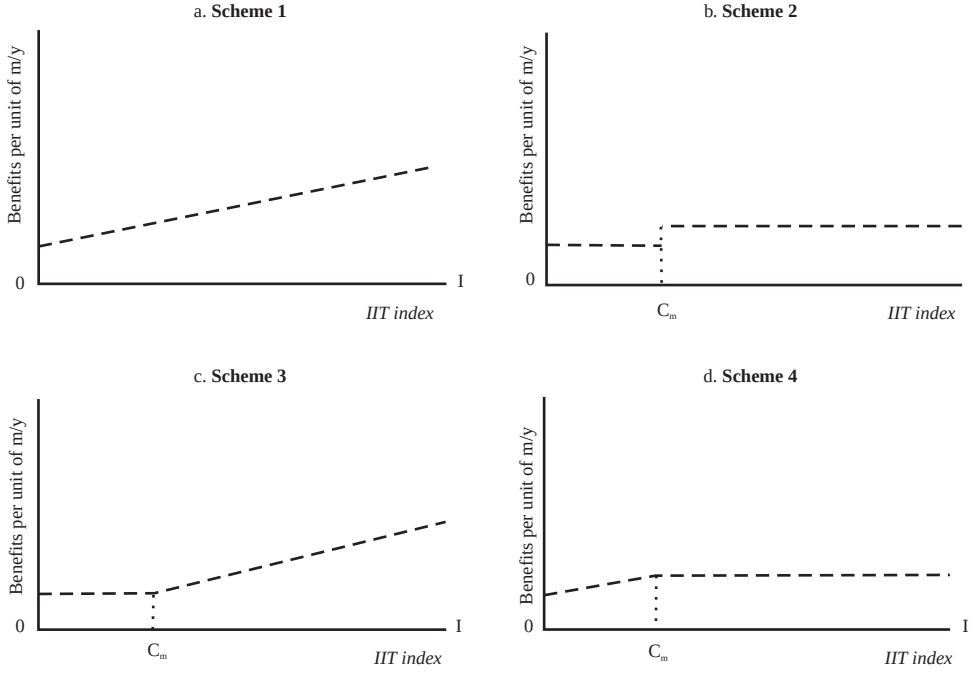
The import shares are then aggregated separately for each sector, and a different coefficient is estimated for each aggregate. Thus, the following specification is estimated:

$$g_i = c + \alpha * g_l + [\beta * \sum_{s \in IR} \frac{m_{ils}}{y_i} + \gamma * \sum_{s \in IA} \frac{m_{ils}}{y_i}] * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i \qquad (2)$$

The chapter explores IIT cut-offs ranging from 0.1 to 0.9, in increments of 0.1. If both intra- and inter-industry trade have the same effects on technology transfers, their coefficients should not be significantly different, irrespective of the cut-off. If, instead, intra-industry trade has a significantly larger impact than inter-industry trade, two results can be expected. First, the coefficient on intra-industry trade should be larger than the coefficient on inter-industry trade, irrespective of the cut-off. Moreover, the difference between the two should become more significant as the chosen cut-off nears the "true" one. Second, as the cut-off is raised, the coefficients on both intra- and inter-industry trade should increase. Figures 5.1a-d illustrate four different ways in which the technological benefits from importing in a given sector can relate to the sector's degree of intra-industry trade. In accordance with the main hypothesis, all four schemes show that the benefits from trade are increasing, although not necessarily strictly so, in line with the degree of intra-industry trade of the sector. In all four schemes, the coefficients on inter- and intra-industry trade are increasing, at least over a range, in the cut-off for the IIT index.

Figure 5.1a shows how the benefits from intra-industry trade can increase continuously. In this first scheme, both coefficients increase continuously as the cut-off is raised. In the second scheme (Figure 5.1b), the benefits can take only two values: a constant low value for sectors with low degrees of intra-industry trade, and a constant high value for sectors with high degrees of it. As the cut-off is raised, this scheme shows two phases. In the first, the coefficient on inter-industry trade holds constant while the one on intra-industry trade increases. In the second, the coefficient on inter-industry trade increases while the one on intra-industry trade stays constant. The "true" cut-off, $C_m$, occurs where the coefficient on inter-industry trade stops being constant and the one on intra-industry trade starts. In the third scheme (Figure 5.1c), the coefficient on intra-industry trade increases continuously, while the one on inter-industry trade is at first constant and then increases. The point at which the coefficient on inter-industry trade starts increasing identifies the true cut-off, $C_m$. Finally, in the fourth scheme (Figure 5.1d), the coefficient on inter-industry trade increases continuously while the one on intra-industry trade at first increases and then is constant. In this case, the true cut-off lies at the point where intra-industry trade starts being constant.

Figure 5.1. **How Technological Benefits from Importing in a Sector Can Relate to the Degree of Intra–Industry Trade**




### *Testing for Robustness: Excluding Net Exporters from Inter-industry Traders*

Inter-industry trade includes two types of sectors: net importers and net exporters. Net exporters are presumably technologically advanced and thus less likely to adopt the technologies used in their imports. Including them with net importers would bias the results to show that inter-industry trade is less efficient in transferring technology. To test the robustness of the results, therefore, the sectors are classified into three groups on the basis of the value of their export-to-import ratios: no base sector (*NB*), base sector (*B*) and good sector (*G*). Let $b_1$ and $b_2$ denote two cut-offs.

$$s \in NB \text{ if } \frac{X_s}{M_s} \leq b_1$$

$$s \in B \text{ if } b_1 < \frac{X_s}{M_s} \leq b_2$$

$$s \in G \text{ if } \frac{X_s}{M_s} > b_2$$

Note that there is a direct correspondence between the cut-off for the IIT index, *b*, and the two cut-offs for the ratio of exports to imports, $b_1$ and $b_2$, which can be expressed as:

$$b_1 = \frac{b}{2 - b} = \frac{1}{b_2}$$

With the corresponding cut-offs for the export-to-import ratio, the robustness of the results obtained on the basis of the distinction between inter- and intra-industry trade can be verified using the following specification:

$$g_i = c + \alpha * g_l + [\beta * \sum_{s \in NB} \frac{m_{ils}}{y_i} + \gamma * \sum_{s \in B} \frac{m_{ils}}{y_i} + \delta * \sum_{s \in G} \frac{m_{ils}}{y_i}] * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i \qquad (3)$$

***Non-linear Regression Specification***

The non-linear regression specification is the continuous version of the cut-off-based approach. Instead of splitting the sectors into two groups based on the value of their IIT index, the imports of each sector are weighted by a function of their IIT index.

$$g_i = c + \alpha * g_l + [\sum_s h(IIT_s) * \frac{m_{ils}}{y_i}] * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i \qquad (4)$$

The IIT index is entered in a flexible form, namely a quadratic, which will allow explicit testing of its role.

$$h(IIT_s) = \beta + \gamma * IIT_s + \delta * IIT_s^2$$

***Extending the Framework to Several Technological Leaders***

The model is specified with a unique technological leader. In practice, however, the technological leader is the group of OECD countries, and the TFP growth of the importing country is assumed to depend on the sum of the technology transfers from each technological leader. Thus, for example, equation 1 becomes

$$g_i = \alpha * \sum_{j \in OECD} g_j + \beta * \sum_{j \in OECD} \left( \frac{m_{i,j}}{y_i} * \ln \frac{TFP_j}{TFP_i} \right) + \varepsilon_i$$

This aggregation procedure excludes the possibility of duplication or synergy amongst the technological transfers from different leaders. This assumption usually is made in the literature. Jaumotte (1998) tested and could not reject it.

**Data**

The sample contains 87 countries, of which 63 are developing countries and 24 are OECD countries. The developing countries are grouped into five regions: East Asia (8 countries), Latin America (22), Middle East and North Africa (8), South Asia (5) and sub-Saharan Africa (20). See Appendix 1 for a complete list of countries. The data cover 1970-93.

To measure TFP, the chapter uses the growth-accounting approach, which imposes conventional values for factor shares. It then uses three alternative measures of TFP to test the robustness of the results to a particular specification of the aggregate production function. These are given by

$$TFP_1 = \frac{Y}{K^{\alpha} \cdot L^{1-\alpha}}, \quad \alpha = 0.4$$

$$TFP_2 = \frac{Y}{K^{\alpha} \cdot H^{\beta} \cdot L^{1-\alpha-\beta}}, \quad \alpha = \beta = 1/3$$

$$TFP_3 = \frac{Y}{K^{\alpha} \cdot (H \cdot L)^{1-\alpha}}, \quad \alpha = 0.4$$

where $Y$ denotes GDP, $K$ denotes the total stock of physical capital, $L$ denotes the labour force and $H$ denotes the stock of human capital. Note that the last specification exhibits increasing returns to scale, while the other two feature constant returns to scale. The data needed to measure TFP are from a revised version of the data set compiled by Bosworth, Collins and Chen (1995). The definition and the original source of the data for each variable are given in Appendix 2. To make the TFP levels comparable across countries, the data on output and physical capital were converted into 1987 international prices, using 1987 purchasing-power parities for GDP and investment[3].

The trade data for measuring the import-to-GDP ratios, IIT indexes and export-to-import ratios are from Feenstra, Lipsey and Bowen (1997), who report manufacturing trade flows disaggregated by trade partners and sectors in 34 industries classified according to the Bureau of Economic Analysis Manufacturing Industry Classification. The trade data are aggregated into 10 sectoral categories matching the International Standard Industrial Classification system. The data for nominal GDP are from the *World Economic Outlook* (IMF, 1997). The ratios of imports to GDP are calculated using imports from OECD countries only, whereas the IIT indexes and ratios of exports to imports are based on trade with the world.

Tables 5.1 and 5.2 summarise the TFP data for the sample of countries examined in the chapter. Table 5.1 reports the average annual growth rate of TFP during the period 1970-93 by region. Table 5.2 reports the average TFP gap of each region with

respect to OECD countries in 1970 and 1993 and the TFP growth rate during 1970-93. An increase in the gap indicates that the region has been diverging from the OECD countries, while a decrease reflects catch-up.

Table 5.1. **Average TFP Growth, 1970-93**
(Standard errors are in parentheses)

| Region | $TFP_1$ | $TFP_2$ | $TFP_3$ |
|---|---|---|---|
| East Asia | 0.02 | 0.03 | 0.01 |
| | (0.004) | (0.004) | (0.004) |
| Middle East and North Africa | 0.01 | 0.01 | 0.001 |
| | (0.004) | (0.004) | (0.004) |
| OECD countries | 0.01 | 0.01 | 0.004 |
| | (0.002) | (0.002) | (0.002) |
| South Asia | 0.01 | 0.02 | 0.01 |
| | (0.01) | (0.005) | (0.01) |
| Sub-Saharan Africa | -0.01 | 0.002 | -0.01 |
| | (0.003) | (0.003) | (0.003) |
| Latin America | -0.005 | 0.11 | -0.01 |
| | (0.002) | (0.002) | (0.002) |

Table 5.1 shows the TFP growth rates of OECD countries as significantly positive over the entire period although, not surprisingly, East Asia had higher ones. TFP growth was also positive for Middle East/North Africa and South Asia but less significantly so. Strikingly, sub-Saharan Africa and Latin America had significantly negative TFP growth rates. As Table 5.1 suggests, Table 5.2 shows East Asia catching up with the OECD countries, while sub-Saharan Africa and Latin America diverged significantly from them.

Tables 5.3-5.5 summarise the trade data for the sample. Table 5.3 reports the share of imports from the OECD countries in GDP, averaged for 1970-90 by region. Apart from South Asia, the data are similar across regions, ranging from 14 per cent to 21 per cent. Tables 5.4 and 5.5 report the percentages of countries that had intra-industry trade indexes greater than 0.7, by region and sector in 1970 (Table 5.4) and 1990 (Table 5.5). Two main facts emerge from these tables. First, as the sector totals indicate, no sector is an inter-industry or intra-industry trader by nature. The proportion of countries in which intra-industry trade is considered to predominate in a given sector is similar across all sectors. Second, the regional totals show great variation across regions. South Asia and Latin America started in 1970 with more intra-industry trade sectors than the Middle East and North Africa, East Asia and sub-Saharan Africa. By 1990, however, East Asia had more intra-industry trade sectors than the Middle East and North Africa, South Asia and sub-Saharan Africa.

Table 5.2. **Descriptive Statistics on TFP Gaps**
(Standard errors are in parentheses)

| | Gap 1 | | | Gap 2 | | | Gap 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Regional Averages | 1970 | 1993 | Growth, 1970-93 | 1970 | 1993 | Growth, 1970–93 | 1970 | 1993 | Growth, 1970-93 |
| East Asia | 2.17 | 1.77 | -0.15 | 1.85 | 1.32 | -0.29 | 1.89 | 1.61 | -0.11 |
| | (0.26) | (0.32) | (0.12) | (0.54) | (0.68) | (0.11) | (0.21) | (0.26) | (0.13) |
| Middle East and North Africa | 1.41 | 1.45 | 0.14 | 3.23 | 2.42 | -0.03 | 1.19 | 1.23 | 0.19 |
| | (0.26) | (0.32) | (0.12) | (0.54) | (0.68) | (0.11) | (0.21) | (0.26) | (0.13) |
| OECD countries | 1.03 | 1.02 | 0.00 | 1.38 | 1.32 | -0.01 | 1.02 | 1.01 | 0.00 |
| | (0.15) | (0.18) | (0.07) | (0.31) | (0.39) | (0.06) | (0.12) | (0.15) | (0.07) |
| South Asia | 2.43 | 2.40 | -0.02 | 2.06 | 1.87 | -0.12 | 2.01 | 1.99 | -0.03 |
| | (0.33) | (0.40) | (0.16) | (0.68) | (0.86) | (0.14) | (0.26) | (0.33) | (0.16) |
| Sub-Saharan Africa | 2.24 | 3.02 | 0.42 | 3.39 | 3.92 | 0.25 | 1.78 | 2.36 | 0.39 |
| | (0.16) | (0.20) | (0.08) | (0.34) | (0.43) | (0.07) | (0.13) | (0.16) | (0.08) |
| Latin America | 1.45 | 2.06 | 0.40 | 2.78 | 3.68 | 0.24 | 1.27 | 1.82 | 0.43 |
| | (0.16) | (0.19) | (0.08) | (0.32) | (0.41) | (0.07) | (0.12) | (0.16) | (0.08) |



Table 5.3. **Share of Imports from OECD Countries**

| | 1970-90 | | 1970 | | 1990 | |
|---|---|---|---|---|---|---|
| Regional Averages | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. |
| East Asia | 0.16 | 0.08 | 0.14 | 0.07 | 0.19 | 0.10 |
| Middle East and North Africa | 0.21 | 0.09 | 0.14 | 0.04 | 0.24 | 0.11 |
| OECD countries | 0.21 | 0.12 | 0.18 | 0.10 | 0.21 | 0.12 |
| South Asia | 0.08 | 0.05 | 0.05 | 0.02 | 0.06 | 0.05 |
| Sub-Saharan Africa | 0.14 | 0.06 | 0.15 | 0.06 | 0.14 | 0.08 |
| Latin America | 0.21 | 0.09 | 0.14 | 0.08 | 0.18 | 0.11 |

*Note:* East Asia excludes Singapore. Middle East and North Africa excludes Malta and Cyprus. Latin America excludes Panama.

Table 5.4. **Percentage of Countries with an Intra-industry Trade Index Greater than 0.7 in 1970, by Region**

| Sector | Region | | | | | | All Regions |
|---|---|---|---|---|---|---|---|
| | East Asia | South Asia | Sub-Saharan Africa | Middle East/ North Africa | Latin America | Industrial Countries[1] | |
| Non-manufacturing | 12.5 | 60.0 | 9.5 | 25.0 | 36.4 | 37.5 | 28.4 |
| Manufacturing | | | | | | | |
| Food, beverages, and tobacco | 37.5 | 40.0 | 42.9 | 37.5 | 36.4 | 37.5 | 38.6 |
| Textiles, wearing apparel and leather | 0.0 | 0.0 | 9.5 | 37.5 | 18.2 | 54.2 | 25.0 |
| Wood and wood products | 25.0 | 20.0 | 9.5 | 0.0 | 18.2 | 25.0 | 17.1 |
| Paper, printing, and publishing | 25.0 | 0.0 | 0.0 | 0.0 | 4.6 | 37.5 | 13.6 |
| Chemicals | 0.0 | 0.0 | 9.5 | 25.0 | 13.6 | 50.0 | 21.6 |
| Non-metallic mineral products, except fuel | 0.0 | 20.0 | 14.3 | 0.0 | 18.2 | 29.2 | 17.1 |
| Basic metal industries | 0.0 | 20.0 | 14.3 | 12.5 | 13.6 | 37.5 | 19.3 |
| Fabricated metal products | 12.5 | 0.0 | 4.8 | 0.0 | 4.6 | 41.7 | 14.8 |
| Other manufacturing | 12.5 | 40.0 | 14.3 | 0.0 | 22.7 | 37.5 | 22.7 |
| All sectors | 12.5 | 15.6 | 13.2 | 12.5 | 16.7 | 38.9 | ---- |

*Note:* 1. Includes the 24 OECD countries in the sample, plus Israel.



Table 5.5. **Percentage of Countries with an Intra-industry Trade Index Greater than 0.7 in 1990, by Region**

| Sector | Region | | | | | | All Regions |
|---|---|---|---|---|---|---|---|
| | East Asia | South Asia | Sub-Saharan Africa | Middle East/ North Africa | Latin America | Industrial Countries[1] | |
| Non-manufacturing | 50.0 | 60.0 | 19.1 | 37.5 | 31.8 | 45.8 | 36.4 |
| Manufacturing | | | | | | | |
| Food, beverages, and tobacco | 50.0 | 60.0 | 38.1 | 25.0 | 45.5 | 54.2 | 45.5 |
| Textiles, wearing apparel and leather | 37.5 | 20.0 | 33.3 | 62.5 | 27.3 | 50.0 | 38.6 |
| Wood and wood products | 25.0 | 0.0 | 14.3 | 0.0 | 22.7 | 37.5 | 21.6 |
| Paper, printing, and publishing | 25.0 | 0.0 | 9.5 | 12.5 | 9.1 | 54.2 | 22.7 |
| Chemicals | 50.0 | 20.0 | 4.8 | 37.5 | 13.6 | 75.0 | 34.1 |
| Non-metallic mineral products, except fuel | 62.5 | 20.0 | 9.5 | 25.0 | 22.7 | 58.3 | 33.0 |
| Basic metal industries | 37.5 | 0.0 | 4.8 | 0.0 | 18.2 | 62.5 | 26.1 |
| Fabricated metal products | 62.5 | 0.0 | 0.0 | 12.5 | 4.6 | 66.7 | 26.1 |
| Other manufacturing | 12.5 | 40.0 | 19.1 | 25.0 | 13.6 | 58.3 | 29.6 |
| All sectors | 40.3 | 17.8 | 14.8 | 22.2 | 19.7 | 57.4 | ---- |

*Note:* 1. Includes the 24 OECD countries in the sample, plus Israel.

## Results

The structure of the data is as follows. The data for 1970-93 were split into five sub-periods: 1970-74, 1975-79, 1980-84, 1985-89 and 1990-93. The use of five-year intervals helps to smooth business-cycle effects and to isolate long-run evolutions. The dependent variable in the regressions is measured as the average annual TFP growth for each sub-period. The explanatory variables, however — the technological gap and the ratio of imports to GDP — are measured as the beginning-of-period values instead of the five-year averages. This helps minimise the risk of endogeneity. Because the time dimension of the panel is relatively small compared with the number of countries, one can ignore time-series issues, for which the techniques have not yet been fully developed for panel data.

To test the robustness of the results across regions, each equation was estimated first for the total sample and then by region. The two main regions considered were the OECD countries and the developing countries. The developing countries were further disaggregated into East Asia, Latin America, the Middle East and North Africa, South Asia and sub-Saharan Africa. The estimates for the full sample are reported both with and without country-specific fixed effects. For the regional estimates, fixed effects are included only when an *F* test indicated they were necessary. The *F*-test statistics are also reported in the tables. All estimates have heteroskedastic-consistent standard errors noted in parentheses.

The equations were estimated for each of the three TFP measures in the data section. Only the results for $TFP_1$ are reported, however, because the results for the alternative measures of TFP were similar. Table 5.6 reports the estimation results of equation 1. The TFP gap, weighted by the share of imports from OECD countries in GDP, enters significantly in most regressions, confirming the finding by previous studies that trade with OECD countries plays an important role in the transfer of technologies. The model holds not only for the full sample but also for most of the regions[4]. The results suggest it is important to control for initial conditions that might affect the TFP growth potential of countries. Indeed, the results are stronger when country-specific fixed effects are introduced or when the regressions are estimated by region. For instance, in the regression for the total sample, the adjusted $R^2$ increases from 0.006 without fixed effects to 0.18 when fixed effects are included. The size of the coefficient on the import-weighted gap also increases considerably, from 0.01 to 0.10. Similarly, the adjusted $R^2$ and the size of the coefficient on the import-weighted gap are much larger for the regional regressions than for the full-sample regression without fixed effects.

Table 5.6. **Estimation Results of Equation 1 for TFP**[1]

| | Coefficients | | | Fixed Effects | $R^2$ | Adjusted $R^2$ | $F$ test, no fixed effects |
|---|---|---|---|---|---|---|---|
| | C | α | β | | | | |
| Full Sample | -0.005 | 0.793 | 0.013 | No | 0.011 | 0.006 | 2.0626** |
| (432 observations) | (0.004) | (0.469) | (0.014) | | | | |
| | | 0.908 | 0.098 | Yes | 0.348 | 0.180 | |
| | | (0.415 | (0.024) | | | | |
| OECD Countries | -0.002 | 0.965 | 0.129 | No | 0.202 | 0.189 | 1.054 |
| (120 observations) | (0.003) | (0.320) | (0.030) | | | | |
| Developing Countries | | 0.882 | 0.098 | Yes | 0.336 | 0.164 | 1.911** |
| (312 observations) | | (0.565) | (0.024) | | | | |
| East Asia | 0.020 | 0.146 | -0.041 | No | 0.008 | -0.045 | 1.445 |
| (40 observations) | (0.014) | (1.344) | (0.054) | | | | |
| Latin America | | 1.166 | 0.157 | Yes | 0.302 | 0.115 | 1.750** |
| (110 observations) | | (1.053) | (0.049) | | | | |
| Middle East and North Africa | -0.021 | 0.751 | 0.180 | No | 0.355 | 0.320 | 0.398 |
| (40 observations) | (0.013) | (1.595) | (0.047) | | | | |
| South Asia | 0.018 | -1.004 | -0.004 | No | 0.036 | -0.056 | 0.256 |
| (24 observations) | (0.008) | (1.038) | (0.055) | | | | |
| Sub-Saharan Africa | -0.028 | 2.249 | 0.035 | No | 0.082 | 0.063 | 1.236 |
| (98 observations) | (0.010) | (1.177) | (0.013) | | | | |

*Notes:* Heteroskedasticity-consistent standard errors are in parentheses. For the *F* tests only, * indicates a 10 per cent significance level and ** indicates a 5 per cent significance level.

Equation 1: $$g_i = c + \alpha * g_l + \beta * \frac{m_{il}}{y_i} * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i$$

The difference between the two sets of results can be interpreted in terms of unconditional versus conditional convergence. The regression in the full sample without fixed effects assumes that all countries are converging towards the same steady-state level of technological development and measures the speed of convergence towards this unconditional steady state. In controlling for fixed effects or estimating the regression by region, however, countries are allowed to have their own, different steady states and the regression measures the speed of convergence towards them — hence the term "conditional convergence". As the results show, conditional convergence is much faster than unconditional convergence.

In sub-Saharan Africa, the fixed effects are negative, suggesting that the region is characterised by conditions which, if unchanged, will prevent it in the long run from attaining the level of technological development that the OECD countries have achieved. Its steady-state level of technology, conditional on these factors, is lower.

Next, the ratio of imports from OECD countries to GDP is divided into two sub-aggregates. One groups imports in sectors classified as intra-industry traders and the other groups imports in sectors classified as inter-industry traders. Table 5.7 reports the estimation results of equation 2, for a range of cut-offs for the IIT index. First, the coefficient on *IA* (the term that interacts the import shares of *intra*-industry sectors

with TFP gaps) is consistently larger than the coefficient on *IR* (the term that interacts the import shares of *inter*-industry sectors with TFP gaps). The difference between the two coefficients becomes more significant as the cut-off for the IIT index is raised. Table 5.7 also shows from the *F* tests of the null hypothesis that the coefficients are not significantly different.

Table 5.7. **Estimation Results of Equation 2: Sensitivity to the Cut-off for the IIT Index for Total Sample**

| | Cut-off | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0.9 | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 | 0.3 | 0.2 | 0.1 |
| β | 0.086 | 0.085 | 0.077 | 0.077 | 0.087 | 0.076 | 0.076 | 0.080 | 0.077 |
| | (0.022) | (0.022) | (0.023) | (0.023) | (0.025) | (0.028) | (0.029) | (0.042) | (0.042) |
| γ | 0.447 | 0.287 | 0.261 | 0.211 | 0.152 | 0.152 | 0.147 | 0.119 | 0.114 |
| | (0.107) | (0.091) | (0.070) | (0.075) | (0.078) | (0.062) | (0.051) | (0.044) | (0.034) |
| $R^2$ | 0.368 | 0.360 | 0.362 | 0.357 | 0.350 | 0.351 | 0.352 | 0.349 | 0.349 |
| Adjusted $R^2$ | 0.204 | 0.193 | 0.196 | 0.189 | 0.181 | 0.182 | 0.183 | 0.180 | 0.180 |
| *F* test, β = γ | 11.123 | 6.368 | 7.417 | 4.790 | 1.045 | 1.709 | 2.139 | 0.602 | 0.787 |

Equation 2: $$g_i = c + \alpha * g_I + [\,\beta * \sum_{s \in IR} \frac{m_{ils}}{y_i} + \gamma * \sum_{s \in IA} \frac{m_{ils}}{y_i}\,] * \ln \frac{TFP_I}{TFP_i} + \varepsilon_i$$

Second, as the cut-off is raised, the coefficients on both *IA* and *IR* increase. The coefficient on *IR* at first holds stable at about 0.077, until the cut-off for the IIT index is raised above 0.7, when it starts increasing. The coefficient on *IA*, however, increases continuously. This pattern corresponds to the one described in Figure 5.1c. Both results indicate that intra-industry trade is a more efficient channel of technology transfer than inter-industry trade, and transfers through trade start increasing dramatically when the sector's IIT index rises above 0.7, which appears to be the appropriate cut-off separating intra- and inter-industry trade sectors.

Table 5.8 reports the entire estimation results of equation 2 for a cut-off of 0.7 for the IIT index. Note that the coefficient on TFP growth in OECD countries has a point estimate close to one, as the theoretical model predicts. The null hypothesis that the coefficient is one cannot be rejected and the coefficient is generally significantly different from zero. Regarding the respective roles of intra- and inter-industry trade, the coefficient on intra-industry trade is three to four times larger than the coefficient on inter-industry trade, and significantly so. The results for the total sample are confirmed both for developing and OECD countries, but more strongly for developing countries. Among the latter, the results are particularly strong for sub-Saharan Africa. The difference between intra- and inter-industry trade takes a different form in East Asia, with a non-significant effect of *IA* but a significantly negative effect of *IR*. Thus, the null hypothesis that the two coefficients are the same can also be rejected with confidence.

Table 5.8. **Estimation Results of Equation 2 for TFP**

| | Coefficients | | | | Fixed Effects | $R^2$ | Adjusted $R^2$ | *F* test, no fixed effects | *F* test $\beta = \gamma$ |
|---|---|---|---|---|---|---|---|---|---|
| | C | α | β | γ | | | | | |
| Full Sample (432 observations) | -0.006 (0.004) | 0.929 (0.463) | -0.007 (0.014) | 0.157 (0.052) | No | 0.035 | 0.029 | 2.033** | 10.984** |
| | | 1.066 (0.416) | 0.077 (0.023) | 0.261 (0.070) | Yes | 0.362 | 0.196 | | 7.417** |
| Developing Countries (312 observations) | | 1.113 (0.574) | 0.077 (0.024) | 0.266 (0.075) | Yes | 0.350 | 0.179 | 1.881** | 5.420** |
| OECD Countries (120 observations) | -0.002 (0.003) | 0.964 (0.321) | 0.086 (0.052) | 0.205 (0.063) | No | 0.213 | 0.193 | 1.046 | 1.632 |
| East Asia (40 observations) | 0.021 (0.013) | 0.995 (1.316) | -0.175 (0.067) | 0.028 (0.068) | No | 0.136 | 0.064 | 1.342 | 5.302** |
| Latin America (110 observations) | | 1.163 (1.059) | 0.159 (0.059) | 0.150 (0.141) | Yes | 0.302 | 0.105 | 1.676** | 0.003 |
| Middle East and North Africa (40 observations) | -0.021 (0.013) | 0.753 (1.691) | 0.180 (0.077) | 0.181 (0.147) | No | 0.355 | 0.301 | 0.386 | 0.000 |
| South Asia (24 observations) | 0.019 (0.007) | -1.076 (0.951) | 0.004 (0.072) | -0.122 (0.349) | No | 0.040 | -0.104 | 0.272 | 0.088 |
| Sub-Saharan Africa | -0.029 (0.010) | 2.257 (1.165) | 0.021 (0.012) | 0.284 (0.110) | No | 0.109 | 0.081 | 1.461 | 2.843* |
| (98 observations) | | 2.129 (1.051) | 0.018 (0.027) | 0.554 (0.205) | Yes | 0.350 | 0.159 | 1.461 | 5.876** |

*Notes:* *IA* and *IR* categories are calculated based on a benchmark of 0.7 for the IIT index. Heteroskedasticity-consistent standard errors are in parentheses. For the *F* tests only, * indicates a 10 per cent significance level, and ** indicates a 5 per cent significance level.

Equation 2: $$g_i = c + \alpha * g_l + [\beta * \sum_{s \in IR} \frac{m_{ils}}{y_i} + \gamma * \sum_{s \in IA} \frac{m_{ils}}{y_i}] * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i$$

Table 5.9 tests the robustness of these results by excluding net exporters from the inter-industry trade category. The classification of sectors as net importers or net exporters is based on their export-to-import ratios, with cut-offs at 0.5 and 1.9, corresponding to the cut-off of 0.7 for the IIT index. A sector is classed as a net importer if its ratio is below 0.5, indicating that it has no production base (NB). It is classed as a sector with intra-industry trade if its ratio falls between 0.5 and 1.9, indicating the existence of a production base (B). It is called a net exporter if its ratio is greater than 1.9, indicating a strong production base (G). Confirming *a priori*

expectations, the coefficient on G is negative or not significant. The results for NB and B are similar to those obtained previously for inter- and intra-industry trade, confirming the greater importance of intra-industry trade.

Table 5.9. **Estimation Results of Equation 3 for TFP**
(Full sample, 432 observations)

| Coefficient | | | | | | | | *F* tests | |
|---|---|---|---|---|---|---|---|---|---|
| C | α | β | γ | δ | Fixed Effects | $R^2$ | Adjusted $R^2$ | No Fixed Effects | β = γ |
| -0.006 | 0.914 | 0.015 | 0.147 | -0.267 | No | 0.051 | 0.042 | 1.933** | 6.649** |
| (0.004) | (0.462) | (0.016) | (0.055) | (0.132) | | | | | |
| | 1.057 | 0.082 | 0.254 | 0.017 | Yes | 0.362 | 0.194 | | 5.398** |
| | (0.419) | (0.028) | (0.069) | (0.160) | | | | | |

*Notes:* Heteroskedasticity-consistent standard errors are in parentheses. For the *F* tests only, * indicates a 10 per cent significance level, and ** indicates a 5 per cent significance level. Base, No Base, and Good Categories are calculated based on benchmarks of 7/13 and 13/7 for the export-import ratio corresponding to a cut-off of 0.7 for the IIT index.

Equation 3: $$g_i = c + \alpha * g_l + [\beta * \sum_{s \in NB} \frac{m_{ils}}{y_i} + \gamma * \sum_{s \in B} \frac{m_{ils}}{y_i} + \delta * \sum_{s \in G} \frac{m_{ils}}{y_i}] * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i$$

Table 5.10 reports the estimation results for the non-linear specification, the continuous equivalent of the cut-off-based approach. Instead of dividing the sectors into two subgroups based on their IIT index values, the imports of each sector are weighted by some — possibly non-linear — function of the IIT index. The index is entered in the form of a second-order polynomial, whose coefficients are estimated freely. The regression for the total sample when fixed effects are included clearly indicates a positive and increasing influence of the IIT index on TFP growth. The coefficient on the linear term γ is negative but not significant, while that on the squared IIT index δ is positive and strongly significant. Restricting the sample to developing countries or to OECD countries yields the same pattern of results, although less strongly for the OECD countries.

## Conclusions and Policy Implications

This chapter has investigated the role of international trade in transferring technology from industrial to developing countries. It tested the hypothesis that intra-industry trade is more effective in transferring technology than is inter-industry trade. The rationale for this hypothesis is that a country is more likely to absorb the innovations embodied in foreign technology when it already produces and exports goods in the same product category as those it imports.

The chapter takes a general framework already developed by researchers and modifies it to test for the effects of inter-industry trade versus those of intra-industry trade. The tests used data for the absorption of technology (measured by growth of TFP) and trade of 87 countries during 1970-93. Of the countries in the sample, 20 were in sub-Saharan Africa.

Table 5.10. **Non-linear Estimation Results for TFP**[1]

| | Coefficients | | | | | Fixed Effects | $R^2$ | Adjusted $R^2$ | *F* test, No Fixed Effects |
|---|---|---|---|---|---|---|---|---|---|
| | | α | β | γ | δ | | | | |
| Full Sample<br>(432 observations) | -0.006<br>(0.004) | 0.892<br>(0.458) | -0.021<br>(0.029) | 0.059<br>(0.245) | 0.124<br>(0.270) | No | 0.035 | 0.026 | 2.051** |
| | | 1.099<br>(0.369) | 0.091<br>(0.043) | -0.302<br>(0.279) | 0.618<br>(0.280) | Yes | 0.364 | 0.196 | |
| OECD Countries<br>(120 observations) | -0.002<br>(0.003) | 0.962<br>(0.308) | 0.179<br>(0.267) | -0.547<br>(0.988) | 0.662<br>(0.836) | No | 0.217 | 0.190 | 1.089 |
| Developing Countries<br>(312 observations) | | 1.158<br>(0.507) | 0.089<br>(0.044) | -0.296<br>(0.284) | 0.623<br>(0.289) | Yes | 0.353 | 0.179 | 1.906** |
| East Asia<br>(40 observations) | 0.023<br>(0.012) | 1.032<br>(1.240) | -0.287<br>(0.134) | 0.202<br>(0.467) | 0.144<br>(0.436) | No | 0.153 | 0.056 | 1.410 |
| Latin America<br>(110 observations) | | 1.207<br>(0.947) | 0.301<br>(0.062) | -0.682<br>(0.513) | 0.458<br>(0.676) | Yes | 0.335 | 0.137 | 1.704** |
| Middle East and North Africa<br>(40 observations) | -0.028<br>(0.014) | 1.118<br>(1.505) | 0.278<br>(0.207) | -0.979<br>(1.155) | 1.253<br>(1.281) | No | 0.372 | 0.300 | 0.900 |
| South Asia<br>(24 observations) | 0.017<br>(0.007) | -1.020<br>(0.887) | -0.108<br>(0.095) | 1.745<br>(0.891) | -2.291<br>(1.328) | No | 0.084 | -0.109 | 0.262 |
| Sub-Saharan Africa<br>(98 observations) | | 2.012<br>(0.855) | -0.113<br>(0.067) | 0.646<br>(0.518) | 0.431<br>(0.575) | Yes | 0.400 | 0.213 | 1.698** |

*Notes:* Heteroskedasticity-consistent standard errors are in parentheses. For the *F* tests only, * indicates a 10 per cent significance level, and ** indicates a 5 per cent significance level.

Non-linear estimation results:

$$g_i = c_i + \alpha * g_l + [\sum_s h(IIT_{is}) * \frac{m_{ils}}{y_i}] * \ln \frac{TFP_l}{TFP_i} + \varepsilon_i$$

$$h(IIT_{is}) = \beta + \gamma * IIT_{is} + \delta * IIT_{is}^2$$

The tests, for both the full sample and the subgroup of 20 African countries, confirmed earlier research, which showed that developing countries acquire technology by trading with industrial countries. The findings indicate that, other factors being constant, developing countries that imported more from OECD countries (as measured by their import-to-GDP ratios) experienced faster TFP growth. The wider the initial technology gap, the larger the gain. Thus, countries technologically farther behind in 1970 gained more than those technologically more advanced.

Intra-industry trade played a larger and more significant role in transferring technology than did inter-industry trade. TFP growth was much more pronounced when a sector's IIT index exceeded 0.7, a finding even more strongly evident in the subgroup of 20 African countries. The 0.7 cut-off for the IIT index was used to differentiate sectors according to their export/import intensity ($X/M$). Both the import-intensive sectors (with $X/M < 0.5$) and the export-intensive sectors (with $X/M > 1.9$) had an IIT below 0.7, while sectors with more significant two-way trade ($0.5 < X/M < 1.9$) had an IIT above 0.7. Tests repeated without data from export-intensive sectors reconfirmed these findings. This data exclusion was justified because export-oriented industries presumably are more advanced technologically and thus have less need to adopt the technologies of their import sectors.

Test results also showed the existence of country-specific factors that could prevent sub-Saharan Africa from attaining the same steady-state level of technological development as have OECD countries, but the coefficients calculated from the tests could not identify the precise factors. Nonetheless, the general economic literature suggests several factors that might affect a country's long-run equilibrium level of technology. These factors may be grouped under "general productivity parameters"; they include political stability, institutional environments and human capital.

One can draw several policy implications from these results, including confirmation of the case for accelerating trade liberalisation to encourage technology transfers. The following recommendations emerge:

— Developing countries, when negotiating trade agreements with industrial countries, should seek to reduce trade barriers in sectors with high IIT at the outset of liberalisation. This is contrary to current developing-country practices, which usually seek to retain trade protection for goods these countries produce. The findings here suggest, however, that rapid liberalisation of such sectors offers greater benefit to developing countries.

— Developing countries should adopt domestic policies that actively promote intra-industry trade. This may include both devising policies to provide key infrastructure or vocational training that will enhance production and exports in new sectors, and adopting measures to encourage foreign direct investment (FDI). As other researchers have argued, FDI may lower the cost of adopting and producing new technologies, because foreign investors likely will already be familiar with them. Thus, FDI may lower the cost of producing and exporting new goods.

— Finally, developing countries should focus on identifying the specific factors that can prevent them from reaching their technological potential and adopting remedial actions. Policy reform itself would need to take a co-ordinated approach to address the entire mix of policies rather than focus on sequential change.

## Appendix 1. Sample Economies, by Region

*East Asia:* China, Chinese Taipei, Indonesia, Malaysia, Philippines, Republic of Korea, Singapore and Thailand.

*South Asia:* Bangladesh, India, Myanmar, Pakistan and Sri Lanka.

*Industrial countries:* Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

*Middle East and North Africa:* Algeria, Cyprus, Egypt, Iran, Jordan, Malta, Morocco and Tunisia.

*Latin America:* Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela.

*Sub-Saharan Africa:* Cameroon, Côte d'Ivoire, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Uganda, Zaire, Zambia and Zimbabwe.

## Appendix 2. Data Sources and Construction

The definitions and the original sources of the data for each variable needed to measure total factor productivity (TFP), as described in the paper by Bosworth, Collins and Chen (1995), are listed below.

*GDP:* Definition: local currency, 1987 constant prices. Primary sources: OECD for the industrial countries, World Bank and IMF for the developing countries.

*Stock of physical capital:* Definition: local currency, 1987 constant prices. The measure of the capital stock is based on a perpetual inventory estimation with a common fixed annual geometric depreciation rate of 0.04. Primary source: Nehru and Dhareshwar (1993).

*Labour force:* Definition and source: actual employment for the industrial countries and estimates from the International Labour Organisation of the economically active population for developing countries.

*Education:* Definition:

$$H = \sum_j w_j \cdot P_j$$

where $H$ denotes the stock of human capital, $w_j$ denotes the wage weight of people at the $j$th education level, and $P_j$ denotes the fraction of the population in the $j$th education level. The wage weights are standardised at 1.0 for those who have completed the primary level of education. The relevant wage weights are 0.7 for no schooling, 1.4 for completion of the secondary level, and 2.0 for completion of the third level. Note that the few studies that have examined the structure of relative wage rates by education find surprisingly little variation across countries. Source: Barro and Lee (1993) for the fractions of the population at the different education levels.

## Notes

1. The authors thank Geert Almekinders, Robert Barro, Ehsan Choudhri, David Coe, Roland Daumont, Samir El-Khouri, Dominique Gross, Elhanan Helpman, Suheil Kawar, Mohsin Khan, Saleh Nsouli, Jean-François Ruhashyankiko and Abdelhak Senhadji for helpful comments. The authors are also grateful to Barry Bosworth for providing the data on output, physical capital, labour and education.

2. TFP is defined as the log of output minus the weighted logs of factor inputs, where the weights equal factor shares.

3. These data are provided in the Penn World Tables.

4. The absence of significant results for East Asia and South Asia might be due to the small sample size for these regions.

# Bibliography


AGMON, T. (1979), "Specialization in the European Coal and Steel Community", *Journal of Common Market Studies*, Vol. 8.

BARRO, R.J. and J.-W. LEE (1993), "International Comparisons of Educational Attainment", *Journal of Monetary Economics*, Vol. 32, December.

BARRO, R.J. and X. SALA-I-MARTIN (1995), *Economic Growth*, McGraw-Hill, New York.

BAYOUMI, T., D.T. COE and E. HELPMAN (1996), "R&D Spillovers and Global Growth", *NBER Working Paper* No. 5628, National Bureau of Economic Research, Cambridge, Massachusetts.

BOSWORTH, B., S. COLLINS and Y.–C. CHEN (1995), "Accounting for Differences in Economic Growth", *Brookings Discussion Papers in International Economics*, Vol. 115, Brookings Institution, Washington, D.C.

COE, D.T. and E. HELPMAN (1995), "International R&D Spillovers". *European Economic Review*, Vol. 39, February.

COE, D.T., E. HELPMAN and A.W. HOFFMAISTER (1997), "North-South R&D Spillovers", *The Economic Journal*, January.

COE, D.T. and A.W. HOFFMAISTER (1998), "North-South Trade: Is Africa Unusual?", IMF Working Paper 98/94, International Monetary Fund, Washington, D.C.

FEENSTRA, R.C., R.E. LIPSEY and H.P. BOWEN (1997), "World Trade Flows, 1970-1992, with Production and Tariff Data", NBER Working Paper No. 5910, National Bureau of Economic Research, Cambridge, Massachusetts.

GREENAWAY, D. and C. MILNER (1986), *The Economics of Intraindustry Trade*, Basil Blackwell, New York, N.Y.

GROSSMAN, G.M. and E. HELPMAN (1991), *Innovation and Growth in the Global Economy*, MIT Press, Cambridge, Massachusetts.

INTERNATIONAL MONETARY FUND (1997), *World Economic Outlook*, World Economic and Financial Surveys, Washington, D.C.

JAUMOTTE, F. (1998), "Technology Diffusion and Trade: An Empirical Investigation", unpublished, Harvard University, Cambridge, Massachusetts.

KELLER, W. (1997), "Trade and the Transmission of Technology", NBER Working Paper No. 6113, National Bureau of Economic Research, Cambridge, Massachusetts.

NEHRU, V. and A. DHARESHWAR (1993), "A New Database on Physical Capital Stock: Sources, Methodology and Results", *Revista de Analisis Economico*, Vol. 8, June.

VAMVAKIDIS, A. (1998), "Explaining Investment in the WAEMU", IMF Working Paper 98/99, International Monetary Fund, Washington, D.C.

# Part III

# Building an Appropriate Institutional Environment to Promote Competitiveness

*Chapter 6*

# Competitiveness and Foreign Direct Investment in Africa

*Sara E. Sievers*

## What Are Competitiveness Rankings?

The term "competitiveness" causes many academics some discomfort, piques the attention of policymakers and assumes near-mantra status in much of the private sector[1]. The competitiveness index rankings that this chapter discusses were designed as a tool for businesses and governments, a spur to reform and a signal of success rather than a strict academic exercise. The index subordinates market size, natural-resource endowments and other characteristics of business interest to economic growth, which represents a better estimate of the medium-term health of national economies. Survey results and empirical data both show that the most important factor in propelling economic growth, attracting foreign direct investment in the long term or allowing the healthy increase of domestic firms is a stable, well-managed economy. The work described here, conducted originally for the 1998 *Africa Competitiveness Report*, measures the competitiveness of 23 African countries based on estimates for their medium-term economic growth, controlling for levels of initial income (Table 6.1).

Table 6.1. **African Competitiveness Index**

| Rank | Country | Scale | Rank | Country | Scale |
|---|---|---|---|---|---|
| 1 | Mauritius | 0.87 | 13 | Kenya | -0.15 |
| 2 | Tunisia | 0.79 | 14 | Uganda | -0.16 |
| 3 | Botswana | 0.54 | 15 | Burkina Faso | -0.21 |
| 4 | Namibia | 0.43 | 16 | Tanzania | -0.24 |
| 5 | Morocco | 0.40 | 17 | Ethiopia | -0.25 |
| 6 | Egypt | 0.38 | 18 | Mozambique | -0.32 |
| 7 | South Africa | 0.34 | 19 | Cameroon | -0.38 |
| 8 | Swaziland | 0.22 | 20 | Zimbabwe | -0.40 |
| 9 | Ghana | 0.09 | 21 | Malawi | -0.43 |
| 10 | Lesotho | 0.06 | 22 | Nigeria | -0.48 |
| 11 | Côte d'Ivoire | -0.09 | 23 | Angola | -0.79 |
| 12 | Zambia | -0.09[a] | | | |

*Source:* *Africa Competitiveness Report*, 1998.
*Note:* a. Before rounding scale numbers, Zambia scores slightly behind Côte d'Ivoire.

The index methodology has attracted considerable attention and debate among those familiar with the rankings. Given these concerns, it is worth detailing the justification for the methodology as well as the variables contained in the index, their sources, and the weighting each received.

The methodology used in the Africa competitiveness rankings is the index used for several years by the Harvard Institute for International Development (HIID) and the World Economic Forum (WEF) to calculate global competitiveness rankings. Comparisons of the competitiveness rankings with subsequent economic performance have confirmed the general reliability of the methodology, because the index has done a good job predicting future economic growth during several years of global rankings. Other rankings of African countries that measure components of economic health, such as those of *Institutional Investor*, the Index of Economic Freedom and Transparency International, have shown a high degree of correlation with the competitiveness index. For these reasons, as well as the strength of the theoretical base in the economic-growth literature upon which the methodology is based, the competitiveness rankings are useful and defensible, and plans are to continue to use the index as currently defined and calculated.

The overall index is an average of six sub-indices, which in turn combine hard data collected from African governments and international organisations, and the results of an Executive Survey of African businesses conducted in preparation for the *Competitiveness Report*. The six sub-indices listed below were selected on the basis of a thorough analysis of factors with a demonstrated effect on economic growth.

— *Openness.* This sub-index measures the degree to which government policies open each country to international trade. It looks at such indicators as exchange-rate policy, barriers to imports, average tariff rates, and similar items.

— *Government*. This variable looks at government consumption rates, budget deficits, and national tax policies, as well as businesses' perceptions of the extent of state involvement in the private sector, government competence, and taxes.

— *Finance* includes firms' access to financing, the maturity of the banking sector and corporate attitudes towards taxation.

— *Infrastructure.* This sub-index covers the extent and quality of roads, railways, ports, and air travel. It also looks at telecommunications infrastructures and access to computers. The quality of utilities, such as water and electricity supply, is also included.

— *Labour* examines the characteristics of the workforce relevant to economic growth. What are national education rates? Is health care adequate? From business perspectives, does government over-regulate workplace conditions?

— *Institutions*. The only one based entirely on survey data, this sub-index includes subjects such as crime rates and the effectiveness of police forces, the quality of legal institutions and other rule-of-law issues. Political and policy stability are key components.

The hard data variables come largely from World Bank sources, in particular the 1997 *African Development Indicators*, the African Development Bank's *Africa in Figures*, and the US Central Intelligence Agency's *Country Factbooks*. Other sources include the International Monetary Fund, the United Nations and individual countries. For most countries, resident experts check the data to ensure their general accuracy. Even with such measures, however, the reliability of data for parts of Africa varies widely.

WEF and HIID collaborate to conduct surveys of the business communities in the 24 countries covered in the *Africa Competitiveness Report*. In partnership with local business organisations and economic institutes, as well as individual consultants, WEF and HIID have received responses from more than 650 companies working in Africa. This sample consists primarily of medium-sized to large businesses, 80 per cent locally owned, which produce largely for domestic markets.

The response rate varied across countries, with most providing between 25 and 55 completed surveys. Sample sizes were unusually small in Angola, Swaziland and Lesotho. Two of these economies are themselves quite small, so the small number of responses is not surprising. Because the data that were collected matched relatively well with other sources of information, the survey responses were included in the overall index.

The competitiveness results show that small, dynamic, stable economies with solid export bases perform best. The top finishers, Mauritius, Tunisia, and Botswana, all are reliably well managed economies and have been so over time. They all have significant export interest, and all have a history of sustained, respectable economic growth.

Mauritius moved from a multi-cultural, mono-crop economy at independence 30 years ago to become one of Africa's richest countries, with current average per capita annual income at just under $3 700. Annual growth rates averaging 6 per cent explain much of the turnaround, aided in part by one of Africa's few export-processing zones, through which nearly 90 per cent of the country's trade flows.

At an average of 4.5 per cent this decade, growth in Tunisia has been less dramatic than in some other top finishers, but it has been consistently good. Moreover, with real GDP at just under $14 billion, Tunisia's economy is more than four times as large as either Mauritius or Botswana.

Botswana, another of Africa's success stories, was one of the world's 20 poorest countries at independence 30 years ago, but is now a solid member of the World Bank's group of middle-income countries, with Africa's fourth-highest per capita GDP. A diversified and carefully managed mining sector has driven nearly two decades of 8 per cent growth.

The countries that have done well have largely avoided the extreme economic and political turmoil that trapped many places in Africa during the 1970s and 1980s. The middle performers, as a rule, are reforming but still recovering from a long period of poor performance. Whether burdened by socialist economic systems, such

as Tanzania's under previous leadership, or outright civil war, as in Ethiopia, even policy-smart economies take time to rebuild. The classification of well known reforming countries, such as Ghana and Uganda, as "middle performers" may surprise many, but it should be recalled that in both countries, even after a decade of overall stability, real per capita GDP is just recovering its 1970 level.

Those middle performers not in the recovery stage often have relative stability but sporadic reform policies. Kenya, for example, has since 1993 had periods of reform interspersed with faltering government commitment to liberalisation, characterised by the economic unrest surrounding the electoral activity of 1997. Zambia has started and stopped reform several times since the early 1990s.

The poorly performing countries are largely those that have suffered recent political turmoil, such as the lengthy civil wars in Angola and Mozambique or the military dictatorship in Nigeria, or that have yet to commit themselves to market-oriented economies. Some, such as Malawi, are new reformers facing particularly difficult geographical, demographic, or environmental situations, which make achieving immediate fast growth and competitiveness more challenging.

The competitiveness index shows a strong geographic bunching of the more competitive economies. North Africa scores well, as do the island state of Mauritius and countries in the Southern African Customs Union (Botswana, Lesotho, Namibia, South Africa, and Swaziland). This is consistent with recent research, which emphasises the correlation between geography and economic growth. Without suggesting "geographical determinism", it is clear that geography plays one important role among many in economic performance. Geographical features are not included in the variables used to calculate the competitiveness index.

## Increasing Competitiveness through Increasing Growth

Once African countries decide that fast growth is a national priority, where should their leaders begin to reform? Research by HIID and others shows that policy variables are the most important factors in promoting or restraining growth. Particularly important are openness to trade, high national saving rates, and smoothly functioning government institutions. Geographical location, natural-resource endowments and demographic patterns also emerge as important factors in economic growth.

The surveys show that the business community in much of Africa concurs with the importance of government policy. Foreign-owned firms listed political and policy stability as the most important factors affecting where they invest and as among the most critical in determining their investment's eventual success. Domestic businesses tied policy instability with high inflation as a key barrier to business, ranking just behind taxes, infrastructure, and access to financing. Because many questions contained in the survey are virtually identical to those in the *Global Competitiveness Report*, one can compare results from Africa with those from a wide variety of other countries.

### *Openness*

Openness to trade is usually the best place for governments to begin if their goal is to promote fast growth. During 1970-90, much of Africa stayed effectively closed to trade, except for natural-resource exports and the imports they financed. It was very difficult under existing regulations for new export sectors to arise. Even today, after several years of trade liberalisation, considerable room remains for further trade-policy liberalisation.

Survey results confirm both the importance of openness and the need to do more. Openness to trade in both goods and information is generally perceived as low in Africa compared with the rest of the world, although clearly improving in recent years. A series of survey questions looked at factors such as tariffs and quotas, import barriers and national export positions more generally.

When asked whether the levels of tariffs and quotas "significantly raise the cost of acquiring foreign materials and equipment for your firm", most companies in Africa responded "yes". A question of almost identical wording included in the *Global Competitiveness Report* shows that much of the rest of the world says "no". This result holds not just for industrial economies but for all. Table 6.2 provides a more precise breakdown.

Table 6.2. **Responses to the Question: The level of import tariffs and quotas in your country significantly raises the cost of acquiring foreign materials and equipment for your firm**
(1 = strongly agree, 7 = strongly disagree)

| Global Rank | Country | Mean Response | Global Rank | Country | Mean Response |
|---|---|---|---|---|---|
| 1 | Denmark | 6.47 | 44 | Hungary | 3.96 |
| 2 | Hong Kong-China | 6.46 | 45 | Peru | 3.88 |
| 3 | Finland | 6.40 | 46 | India | 3.81 |
| 4 | Spain | 6.29 | | Kenya | 3.72 |
| 17 | Austria | 5.68 | 47 | Poland | 3.62 |
| | Tunisia | 5.67 | | Egypt | 3.38 |
| 18 | Norway | 5.53 | | Côte d'Ivoire | 3.35 |
| 21 | Argentina | 5.44 | 48 | Colombia | 3.28 |
| 22 | Mexico | 5.44 | | Namibia | 3.25 |
| 24 | Philippines | 5.33 | | Malawi | 3.10 |
| 25 | Czech Republic | 5.32 | 49 | Vietnam | 3.04 |
| 29 | Malaysia | 5.18 | | Zimbabwe | 3.00 |
| 30 | Turkey | 5.05 | | Uganda | 3.00 |
| 31 | Indonesia | 4.94 | 50 | Russia | 2.83 |
| 32 | Brazil | 4.72 | | Cameroon | 2.81 |
| 33 | Thailand | 4.69 | | Zambia | 2.80 |
| 34 | Chile | 4.67 | | Ethiopia | 2.78 |
| 40 | Slovakia | 4.45 | | Nigeria | 2.66 |
| | Ghana | 4.40 | 52 | Ukraine[a] | 2.61 |
| | Botswana | 4.39 | | Tanzania | 2.57 |
| | Morocco | 4.33 | | Burkina Faso | 2.54 |
| | South Africa | 4.15 | | Mozambique | 2.43 |
| 43 | Iceland | 4.00 | | | |

*Sources:* *Global Competitiveness Report*, 1997, for global rank, and *Africa Competitiveness Report* for mean response.
*Note:* *a)* Bottom-ranked country in *Global Competitiveness Report*, 1997.

Similar results hold true for questions on hidden import barriers and exchange-rate volatility and misalignment. African countries generally have much lower means than countries elsewhere. Africa's responses do show results similar to those of the world more generally for the availability of foreign exchange at reasonable rates, which has improved in the past five years.

Trade regulations can be very quickly improved; the necessary changes require only a series of government decisions. The survey results amply indicate progress — both anticipated and experienced — towards more open economies in Africa. Among the trends of optimism and anticipated improvement, trade openness ranks alongside telecommunications as having progressed the fastest in the past five years. Recent lowering of trade barriers, through tariff reductions and other means, is well documented throughout the continent. The surveys show that businesses both expect and want this trend to continue.

### *Strength of Institutions*

Africa's governmental and judicial institutions got a mixed view in the surveys — better than conventional wisdom assumes, but generally lower than needed for sustained high growth. The data show, for example, that the extent of corruption varies widely within Africa. Some countries show minimal incidence while others show very high levels. On the whole, Africa is not an outlier on this score compared with other parts of the developing world, although this masks a wide range of performance.

Corruption is only one of several variables that measure the overall quality of institutions. When questioned about market dominance by a few companies (all questions are on a 7-point scale; higher is better), Africa's average response was 3; for 20 developing economies in the *Global Competitiveness Report*, it was 3.28. Responses to questions on the quality of rule of law scored similarly. On the effectiveness of national legal systems in enforcing contracts, African countries responded slightly more confidently, at 4.4, than did the group of 20 other developing economies (4.2). On the effectiveness of the police force in providing security, Africa scored 3.65, just below the average of the others, at 3.75. Moreover, business respondents do not anticipate major changes in policy in coming years. This includes responses from countries such as Angola, Ethiopia and Mozambique, which have recently emerged from conflict.

While strengthening appropriate institutions in Africa is clearly important and should be a focus of attention from governments that desire fast growth, the data suggest that a large number of African countries lie well within the range of institutional quality in developing economies. Still, Africa's official institutions need considerable improvement. If not a source of slow growth, institutions in Africa are not yet a propelling force towards prosperity.

### *Geography and Health*

Other factors affect growth but are more difficult to overcome through proper policies. Africa as a whole faces several geographical difficulties, though their extent varies widely. As is well known, the interior suffers from very high transport costs to Africa's ports. No major navigable rivers exist to carry ocean-going trade from the interior all the way to or from the sea — in contrast, say, to the Mississippi, the Saint Lawrence Seaway, or the Rhine. Many African countries, 15 out of 53, are landlocked, adding to the high costs of transport. Not only must trade pass a considerable distance over land, but it must also cross political borders.

Almost 90 per cent of Africa sits in the tropics, which brings a distinctive set of challenges and difficulties. Tropical agriculture often has very low productivity, because of such variables as poor soils, torrential rains, unstable weather patterns, pests and veterinary disease. Fortunately, highly productive tropical economies, such as Hong Kong-China, Malaysia and Singapore, have proven that manufactures can thrive in the tropics if economic policy is supportive.

Health is another growth-related factor, regarding which Africa faces particular challenges. Unfortunately, effective health care continues to elude many African countries, lowering the quality of life and playing a part in slowing economic growth. The continent-wide average life expectancy at birth is 54 years, considerably below most other regions in the world, due in part to a huge burden of infectious disease. To some extent, this results from Africa's low income levels; as income increases, disease rates will almost surely decline. At the same time, many of these diseases are related to the continent's special tropical ecology and climatic conditions.

AIDS continues to plague some parts of Southern Africa and the areas surrounding the Great Lakes, and it is present to some degree in most sub-Saharan countries. Drug-resistant strains of many existing infectious diseases, such as cholera, dysentery and pneumonia, further complicate health care delivery. In part, more investment in public-health surveillance and improved interventions are appropriate responses. More research on new and re-emerging diseases is critical for the future health of the continent.

## Competitiveness and Foreign Investment

The global surge in foreign direct investment (FDI) in the past decade has largely bypassed Africa (Table 6.3). In 1996, total inflows of FDI world-wide stood at just over $349 billion, of which the United States was the largest recipient. Africa's share was just under $5 billion, or 1.4 per cent. While overall levels of investment in Africa increased by 5.3 per cent in 1996, its share of developing-country flows more than halved, from 11 per cent to 5 per cent from 1986 to 1990. Worse still, the investment that does arrive is unevenly distributed. A disproportionate share goes to North Africa or oil-exporting countries such as Nigeria (Table 6.4). Indeed, half of all inflows to Africa from 1990 to 1995 went to Nigeria and Egypt.

Table 6.3. **Foreign Direct Investment Inflow by Region, 1996**

| | Millions of Dollars | Share of World Total (%) |
|---|---|---|
| Inflows | 349 227 | 100.0 |
| Industrial Economies | 208 226 | 60.0 |
| Western Europe | 105 379 | 30.2 |
| North America | 91 910 | 26.2 |
| Other Industrial Economies | 11 536 | 3.3 |
| Central and Eastern Europe | 12 261 | 3.5 |
| Developing Countries | 128 741 | 36.9 |
| Asia | 84 283 | 24.1 |
| Latin America and the Caribbean | 38 563 | 11.0 |
| Africa | 4 949 | 1.4 |
| Other Developing Economies | 946 | 0.3 |

*Source:* UN, *World Investment Report*, 1997.

Table 6.4. **Foreign Direct Investment Inflows to Africa, 1996**

| Country | Millions of Dollars | Shares (%) of | | Country | Millions of Dollars | Shares (%) of | |
|---|---|---|---|---|---|---|---|
| | | Africa Total | World Total | | | Africa Total | World Total |
| Total | 4 949 | 100.0 | 1.4 | Morocco | 400 | 8.1 | 0.1 |
| Angola | 290 | 5.9 | 0.0 | Mozambique | 29 | 0.6 | 0.0 |
| Botswana | 23 | 0.5 | 0.0 | Namibia | 52 | 1.0 | 0.0 |
| Burkina Faso | 3 | 0.1 | 0.0 | Nigeria | 1 720 | 34.8 | 0.4 |
| Cameroon | 35 | 0.7 | 0.0 | Senegal | 53 | 1.1 | 0.0 |
| Côte d'Ivoire | 21 | 0.4 | 0.0 | South Africa | 330 | 6.7 | 0.0 |
| Egypt | 740 | 15.0 | 0.2 | Swaziland | 67 | 1.4 | 0.0 |
| Ethiopia | 5 | 0.1 | 0.0 | Tanzania | 190 | 3.8 | 0.0 |
| Ghana | 255 | 5.1 | 0.0 | Tunisia | 370 | 7.5 | 0.1 |
| Kenya | 37 | 0.7 | 0.0 | Uganda | 135 | 2.7 | 0.0 |
| Lesotho | 17 | 0.3 | 0.0 | Zambia | 58 | 1.2 | 0.0 |
| Malawi | 17 | 0.3 | 0.0 | Zimbabwe | 47 | 0.9 | 0.0 |
| Mauritius | 21 | 0.4 | 0.0 | | | | |

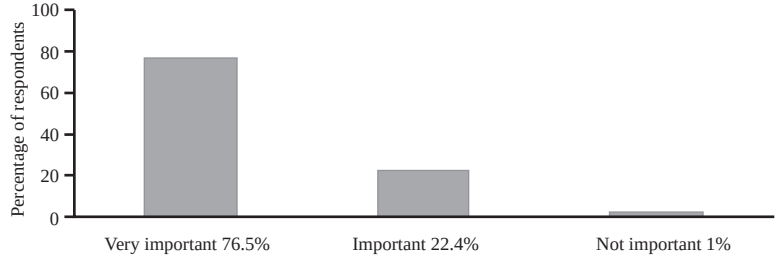
*Source:* UN, *World Investment Report*, 1997

The problem is not simply one of low returns in Africa. In fact, the foreign investment that has been undertaken has yielded rather high returns, according to the recent measures of the *World Investment Report*. Foreigners are not yet seizing investment opportunities in Africa, for several reasons: market responses have not yet caught up with recent African economic and political reforms; these reforms remain incomplete, so investors remain on the sidelines; and there is simply a lack in world markets of information about the African economies.

What do foreign-owned firms currently operating in Africa say are the most important factors in determining their level of investment and in conducting business once that investment is made? The Executive Survey revealed that the greatest concern, by a considerable margin, is stability — both political and for specific economic policies. Next comes the tax system, followed by infrastructure. The survey also clearly documents the deleterious effect of corruption on foreign businesses in places where it is widespread.

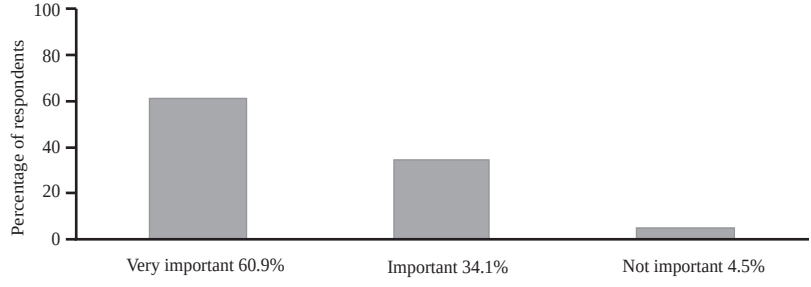
Questions about political and policy stability appeared in several parts of the survey, to test for accuracy of response. The results were consistent. More than 75 per cent of the respondents claimed political stability to be "very important" and the remainder considered it "important" (Figure 6.1). Three-quarters of them reported significant cost to businesses resulting from policy uncertainty. Just over 60 per cent ranked policy instability as a "very important" variable affecting business (Figure 6.2).

Figure 6.1. **The Importance of Political Stability**




*Source:* J. Sachs and S. Sievers, *Africa Competitiveness Report*, Worldlink, London, 1998.

Figure 6.2. **The Importance of Predictability and Reliability of Government Policies, Regulations and Laws**




*Source:* J. Sachs and S. Sievers, *Africa Competitiveness Report*, Worldlink, London, 1998.

Why do firms insist strongly and consistently on stability? They certainly should expect some uncertainty in dynamic emerging markets. Nevertheless, a chief goal of business planning lies in minimising risk. Rapid, unanticipated changes in the regulatory environment greatly increase risk and squeeze firms' margins, making companies reluctant to invest.

What are the implications for policymakers? Although domestic firms may have fewer options to move elsewhere, foreign firms decide from among a range of alternatives in choosing the best locations for their investments. One key role of government, then, is to create and maintain a stable business climate for domestic and foreign investors alike. Policymaking throughout Africa has had a reputation for sudden

reversals and an unpredictable regulatory environment. A mercurial, high-risk environment invites short-term speculators with ephemeral investments, not the sensible, forward-looking investors who would contribute most to long-term growth.

### *Taxes*

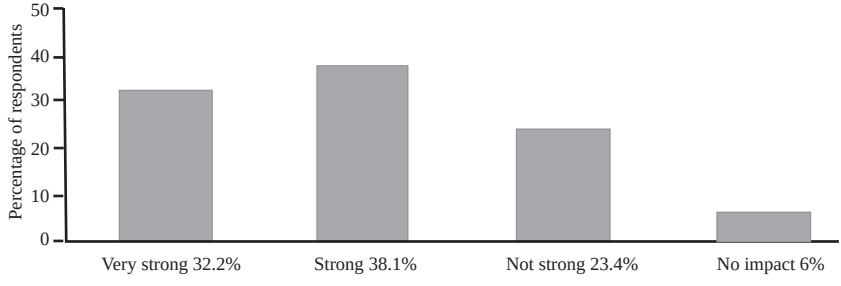
As in many places, high taxes are a frustration for businesses in Africa. "Tax regulation and/or high rates" tops the list of grievances for companies overall, and ranks second for companies with foreign ownership. On a related question, 32 per cent of respondents say that tax evasion is a problem. Taxes do decline in significance in answers to more general questions that probe foreign companies' primary criteria when making investment decisions.

Should policymakers adjust their tax strategies to attract and sustain FDI? The answer is almost surely yes. In some sectors, such as export processing of apparel, leather goods and electronics components, the international environment for FDI is so competitive that tax incentives (e.g. tax holidays) almost always form part of the overall package of policies to attract FDI. Other sectors, such as mining, have widely accepted international norms for royalties and corporate income taxes. In addition to broadly based tax systems with low marginal tax rates and fair administration of taxation, most countries will need some differentiation of their tax codes to attract and maintain FDI in the best ways.

### *Infrastructure*

Firms indicate strong feelings about infrastructure's importance in their business decisions and operations; it ranks high on the list of complaints for all businesses (Figure 6.3), and third for foreign-owned firms. Two survey questions help particularly in identifying the infrastructure problems of most concern to firms. The first asks companies which forms of transportation they use more frequently, and the second asks about the conditions of roads, railways and so on, and their impact on competitiveness. Firms overwhelmingly say that roads are most important, followed by airports.

Figure 6.3. **The Impact of Inadequate Supply of Infrastructure on Business (All Firms)**




*Source:* J. Sachs and S. Sievers, *Africa Competitiveness Report*, Worldlink, London, 1998.

Improving infrastructure to the satisfaction of many foreign businesses is often extremely expensive. Countries with poor infrastructure and limited budgets should consider two things: first, raising capital from the private sector through some form of concessions or privatisation of existing infrastructure; and, second, prioritising spending by thinking more carefully about the kinds of multinational companies the nation can and should attract, and shaping infrastructure improvements accordingly. Coastal economies, for example, may have great potential for the establishment or enlargement of export-processing zones linked to port facilities. If so, improvements in the physical and administrative operation of ports can be a crucial spur to export-led growth.

### *Corruption*

Corruption is the fourth major concern of foreign businesses. How large a concern? This varies widely from country to country, but it was extremely prominent in the survey responses from Cameroon, Nigeria, Mozambique and Kenya. Table 6.5 shows a country-by-country breakdown of the responses to a survey question on corruption.

Table 6.5. **Responses to the Question: In your country, irregular, additional payments connected with import and export permits, business licences, exchange controls, tax assessments, police protection, or loan applications are**
(1 = required for effective business, 7 = rare in the business community)

| Country | Mean | Country | Mean |
|---|---|---|---|
| Cameroon | 2.33 | Ghana | 4.18 |
| Nigeria | 2.45 | Malawi | 4.21 |
| Kenya | 2.95 | Zimbabwe | 4.31 |
| Egypt | 3.33 | Zambia | 4.40 |
| Uganda | 3.42 | Mauritius | 4.66 |
| Tanzania | 3.43 | Namibia | 5.00 |
| Côte d'Ivoire | 3.45 | South Africa | 5.31 |
| Ethiopia | 3.67 | Tunisia | 5.62 |
| Burkina Faso | 4.00 | Botswana | 6.28 |

*Source: Global Competitiveness Report*, 1998.

Considerable recent economic research has demonstrated that corruption is a barrier to FDI and economic growth. Governments that ignore it do so at serious peril to their economies and to the attractiveness of their countries as hosts for FDI. The challenge of good governance is difficult under any circumstances. If the cost of not addressing problems of governance is sufficiently great, as this survey suggests is the case for a number of countries, then firm commitments to transparency and the rule of law are worth the political cost to national leadership.

**What Must Africa Do?**

The final question of the survey asked respondents which areas posed the most serious problems for doing business. After the familiar complaints about tax regulations and financing, businesses operating in Africa list infrastructure, inflation and corruption as their most serious obstacles. For foreign-owned companies alone, the list varies only slightly, with low education levels replacing financing. An earlier question posed exclusively to firms actively engaged in FDI asked them to rate the factors that affected their decision to invest. Political stability and predictable, reliable policies and laws finish first and second, followed closely by infrastructure and the ability to repatriate capital. These results hold both for companies primarily engaged in exporting and those dependent on imported inputs.

The message to African policymakers is clear: the things that businesses — foreign and domestic, producing for domestic or export markets — say are their most serious constraints lie within the control of African governments. Get the fundamentals right, and businesses already working in the country will be able to grow. If that occurs, and if the attitudes of those currently investing from abroad are any indication of broader sentiment, the country will also attract new capital. For the believer in a market economy, this is a powerful message. Control inflation by resisting the temptation to resort to deficit financing. Improve infrastructure through privatisation, equity share sales, and other ways of attracting capital without increasing national debt. Allow goods and capital to flow freely across national borders. Control corruption. Most important, keep credibility in government reform through consistent, reliable policy stability.

## Note

1. This chapter draws heavily on the work of Jeffrey Sachs and Sara Sievers first published in the 1998 *Africa Competitiveness Report*. Permission for publication has been granted by WorldLink, publishers of the report.

*Chapter 7*

# Exporting and Efficiency in African Manufacturing

*Arne Bigsten, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Willem Gunning, Jean Habarurema, Abena Oduro, Remco Oostendorp, Catherine Pattillo, Måns Söderbom, Francis Teal and Albert Zeufack*

The many cross-country studies of the determinants of growth in Africa undertaken in the last few years typically conclude that the inward orientation of African countries has been a major obstacle to growth (see, for example, the survey in Collier and Gunning, 1999)[1]. A variety of mechanisms to increase openness and thereby growth have been proposed. To compete against international producers, domestic firms must adopt newer and more efficient technology or use the same technology with less x-inefficiency in order to reduce costs (Nishimizu and Robinson, 1984). Higher volumes of trade increase international technical knowledge transfer (Grossman and Helpman, 1991). If domestic firms have different degrees of inefficiency, the exit of the less efficient ones results in lower average costs and higher productivity. The firms that remain are forced to adjust in two ways: by expanding their scale of production and exploiting economies of scale, and by reducing their technical inefficiencies[2]. Both these adjustments will decrease average industry costs and raise productivity (Krugman, 1984; Roberts and Tybout, 1991). One may argue that the primary sources of development are learning and knowledge accumulation and, since international trade is one of the most important channels through which knowledge gets transferred, the degree of integration in the world trading system becomes a crucial determinant of growth prospects.

This chapter investigates the extent to which sub-Saharan African manufacturing firms that export are more efficient than those that do not. By observing firms over time, one can find out whether exporting firms increase their efficiency relative to non-exporting firms. Causality is difficult to establish, however. Firms with good management may have both a high level of efficiency and so be more likely to export, and faster growth in efficiency, giving rise to a spurious association between exporting and efficiency gains. Some recent analyses control for this by explaining the change in efficiency in terms of various firm characteristics, including initial levels of efficiency,

and allowing for fixed firm effects (see Bernard and Jensen, 1995, on the US economy; Clerides, Lach and Tybout, 1998, on Mexico, Colombia and Morocco; and Kraay, 1997, on China).

This study looks at four sub-Saharan African countries: Cameroon, Ghana, Kenya and Zimbabwe. All are of similarly modest size, with GNP averaging only $7.7 billion as of 1996. Africa has had the highest level of trade restrictions (Dollar, 1992; Sachs and Warner, 1997), and the four economies conformed to this pattern, with consequently low levels of competition. They have all been technologically backward, for example, with low levels of human capital endowment. Thus, it is useful to explore whether the pattern of higher efficiency associated with exporting exists in these countries as in countries in other regions.

Establishing the link between exports and firm-level efficiency requires firm-level microeconomic data on factor use and output. To date, most studies of the relationship have used industry- or sector-level data (Ghani and Jayarah, 1995), with very few exceptions, especially for Africa. Haddad (1993) finds a positive association between productivity and exports at the firm level: firms closest to maximum efficiency tend to have high export shares. Harrison (1994) shows that ignoring the effects of liberalisation has led researchers to mis-measure the effect of trade reform on productivity.

This chapter extends these papers by using comparable panel sample surveys of four sub-sectors of manufacturing covering 1992-95 in the four countries, to ask whether both the degree of efficiency and its rate of growth associate with exporting. It constructs measures of firm-level efficiency using stochastic production-frontier models to show the relationship between exporting and firm efficiency. There is no attempt to test for causality; that is a subject for future research.

## The Manufacturing Sector in Four Sub-Saharan African Countries

The data were obtained during 1991-95 as part of the Regional Programme on Enterprise Development co-ordinated by the World Bank. In each country, surveys gathered information from a panel of manufacturing firms over three years on a variety of issues, including outputs and resource use. They covered 1992-94 for Kenya, 1991-93 for Ghana, 1992-94 for Zimbabwe and 1992/93-94/95 for Cameroon.

All the countries faced macroeconomic problems that had a significant impact on manufacturing performance. They all had import-substitution development policies from independence through the late 1970s. All introduced structural adjustment programmes in the 1980s, with the support of the World Bank and other aid organisations, and with an emphasis on macroeconomic reforms, trade liberalisation and privatisation.

Only Ghana saw a substantial recovery in real GDP from the mid-1980s. Between 1983 and 1991, it liberalised its exchange rate, so that at the start of the survey period in 1992 the premium on foreign exchange had been eliminated. Financial-sector reforms

in the late 1980s had removed a significant part of the non-performing loans from the banking system and liberalised interest rates. Growth slowed somewhat during the survey period, but Ghana still had the highest trend growth in real per capita income between 1983 and 1992 in the sample, at 1.5 per cent per year.

Between 1983 and 1992, real per capita GDP in Kenya grew by 0.7 per cent, but the withdrawal of donor support in 1991 began a serious economic crisis and a fall in per capita GDP. Political turmoil and ethnic clashes in the run-up to the 1992 election had serious economic repercussions. Uncertainty about government policies and a shortage of foreign exchange held back growth, which fell to 0.5 per cent in 1992 and 0.3 per cent in 1993. The manufacturing sector grew by only 1 per cent and 1.8 per cent in those years. Some recovery emerged in 1994 as macroeconomic efforts began to bear fruit and the reforms were broadened to include structural and institutional improvements. GDP grew by 3 per cent, but the manufacturing sector still managed only 1.9 per cent growth.

Per capita incomes declined in Zimbabwe by 0.2 per cent and in Cameroon by 3.3 per cent between 1983 and 1992. Both countries were thus hard pressed to undertake reforms in the 1990s. Zimbabwe finally adopted a structural adjustment programme in 1991. Policy changes focused initially on dismantling the highly restrictive system of import and foreign exchange controls. This included liberalisation of the foreign exchange market, which eliminated most of the parallel-market premium. Imports were shifted gradually to the Open General Import Licence list, where foreign exchange rationing did not apply. By the time of the first survey in 1993, these reforms had essentially eliminated Zimbabwe's trade and foreign-exchange problems. A very serious drought in 1991/92, however, had strong repercussions on the manufacturing sector until 1993, after which competition increased from both new domestic firms and imports, and the combination of financial liberalisation and large fiscal deficits led to very high real interest rates. They approached 15 per cent in 1994.

Long regarded as an example of success in sub-Saharan Africa, Cameroon suffered a series of external shocks in 1986 that revealed severe structural weaknesses. Its terms of trade worsened by 50 per cent between 1986 and 1994, as prices of its main exports fell while the nominal exchange rate remained fixed and domestic distortions persisted. Per capita income plunged by almost half. The government initially resisted adjustments; it continued investment programmes and maintained public-sector salaries, financed itself by borrowing and building up arrears to the private sector. In 1988, it accepted an IMF-sponsored stabilisation programme, followed by a structural adjustment programme in 1989. Due to the CFA zone's fixed nominal exchange rate *vis-à-vis* the French franc, the government had to use other adjustment instruments. It undertook some reforms, such as price deregulation, financial reforms and tariff reductions, but incomes continued to fall and exports stagnated. The inward orientation of industry, widespread public-sector control of economic activities and the overvalued exchange rate made it hard for exporters to make a breakthrough. In 1994, the CFA franc was finally devalued by 50 per cent against the French franc, and trade and indirect tax reforms were undertaken. Per capita incomes then rose for the first time

since 1986. Large manufacturing firms, particularly exporters, increased production after the devaluation, but among smaller and informal firms production continued to decline.

Only Kenya saw no real devaluation between 1990 and 1994. Zimbabwe's was about 5 per cent, while both Cameroon's and Ghana's were close to 10 per cent. All four countries had relatively extensive reforms under way, although much still remained to accomplish before stable, growth-enhancing environments emerged.

## Efficiency-Frontier Models

To what extent did export activity make it possible for firms to achieve higher efficiency under these turbulent economic circumstances? The econometric estimates of technical efficiency in this section come from stochastic efficiency-frontier models that estimate production-function frontiers and derive technical efficiencies using fixed- and random-effects techniques and a time-variant productivity approach. The data cover a balanced panel of firms for which observations exist for all the years, because the reliability of the measure of technical efficiency depends crucially on the length of time covered by the panel.

Since the pioneering work of Farrell (1957), further developed by Aigner and Chu (1968), firm-level efficiency has often been measured using the efficiency-frontier approach. Given variations in plant technology, the concept estimates actual deviations from an efficient isoquant instead of an average production function. With the frontier-production technique, the expression $y = f(x,t)$ represents the maximum output achievable with the vector of inputs $x$ at time $t$. The observed production of firm $i$ will fall short of the frontier by some amount $u_i = f(x_i,t) - y_i$. If the production function $f(.)$ can be estimated, then a set of specific efficiency indexes $u_i$ can be obtained.

Several techniques have been proposed to estimate $f(.)$ (see surveys by Bauer, 1990; Green, 1993). Following Schmidt and Sickles (1984) and Green (1993), the panel data extension of the frontier model can be written as:

$$\ln y_{it} = \beta_0 + \beta_j \Sigma_j \ln x_{jit} + v_{it} + u_{it} \qquad (1)$$

where $y_{it}$ is the observed value added of the $i$th firm ($i = 1,.....,N$) at time $t$, $x_{jit}$ is a vector of the amount of the $j$th inputs ($j = 1,...J$) employed in firm $i$ at time $t$ ($t = 1,....,T$), and $\beta_0$ and $\beta_j$ represent a vector of technology parameters to be estimated. The compound disturbance is composed of two terms. The first, $v_{it}$, is a random disturbance assumed to be distributed identically and independently across plants with identical zero mean and constant variance. It represents factors such as luck, weather conditions and unpredicted variation in inputs. The second, $u_{it}$, is a firm-specific effect that reflects firm efficiency and management skills. The distribution

of $u_{it}$ is one-sided, reflecting that output must lie on or below the frontier, and it is assumed to be independently and identically distributed across plants, with mean $\mu$ and variance $\sigma^2$.

The stochastic production frontier recognises that deviation from the production frontier might not be entirely under the control of the firm. Contrary to deterministic models, in which events like bad weather or a high number of random equipment failures might appear to constitute inefficiency and translate into measures of increased inefficiency, the stochastic-frontier model allows for such random events (Green, 1993). Also in contrast to deterministic models, the stochastic nature of the model allows some observations to lie above the efficiency frontier, making the estimates less vulnerable to outliers.

Assuming a standard log-linear (Cobb-Douglas) production function and taking logs produces the stochastic production-frontier model in the form proposed by Lovell, Defourny and N'Gbo (1992):

$$\ln Y_{it} = \beta_0 + \beta_1 \ln L_{it} + \beta_2 \ln K_{it} + v_{it} + u_{it} \qquad (2)$$

where $K$ represents the replacement value of equipment and $L$ the number of employees in firm $i$ in period $t$. The error term $v_{it}$ is assumed to be independently and identically distributed as $N(0,\sigma^2)$, independent of the disturbance component $u_{it}$, which is assumed to be independently and identically distributed as the non-positive part of a $N(0,\sigma^2)$ distribution truncated at zero. Both $v$ and $u$ are assumed to be distributed independently of the exogenous variables in the model.

Following Aigner, Lovell and Schmidt (1977), Jondrow *et al.* (1982), and Battese and Coelli (1992), an estimate of the efficiency measure of the $i$th firm at the $t$th time period is given by:

$$eff_{it} = \exp(\hat{u}_{it})$$

Assuming that firm-level inefficiency, $u_{it}$, is constant over time, one can estimate the model using either a fixed-effects or a random-effects approach.

With constant firm effects over time, the model can be estimated using a *within estimator* or least-squares-dummy-variable (LSDV) estimator (see Schmidt and Sickles, 1984). When verifying the assumption of independence between the inefficiency parameter and input levels, a random-effects model is generally preferable (Green, 1993). In such cases, firm effects are treated as random variables and estimated using the variance-components or generalised-least-squares (GLS) approach. The choice between them could be made using the Hausman test (Hausman, 1978). Relaxing the assumption that firm-specific technical efficiency is time-invariant and allowing productivity to change over time, one can identify time paths for firms' technical efficiency (see Cornwell, Schmidt and Sickles, 1990).

## Empirical Results

### *Estimation of Technical Efficiencies*

To derive firm-level inefficiency indexes, a simple production function with capital and labour was estimated separately for each manufacturing sector in the four countries, using the fixed-effects and random-effects approaches. The estimates of the random-effect estimators (GLS) were chosen, because the hypothesis of non-correlation between the inefficiency term and inputs could not be rejected using a Hausman test in nine of the 16 sectors. In the sectors where the hypothesis was rejected, the differences between LSDV and GLS estimates were not significant. The estimation results have a reasonable fit.

The production functions were then used to estimate the efficiency index. To distinguish the efficiency levels of exporters from those of non-exporters, the analysis divided the firms into two categories, initial exporters and non-exporters, then asked, "Are (say) non-exporting firms generally farther from the frontier than firms that export initially?"

Table 7.1 presents average efficiency in the four countries during the survey period, for initial exporters and non-exporters in each sector. Low average technical-efficiency levels in some sectors might indicate unexploited opportunities for productivity improvements through learning. These results are consistent with observed significant average inefficiency in the African manufacturing sector (Nishimizu and Page, 1982; Pack, 1988). In all countries, exporters exhibit higher average efficiency than non-exporters.

Table 7.1. **Efficiency Levels by Category of Initial Exporter: Panel (Random Effects)**

| | Food | | Wood | | Textiles | | Metals | | All | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | n | Mean | n | Mean | n | Mean | n | Mean | n | Mean |
| Cameroon | | | | | | | | | | |
| Initial exporters | 5 | 59.5 | 4 | 59.1 | 1 | 100.0 | 6 | 33.2 | 16 | 52.1 |
| Initial non-exporters | 13 | 30.4 | 7 | 37.1 | 4 | 58.2 | 10 | 17.9 | 34 | 31.4 |
| All | 18 | 38.5 | 11 | 45.1 | 5 | 66.6 | 16 | 23.7 | 50 | 38.0 |
| *P*-value | 18 | 0.0001 | 11 | 0.0001 | 5 | 0.0022 | 16 | 0.0001 | 50 | 0.0001 |
| Ghana | | | | | | | | | | |
| Initial exporters | 0 | - - - | 5 | 63.7 | 0 | - - - | 2 | 12.6 | 7 | 49.1 |
| Initial non-exporters | 25 | 16.8 | 17 | 28.3 | 24 | 32.9 | 20 | 22.4 | 86 | 24.9 |
| All | 25 | 16.8 | 22 | 36.4 | 24 | 32.9 | 22 | 21.5 | 93 | 26.7 |
| *P*-value | 25 | 0.0008 | 22 | 0.0001 | 24 | 0.001 | 22 | 0.0002 | 93 | 0.0001 |
| Kenya | | | | | | | | | | |
| Initial exporters | 3 | 44.4 | 6 | 60.4 | 5 | 10.8 | 7 | 18.8 | 21 | 32.4 |
| Initial non-exporters | 8 | 10.6 | 16 | 26.0 | 12 | 21.6 | 13 | 8.2 | 49 | 17.7 |
| All | 11 | 19.8 | 22 | 35.4 | 17 | 18.4 | 20 | 11.9 | 70 | 22.1 |
| *P*-value | 11 | 0.0245 | 22 | 0.0001 | 17 | 0.0032 | 20 | 0.0205 | 70 | 0.0001 |
| Zimbabwe | | | | | | | | | | |
| Initial exporters | 11 | 44.5 | 5 | 54.0 | 21 | 32.5 | 13 | 43.4 | 50 | 40.1 |
| Initial non-exporters | 14 | 18.2 | 10 | 55.2 | 15 | 34.7 | 5 | 30.0 | 44 | 33.6 |
| All | 25 | 29.8 | 15 | 54.8 | 36 | 33.4 | 18 | 39.7 | 94 | 37.1 |
| *P*-value | 25 | 0.0001 | 15 | 0.0001 | 36 | 0.0001 | 18 | 0.0001 | 94 | 0.0001 |

*Note:* The *P*-value tests the null hypothesis that the means for exporters and non-exporters are equal.

Table 7.2 presents firm-level efficiency indexes for each year of the survey, derived by repeating the estimates with time-variant efficiency parameters for each country. With random-effects average estimates for the period, exporters exhibit higher yearly average efficiency than non-exporters in all countries. These results are consistent with those of Kraay (1997). Using Chinese panel data, he finds that exporting firms tend to be larger and enjoy higher productivity and lower unit costs than non-exporting firms. These observations of greater efficiency among exporters as opposed to non-exporters may, however, simply reflect a selection effect, as the most efficient producers are the most likely to export (Roberts and Tybout, 1997). Whether that is the case for these data remains an issue to be explored.

Table 7.2. **Efficiency Levels by Category of Initial Exporter**
(Time-Variant Productivity Model)

| Country | n | Mean for Survey Year Indicated | | |
|---|---|---|---|---|
| Cameroon | | 1993 | 1994 | 1995 |
| Initial exporters | 16 | 39.9 | 47.5 | 52.7 |
| Initial non-exporters | 34 | 33.7 | 26.8 | 23.9 |
| All | 50 | 35.7 | 33.4 | 33.1 |
| Ghana | | 1991 | 1992 | 1993 |
| Initial exporters | 7 | 32.1 | 42.1 | 47.3 |
| Initial non-exporters | 86 | 24.1 | 23.4 | 21.1 |
| All | 93 | 24.7 | 24.8 | 23.0 |
| Kenya | | 1992 | 1993 | 1994 |
| Initial exporters | 21 | 23.6 | 20.0 | 32.0 |
| Initial non-exporters | 49 | 18.2 | 7.0 | 20.2 |
| All | 70 | 19.8 | 10.9 | 23.8 |
| Zimbabwe | | 1992 | 1993 | 1994 |
| Initial exporters | 50 | 28.9 | 40.7 | 37.5 |
| Initial non-exporters | 44 | 33.2 | 32.9 | 35.1 |
| All | 94 | 30.6 | 37.1 | 36.4 |

### *The Relationship Between Exports and Technical Efficiencies*

To test more formally whether exporting firms are more efficient and whether they have higher rates of efficiency growth one can estimate the following equation:

$$Eff_{it} = \beta X_{it} + e_{it}$$

where $X$ is a vector of exogenous variables that include firm characteristics and competitive conditions. Table 7.3 presents the results. Regression (a) is an OLS estimate of the efficiency level for the three-year period that simply includes the initial exporting status of the firm. Initial exporters tended to exhibit significantly higher efficiency levels than other firms. These results are consistent with those of Roberts and Tybout (1997), who found that exporting firms were more efficient than non-exporters. To control for self-selection of the efficient firms as exporters, regression (b), a GLS estimate of efficiency levels in years two and three, includes the efficiency for the first period. It assumes no serial dependence in $e_{it}$ — i.e. that $E(e_{it}.e_{is}) = 0$ for all $s$, $t$ —

and that although firm performance and exports are jointly determined, exports are predetermined with respect to $e_{it}$. The results show that even with control for initial efficiency levels, initial exporting raises efficiency in the two subsequent years. The effects are quite substantial: initial exporters show 13 per cent higher efficiency during the next two years.

Table 7.3. **Determinants of Technical Efficiency**
(Regressions)

| Variable | (a) Random-Effect Efficiency Level, OLS | (b) Time-Variant Efficiency Level, GLS |
|---|---|---|
| Constant | 0.17** (4.05) | 0.07* (1.87) |
| Initial exporter | 0.13** (3.61) | 0.13** (4.29) |
| Initial efficiency | - - - | 0.38** (8.57) |
| Cameroon | 0.08** (1.99) | 0.03 (0.94) |
| Kenya | -0.09** (-2.27) | -0.09** (-2.70) |
| Zimbabwe | 0.05 (1.42) | 0.05 (1.60) |
| Micro | -0.005(-0.11) | 0.04 (1.10) |
| Medium | 0.02 (0.46) | 0.01 (0.51) |
| Large | -0.05 (-1.05) | -0.02 (-0.46) |
| Wood | 0.19** (4.83) | 0.07** (2.22) |
| Textiles | 0.08** (2.21) | 0.09** (2.84) |
| Metals | 0.03 (-0.85) | 0.06* (1.72) |
| Capital city | 0.02 (0.69) | 0.01 (0.50) |
| Foreign owned | 0.13** (3.52) | 0.02 (0.49) |
| Publicly owned | -0.04 (-0.70) | -0.03 (-0.58) |
| Number of observations | 306 | 606 |
| $R^2$ | 0.24 | 0.23 |

*Notes:*
OLS = ordinary least squares; GLS = generalised least squares. *T*-statistics are in parentheses. For statistical significance, * indicates significant at the 10 per cent level, ** at the 5 per cent level. Dummy variables: value of one if as specified below, value of zero otherwise.

| Variable | Value of one if | Variable | Value of one if |
|---|---|---|---|
| Country | Cameroon | Wood | In wood sector |
| Country | Zimbabwe | Textiles | In textiles sector |
| Country | Kenya | Metals | In metals sector |
| Micro | 1 < employment < 4 | Machines | In machinery sector |
| Medium | 30 < employment < 99 | Capital city | In capital city |
| Large | Employment = 100 or more | Foreign owned | Foreign owned |
| | | Publicly owned | Public ownership |

## Conclusion

This chapter has examined exports and firm-level efficiency in four small African countries, showing the link between efficiency and exporting. The analysis here, however, cannot answer questions about how much higher efficiency enables firms to enter the export market or whether exporting generates a gain in efficiency. Both require further work.

Nevertheless, exporters do increase their efficiency quite rapidly while non-exporting firms do not. This certainly has important policy implications. A strategy of openness and export orientation obviously will have more beneficial efficiency and productivity effects than an inward-oriented strategy. Policies that open the economy should be pursued. The countries studied in this chapter were in the midst of a policy reform process at the time of the surveys, but it was far from complete and policy distortions remained. Despite both this and stagnation in the world economy, firms that ventured into the export market managed to improve their technical efficiency very significantly — a strong indication that export orientation is the appropriate route for African economies. A good strategy for export promotion is a good strategy for growth.

Whole ranges of domestic constraints need to be removed for the beneficial effects of openness to be realised, however. An environment where exporters can thrive requires not only appropriate trade and exchange-rate policies but also readily available human capital and infrastructure that keep transaction costs down. Governments must pursue stable, consistent, credible economic policies and apply them in a non-biased way. Entrepreneurs need economic security and the ability to enforce contracts. Increased trade will build a constituency supporting these types of reforms, which at the same time support trade. Over time, a virtuous circle may develop to reduce the risk of governmental backtracking. Once this process is secured, one can believe that more and more African manufacturers will become able to approach the international best-practice frontier.

## Notes

1. This chapter draws on work undertaken as part of the Regional Programme on Enterprise Development, organised by the World Bank and funded by the Belgian, British, Canadian, Dutch, French and Swedish governments. Support of the British, Dutch, French and Swedish governments for workshops of the group is gratefully acknowledged. The use of the data and the responsibility for the views expressed are those of the authors. The authors form the Industrial Surveys in Africa Group, which uses multi-country data sets to analyse the microeconomics of industrial performance in Africa.

2. If economies of scale exist in previously protected sectors, the same policies that favour scale efficiency in the export sector may reduce scale efficiency in those firms competing with imports, as these producers typically contract or exit when trade liberalisation increases import penetration in the domestic market. See Krugman (1987); Rodrik (1988, 1991).

# Bibliography


AIGNER, D. and S. CHU (1968), "On Estimating the Industry Production Function", *American Economic Review*, Vol. 58, No. 2.

AIGNER, D., C.A.K. LOVELL and P. SCHMIDT (1977), "Formulation and Estimation of Stochastic Frontier Production Function Models", *Journal of Econometrics*, Vol. 6, No. 1.

BATTESE, G.E. and T.J. COELLI (1992), "Frontier Production Functions, Technical Efficiency and Panel Data: With Application to Paddy Farmers in India", *Journal of Productivity Analysis*, Vol. 3, Nos. 1-2.

BAUER, P.W. (1990), "Recent Developments in the Econometric Estimation of Frontiers", *Journal of Econometrics*, Vol. 46, Nos. 1-2.

BERNARD, A.B. and J.B. JENSEN (1995), *Exporters, Jobs and Wages in U.S. Manufacturing 1976-87*, Brookings Papers on Economic Activity, Microeconomics, Brookings Institution, Washington, D.C.

BIGGS, T., M. SHAH and P. SRVIASTAVA (1995), *Technological Capabilities and Learning in African Enterprises*, Technical Paper No. 288, Africa Technical Department Series, World Bank, Washington, D.C.

CLERIDES S., S. LACH and J. TYBOUT (1998), "Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico and Morocco", *Quarterly Journal of Economics*, Vol. 113, No. 3, August.

COLLIER, P. and J.W. GUNNING (1999), "Explaining African Economic Performance", *Journal of Economic Literature*, Vol. 37.

CORNWELL, C., P. SCHMIDT and R.C. SICKLES (1990), "Production Frontiers with Cross-Sectional and Time-Series Variation in Efficiency Levels", *Journal of Econometrics*, Vol. 46, Nos. 1-2.

DOLLAR, D. (1992), "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs 1976-85", *Economic Development and Cultural Change*, Vol. 40, No. 3.

FARRELL, M. (1957), "The Measurement of Productive Efficiency", *The Journal of the Royal Statistical Society*, Series A.

GHANI, E. and C. JAYARAH (1995), "Trade Reform, Efficiency and Growth", Policy Research Working Paper No. 1438, World Bank, Washington, D.C.

GREEN, W.H. (1993), *Econometric Analysis*, Prentice Hall, New York, N.Y.

GROSSMAN, G. and E. HELPMAN (1991), *Innovation and Growth in the Global Economy*, MIT Press, Cambridge, Massachusetts.

HADDAD, M. (1993), "How Trade Liberalization Affected Productivity in Morocco", Policy Research Working Paper No. 1096, World Bank, Washington, D.C.

HARRISON, A. (1994), "Productivity, Imperfect Competition and Trade Reform: Theory and Evidence", *Journal of International Economics*, Vol. 36, Nos. 1-2.

HAUSMAN, J. (1978), "Specification Tests in Econometrics", *Econometrica*, Vol. 46, No. 6.

JONDROW, J., C.A.K. LOVELL, I.S. MATEROV and P. SCHMIDT (1982), "On the Estimation of Technical Inefficiency in Stochastic Frontier Production Function Model", *Journal of Econometrics*, Vol. 19, Nos. 2-3.

KRAAY, A. (1997), *Exports and Economic Performance: Evidence from a Panel of Chinese Enterprises*, World Bank, Washington, D.C.

KRUGMAN, P. (1984), "Import Protection as Export Promotion: Internal Competition in the Presence of Oligopolies and Economies of Scale", *in* H. KIERKOWSKI (ed.), *Monopolistic Competition and International Trade*, Oxford University Press, New York.

KRUGMAN, P. (1987), "The Narrow Moving Band, the Dutch Disease and the Competitive Consequences of Mrs Thatcher: Notes on Trade in the Presence of Dynamic Scale Economies", *Journal of Development Economics*, Vol. 27, Nos. 1-2.

LOVELL, C.A.K., J. DEFOURNY and A.G.M. N'GBO (1992), "Variation in Productive Efficiency in French Workers' Cooperatives", *Journal of Productivity Analysis*, Vol. 3, Nos. 1-2.

NISHIMIZU, M. and J.M. PAGE (1982), "Total Factor Productivity Growth, Technological Progress and Technical Efficiency Change: Dimensions of Productivity Change in Yugoslavia 1967-78", *Economic Journal*, Vol. 92, No. 368.

NISHIMIZU, M. and S. ROBINSON (1984), "Trade Policies and Productivity in Semi-Industrialized Countries", *Journal of Development Economics*, Vol. 16, Nos. 1-2.

PACK, H. (1988), "Industrialization and Trade," *in* H. CHENERY and T.N. SRINIVASAN (eds.), *Handbook of Development Economics*, Vol. 1, North-Holland, Amsterdam.

ROBERTS, M. and J. TYBOUT (1991), *Size Rationalization and Trade Exposure in Developing Countries*, World Bank, Washington, D.C.

ROBERTS, M. and J. TYBOUT (1997), "Producer Turnover and Productivity Growth in Developing Countries", *World Bank Research Observer*, Vol. 12, No. 1.

RODRIK, D. (1988), "Imperfect Competition, Scale Economies and Trade Policy in Developing Countries", *in* R.E. BALDWIN (ed.), *Trade Policy Issues and Empirical Analysis*, University of Chicago Press, Chicago.

RODRIK, D. (1991), "Closing the Technology Gap: Does Trade Liberalization Really Help?" *in* G. HELLEINER (ed.), *Trade Policy, Industrialization and Development: New Perspectives*, Clarendon Press, Oxford.

SACHS, J.D. and A.M. WARNER (1997), "Sources of Slow Growth in African Economies", *Journal of African Economies*, Vol. 6, No. 3.

SCHMIDT, P. and R.C. SICKLES (1984), "Production Frontiers and Panel Data", *Journal of Business and Economic Statistics*, Vol. 2, No. 4.

# Part IV

# Concluding Comments

*Chapter 8*

# Issues in Competitiveness in Sub-Saharan Africa

*Saleh M. Nsouli*

This very useful conference has brought to the fore a number of issues of critical importance to Africa. This chapter puts these issues in the context of recent economic and financial developments in the region and examines the policy implications.

The recent economic recovery in sub-Saharan Africa has renewed optimism in the region's growth and development prospects. Real GDP growth has averaged about 4 per cent annually during the past four years. Inflation has come down significantly, from a peak of about 47 per cent in 1994 to 14 per cent in 1997. The fiscal deficit for the region as a whole, excluding grants, has declined from 7.2 per cent of GDP in 1994 to 4.5 per cent in 1997, and the current-account deficit, again excluding grants, has fallen from 5.4 per cent of GDP to 3.8 per cent[1].

The optimism also reflects improvement in the macroeconomic indicators that has resulted mainly from a re-orientation of economic policies[2]. African governments have made considerable strides in removing price controls and liberalising their trade and exchange systems. They have made a start in dismantling inefficient public enterprises and encouraging a larger role for the private sector. Structural adjustment programmes supported by the IMF and World Bank have often provided the context for implementing these policies.

Yet the path ahead for sub-Saharan Africa remains full of pitfalls. These countries continue to have lower investment and saving rates than other developing countries, and many of them continue to depend heavily on external assistance. Despite the recent move towards more liberalised trade regimes, the region has not yet reversed the decline in its share of world trade observed during the past three decades. It accounted for 3.8 per cent of world exports in 1960, but only 2.1 per cent in 1985 and 1.3 per cent in 1995[3]. Moreover, sub-Saharan Africa depends heavily on exports of primary commodities, making it particularly vulnerable to external shocks. Weak export performance reduces the ability to import foreign capital goods, which, by reducing future production capacity, constrains both exports and growth. Finally, the

recent crisis in East Asia has not only depressed the world economic environment facing the African countries but also pointed to the importance of putting the fundamentals — macroeconomic, structural, and institutional — on a solid footing to ensure that high growth rates become sustainable and economies less vulnerable.

Enhancing sub-Saharan Africa's competitiveness, particularly that of the manufacturing sector, will therefore be a key element in ensuring sustained economic growth. The studies presented at this conference should be instrumental in pointing to policies that the region's countries need to implement to strengthen their competitiveness. Such policies will not only ensure sustained economic growth and a continual improvement in living standards but also speed the convergence of the region's macroeconomic indicators with those of the industrial countries.

The papers, as well as the IMF's experience in assisting these countries in their structural adjustment efforts, point to seven key areas where more progress is needed to promote productivity and competitiveness in manufacturing:

— *Exchange-rate policy* should allow nominal exchange rates to adjust as conditions change, to avoid the emergence of disequilibria. Mwega and Ndung'u confirm the importance of choosing the appropriate exchange-rate regime for Kenya and Cameroon. Elbadawi shows that to become successful exporters of manufactures the sub-Saharan African countries must maintain real exchange rate-based competitiveness on a sustained basis. Regardless of whether a flexible or fixed exchange rate is selected, sound monetary and fiscal policies should be pursued to avoid pressures on the external sector. Sievers points to the many factors beyond the exchange rate that affect competitiveness.

— The *pace of trade liberalisation* needs to be stepped up. Bigsten *et al.* and Hakura and Jaumotte show that increased openness to trade enhances the efficiency and competitiveness of domestic producers. Their analyses suggest that, given the sub-Saharan African countries' technological backwardness, increases in openness to trade are associated with large efficiency gains. Although these countries have begun to liberalise their trade, their trade regimes remain significantly more restrictive and complex than those in most other regions of the world. The design of trade reform should therefore include simpler and more transparent tariff structures, reductions in average tariff rates to 10 per cent or less and the elimination of non-tariff barriers.

— *Structural reform* should accelerate and deepen. This will encourage diversification and reduce vulnerability to external shocks. Several papers underscored its importance, showing that sub-Saharan Africa would benefit from policies aimed at enhancing human capital accumulation and investment in infrastructure. They would include redefining the role of government, away from direct involvement in production and towards the provision of essential public services. The composition of government expenditures needs more attention, to increase the share of outlays on basic health care, primary education, vocational training and infrastructure. Improving infrastructure could also help to facilitate transportation and telecommunications, which would allow these

countries to enlarge their markets and take advantage of economies of scale. A more ambitious pursuit of privatisation programmes would also widen the scope for the private sector. Overall, a more competitive environment should contribute to productivity growth and to strengthening the ability of sub-Saharan African countries to compete in international markets.

— *Enhancing economic security* will also be important. Both private domestic and foreign investors in Africa perceive high risks because of poor contract enforcement and the limited effectiveness of judicial systems and other public services. Several papers, particularly that of Sievers, underscore this. Bold action is needed to improve the transparency, predictability and impartiality of regulatory and legal systems.

— *Strengthening governance and transparency* will generate increased confidence and contribute to greater resource efficiency. Eliminating unproductive government spending and ensuring full transparency and accountability in the management of public resources will be critical. Governments must conduct their operations irreproachably and shun all forms of corruption, nepotism and cronyism. As Elbadawi illustrates, transaction costs, including those arising from corruption as well as inadequate transportation and telecommunications systems, present major impediments to the growth of manufactured exports. Policies aimed at reducing these costs generate a high payoff in increased capacity to produce and export manufactures. Sievers also points to the risks arising from the perception of corruption by foreign investors.

— There is a need to *strengthen financial sectors*. In many sub-Saharan African countries, the weakness of financial sectors throws up an obstacle to mobilising savings to finance productive manufacturing. These countries need to deepen and broaden their financial markets, establish independent and efficient banking-supervision agencies, open their banking sectors to both domestic and foreign competition, privatise government-owned banks and apply best practices in bank management. They must broaden the institutional framework of the financial system for improved intermediation by developing stock exchanges and innovative, efficient ways to extend credit to small investors, including farmers. The legal provisions for loan recovery and contract enforcement must also be rationalised and fully observed, an important factor in ensuring the availability of supplier credit, which will lead to large productivity gains.

— Although this conference has focused on a number of key, specific policy areas, one should keep in mind that these policies need to be implemented within *comprehensive and consistent economic reform programmes.* The discussions at the conference have made it clear that improving competitiveness does not relate to one policy action only. Some speakers have made a strong case for avoiding the overvaluation of exchange rates. Others provide strong arguments for promoting more liberalised trade regimes and other policies to enhance productivity. In assisting member countries, the IMF has found that single policies by themselves are not sufficient to promote competitiveness; policies should be

viewed as mutually reinforcing. Cameroon illustrates this well: both productivity increases and the depreciation of the real effective exchange rate have had a positive and significant influence on its exports. Elbadawi emphasises the importance and the complementarity of policies for lowering transaction costs as well as for appropriate exchange rates to enhance export performance.

To conclude, sub-Saharan Africa has an important challenge ahead, to continue to pursue policies that will enhance the competitiveness of its manufacturing sectors. The reform efforts under way constitute important steps in the right direction, but, as the conference papers suggest, they need to be accelerated, broadened and sustained. As evidenced by the work of the Harvard Institute for International Development, ongoing policy efforts in Africa receive careful monitoring and evaluation, and investment decisions take them into consideration. Despite evident progress, the improvements in the macroeconomic indicators observed in recent years must not give rise to complacency among policymakers in the region. The economic situation remains fragile. Policymakers need to remain strongly committed to the requisite reforms.

## Notes

1. IMF African Department Database, September 1998, and IMF (1998), *World Economic Outlook*, September.

2. S. Fischer, E. Hernández-Catá and M. Khan (1998), "Africa: Is This the Turning Point?", IMF Paper on Policy Analysis and Assessment No. 98/6, Washington, D.C.

3. World Bank (various years), *World Development Report*, Oxford University Press, New York.

*Chapter 9*

# A Panoramic View of Policies for Competitiveness in Manufacturing in Sub-Saharan Africa

*Augustin Kwasi Fosu*

## Competing Theories

To understand the role of manufacturing competitiveness in sub-Saharan Africa, one must distinguish between two competing theories: the neo-classical static theory of comparative advantage (STCA) and the dynamic theory of comparative advantage (DTCA). STCA is the theoretical underpinning of much recent work on the issue of manufacturing/primary goods competitiveness (Wood and Berge, 1997; Wood and Owens, 1997). That theory, buttressed by cross-sectional evidence in such studies, suggests that Africa's comparative advantage, given its endowment, lies in exporting primary commodities rather than manufactured products. STCA thus assumes that endowment is exogenous in the trade relationship.

In contrast, under DTCA, endowment is endogenous. The new endogenous growth theory (EGT) can indeed be viewed as a subset of DTCA, for it concentrates on the endogeneity of technology via total factor productivity. It seems particularly reasonable to assume that endowment is mutable through the pursuit of appropriate policies.

## Policies to Change Endowment

Policies that may alter endowment include those intended to reduce transaction costs, to improve the effectiveness of production factors and to enhance overall competitiveness. They may *reduce transaction costs* associated with, for instance, geography, infrastructure (physical and human) and the government regulatory environment (Elbadawi, 1998). Those designed to overcome the adverse impacts of

geography include the promotion of regional co-operation, which might mitigate disadvantages such as being land locked. Governments, in partnership with private investors, could also undertake public-good investment that reverses the negative effects of deteriorating physical infrastructure. Investments in education and health would help reduce transaction costs associated with low levels of human capital. Also of great importance are institutional rules that streamline regulatory requirements and effect appropriate de-control.

Policies may *improve the effectiveness of production factors* through education and training (Biggs *et al*., 1998; Elbadawi, 1998) and openness (Hakura and Jaumotte, 1998; Adenikinju *et al.*, 1998; Bigsten *et al*., 1998). Biggs *et al.* (1998), for example, find that firms' investments in training have a direct effect on value added in African manufacturing enterprises, as shown by a pooled sample from Ghana, Kenya, and Zimbabwe. Similarly, on the basis of cross-country aggregate data on developing countries generally, Elbadawi (1998) observes a positive impact of schooling on manufactured exports. With respect to openness, Hakura and Jaumotte (1998) find intra-industry international trade relatively effective in the absorption of technology, as reflected in increases in total factor productivity. Similarly, in their country case study of Cameroon, Adenikinju *et al.* (1998) observe that openness, measured by exports per employee, exerts a positive impact on value added in manufacturing; while the cross-country evidence of Bigsten *et al.* (1998) suggests that exporting improves manufacturing-firm efficiency.

Other actions may *enhance overall competitiveness* through exchange-rate policy (Elbadawi, 1998; Sekkat and Varoudakis, 1998) and improving the institutional environment (Sievers, 1998). Both Elbadawi (1998) and Sekkat and Varoudakis (1998) find that real exchange rate (RER) misalignment reduces manufactured exports. The results for the volatility and levels of RER are mixed, however. While Elbadawi (1998) uncovers a negative effect of RER volatility, Sekkat and Varoudakis (1998) generally do not. Similarly, the observation of a negative impact of the level of RER by Sekkat and Varoudakis (1998) is not corroborated by Elbadawi (1998) for manufactured exports (Elbadawi does not report the level of RER in his estimated equations, but an earlier version of his paper showed the RER coefficient as insignificant).

Results based on country case studies also seem mixed. Njinkeu (1998) reports negative effects of both RER misalignment and variability on manufacturing exports for Cameroon. Results for Kenya, however, show the coefficient of RER as significant, but not that of RER misalignment or "transitory" RER (Mwega and Ndung'u, 1998). RER misalignment and volatility have also been found to exert negative impacts on GDP growth generally in sub-Saharan Africa (e.g. Ghura and Grennes, 1993). Thus, avoiding RER misalignment and volatility appear to be desirable policies.

Advocates of RER policy usually point to the potential desirability of having an undervalued currency in order to overcome the "hysteresis" effect of a limited capability to export manufactures (Elbadawi, 1998). The utility of actually manipulating the level of the RER as a policy variable may be questionable, however, especially in the long run, because of the likely prevalence of "beggar-thy-neighbour" and "fallacy-of-

composition" realities. Why would other countries not also pursue policies that depreciate their exchange rates as well to gain competitive advantages? Would not eventual erosion of competitive advantage towards zero occur? Moreover, policies to depreciate exchange rates will likely have a cost in terms of accelerating prices. In short, it might make sense to ensure that a country's exchange rate is well aligned and perhaps subject to as little volatility as possible, but policies that lead to undervalued currencies do not appear likely to be sustainable or desirable in the long run.

Improvement in the institutional environment now receives general acclaim as a major vehicle by which to enhance overall competitiveness. North (1990) emphasises institution building as the main source of modern economic growth, primarily through its ability to reduce transaction costs. The competitiveness index produced by the Harvard Institute for International Development, for example, shows the institutional environment as clearly one of the most important factors influencing competitiveness as perceived by groups surveyed (Sievers, 1998). Political stability and the predictability of policies and laws were among the most salient variables, according to this survey.

Others have also observed the importance of institutional factors in their econometric studies. Among those with positive impacts on growth are the rule of law (e.g. Barro, 1998), anticorruption (e.g. Mauro, 1995), and political stability (e.g. Fosu, 1992). The importance of institutional variables as arguments for the production function cannot be underestimated.

## Two Unanswered Questions

Two unanswered questions persist. First, the *raison d'être* of this conference has been taken as given, namely the presumption that the lack of manufacturing competitiveness is a major impediment for Africa's growth and development. While this may seem obvious from casual empiricism, it needs to be well grounded. As noted above, Wood and Berge (1997) and Wood and Owens (1997) have challenged such a premise, arguing that improving competitiveness in primary exports is the better vehicle by which to augment growth in most sub-Saharan African countries.

In contrast, Fosu (1990), for example, finds that developing economies exporting more non-fuel primary exports have improved their GDP growth little, compared with those with greater increases in their manufacturing exports. This finding is especially bolstered when the dependent variable is the non-export sector, which constitutes the bulk of sub-Saharan Africa's economies (Fosu, 1996*b*). This view of the potency of manufactured exports would appear to provide some justification for concentrating efforts on manufacturing competitiveness.

Second, there is no free lunch. While it might be feasible to implement some of the suggestions above at minimal cost, many could not be acted on without substantial financing. Fisman (1998), for instance, finds a positive relationship between the availability of trade credit and production efficiency. In this regard, therefore, both domestic and international responsibilities appear.

The ultimate responsibility must, of course, rest with governments themselves. They must ensure responsible government, transparency, rule of law and security and respect for the constitution, all of which are conducive to respect for individual rights and the promotion of government partnership with the private sector. If meeting these domestic responsibilities involves substantial costs, then it is appropriate to ask, "Where is the beef?" Governments should reform themselves so that they can have the budgets to achieve their responsibilities. One must be realistic, however, about the political dynamics that could derail such efforts. Domestic policies themselves may be endogenous to these political dynamics. As Easterly (1997) has observed, policy formulation may depend on a nation's ethno-linguistic makeup. If so, then there is an "elephant in the room" (Easterly) and domestic institutions might require external assistance to remove it.

The international community has responsibilities as well. They include the need to reduce the negative implications of the debt overhang for economic performance (Fosu, 1996*a*, 1999; Elbadawi, Ndulu, and Ndung'u, 1996). It is also important to ensure that a healthy relationship exists between donors and aid recipients to engender the best use of aid funds.

The ongoing AERC Collaborative Research on "Managing Transition from Aid Dependence in Sub-Saharan Africa" is of special relevance. The provision of regional infrastructure may require particular external assistance, given its public-good nature as well as the substantial costs involved. Above all, capacity building must be in place to foster ownership and sustainability of sound economic policies. My institution, the AERC, was established with the express purpose of developing and maintaining capacity building in policy-oriented economic research. This purpose has clearly been in view at this conference to share ideas on policies for competitiveness in manufacturing in sub-Saharan Africa.

# Bibliography


ADENIKINJU, A., L. SÖDERLING, C. SOLUDO and A. VAROUDAKIS (1998), "Structural Factors Affecting Manufacturing Competitiveness: Comparative Results from Cameroon, Côte d'Ivoire, Nigeria and Senegal", in this book.

BARRO, R. (1998), "Recent Developments in Growth Theory and Empirics", paper presented at the Netherlands Economics Institute Seminar on Economic Growth and Its Determinants, Ministry for Development Co-operation, The Hague, March.

BIGGS, T., M. SHAH and P. SRAVASTAVA (1998), "Training and Productivity in African Manufacturing Enterprises", mimeo.

BIGSTEN, A. *et al.* (1998), "Exporting and Efficiency in African Manufacturing", in this book.

EASTERLY, W. (1997), "Africa's Growth Tragedy: Policies and Ethnic Divisions", *Quarterly Journal of Economics*, November.

ELBADAWI, I. (1998), "Can Africa Export Manufactures? Endowments, Exchange Rates and Transaction Costs", in this book.

ELBADAWI, I., B. NDULU and N. NDUNG'U (1996), "Debt Overhang and Economic Growth in Sub-Saharan Africa", *in* Z. IQBAL and R. KANBUR (eds.), *External Finance for Low Income Countries*, IMF, Washington, D.C.

FISMAN, R. (1998), "Financing the Free Lunch: Trade Credit and Productive Efficiency in Africa", paper presented at the conference on which this book is based.

FOSU, A.K. (1990), "Export Composition and the Impact of Exports on Economic Growth of Developing Economies", *Economics Letters*, Vol. 34, No. 1.

FOSU, A.K. (1992), "Political Instability and Economic Growth: Evidence from Sub-Saharan Africa", *Economic Development and Cultural Change*, Vol. 40, No. 4.

FOSU, A.K. (1996*a*), "The Impact of External Debt on Economic Growth in Sub-Saharan Africa", *Journal of Economic Development*, Vol. 21, No. 1.

FOSU, A.K. (1996*b*) "Primary Exports and Economic Growth in Developing Countries", *World Economy*, Vol. 19, No. 4.

FOSU, A.K. (1999), "The External Debt Burden and Economic Growth in the 1980s: Evidence from Sub-Saharan Africa", *Canadian Journal of Development Studies*, Vol. 20, No. 1.

GHURA, D. and T.J. GRENNES (1993), "The Real Exchange Rate and Macroeconomic Performance in Sub-Saharan Africa", *Journal of Development Economics*, Vol. 42.

HAKURA, D. and F. JAUMOTTE (1998), "The Role of Trade in Technology Diffusion", in this book.

MAURO, P. (1995), "Corruption and Growth", *Quarterly Journal of Economics*, Vol. 110, No. 3.

MWEGA, F. and N. NDUNG'U (1998), "Kenya's Recent Exchange-rate Policy and Manufactured Export Performance", in this book.

NJINKEU, D. (1998), "Exchange-rate Policy and Manufacturing Export Performance in Cameroon", paper presented at the conference on which this book is based.

NORTH, D. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge.

SEKKAT, K. and A. VAROUDAKIS (1998), *Exchange-rate Management and Manufactured Exports in Sub-Saharan Africa*, Technical Paper No. 134, OECD Development Centre, Paris.

SIEVERS, S. (1998), "Competitiveness and Foreign Direct Investment in Africa", in this book.

WOOD, A. and K. BERGE (1997), "Exporting Manufactures: Human Resources, Natural Resources and Trade Policy", *Journal of Development Studies*, Vol. 34.

WOOD, A. and T. OWENS (1997), "Export-oriented Industrialization Through Primary Processing?" *World Development*, Vol. 25.

*Epilogue*

# Promoting Competitiveness in Manufacturing: A Continuing Challenge for Improving Sub-Saharan Africa's Integration into the Global Economy

*Saleh M. Nsouli and Aristomène Varoudakis*

When the conference which led to this book was held in the autumn of 1998, sub-Saharan Africa (SSA) was already experiencing the fallout from the 1997-98 financial crises. The ripples from Asia, Russia and Brazil had temporarily halted the upturn in the region's economic growth, which from mid-1990 to 1997 had raised expectations for sustained high long-term economic growth in the region. This epilogue briefly reviews key aspects of sub-Saharan Africa's recent economic performance. It again highlights the need to promote export diversification by fostering competitiveness in manufacturing. Looking further ahead, the epilogue points to the challenges for promoting competitiveness in view of the recent moves towards regional integration and points to the window of opportunity opened by the dramatic improvement in global information and communication technologies (ICT).

*A two-track economic recovery shaped by commodity price swings.* In 1998-99, per capita real GDP growth in sub-Saharan Africa slipped into negative figures again (Table E.1). Despite the much lower exposure of SSA economies to volatile short-term capital flows, the region suffered from the 1998-99 financial crisis, mainly because of sharply lower commodity prices from faltering growth in East Asia and the slowdown in world trade. Despite the drag from non-oil commodity prices, which remained near cyclical lows, the region experienced a moderate recovery in 2000, buoyed by the strong rebound in world economic growth.

Contrasting changes in the prices of oil and non-oil commodities have spurred a two-track recovery in sub-Saharan Africa, with oil producing countries growing by about 3.5 per cent, thanks to buoyant export receipts and healthy investment. Elsewhere performance was mixed, but most importantly, countries with better policy environments — such as Botswana, Uganda and several CFA zone countries — enjoyed stronger than average growth, with GDP growing by an estimated 5.2 per cent in 2000. By contrast, countries with poor policies, hit by civil strife, continuing war, or

major political disruptions — such as Angola, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia, Sierra Leone and Zimbabwe — had the weakest performance, with GDP growth remaining flat (World Bank, 2001; IMF, 2000).

Table E.1. **A Snapshot of Sub-Saharan Africa's Recent Macroeconomic Performance**
(Annual growth in percentages)

| | 1990-93 | 1994–97 | 1998 | 1999 | 2000[1] |
|---|---|---|---|---|---|
| **Sub Saharan Africa**[2] | | | | | |
| Real GDP | 0.6 | 4.1 | 2.0 | 2.1 | 2.7 |
| Real GDP per capita | -2.1 | 1.4 | -0.6 | -0.5 | 0.2 |
| **All developing countries**[2] | | | | | |
| Real GDP | 1.8 | 4.7 | 1.0 | 3.2 | 5.3 |
| **Commodity prices**[3] | | | | | |
| Non-oil commodities | -4.0 | 6.6 | -2.9 | -7.9 | -7.2 |
| Oil | -1.4 | 3.3 | -31.8 | 38.3 | 55.0 |

*Sources:* World Bank, 2001, and IMF, 2000.
*Notes:* *1)* Estimates for 2000.
*2)* In constant 1987 dollars.
*3)* In current dollars.

Recent fluctuations in activity underscore the continuing vulnerability of SSA economies to primary commodity price swings. Since mid-1997 the prices of most commodities have fallen sharply, reflecting the disruption in demand in the wake of the financial crisis. Even though world economic activity has rebounded since 1999, non-oil commodity prices have not kept pace, remaining well below pre-crisis peaks throughout 2000.

The continued weakness in non-oil commodity prices reflects in part the slow pace at which the supply of these commodities has adjusted to the slump in demand. Sluggish non-oil commodity prices, along with the sharp increase in the price of oil, have reduced growth in a number of SSA countries dependent on such exports, particularly those that only export primary commodities. Indeed, from 1998 to 2000, nearly 15 SSA economies were hit by losses in the cumulative terms of trade of more than 10 per cent of total exports — reflecting lost export revenues and the higher cost of oil imports. In 10 of those countries, the terms of trade loss exceeded 20 per cent (IMF, 2000). Since most of these countries are also among the world's poorest, these developments further exacerbated rural poverty and made the international targets for reducing poverty in the region even harder to meet (World Bank, 2001).

*SSA exports did not keep pace with the rapid growth in world trade.* The fast recovery from the financial crisis further boosted world trade, which grew at an estimated rate of 12.5 per cent in 2000. Growth in world trade accelerated at an annual rate of 6 per cent over the 1990s, up from 4 per cent in the 1980s. Developing countries as a whole benefited from this trend, with their exports growing by an average annual rate of 10 per cent during the 1990s — triple the growth seen in the 1980s (World Bank, 2001). Several structural factors helped to improve the integration of developing countries into world trade. Continuing reform of trade regimes and

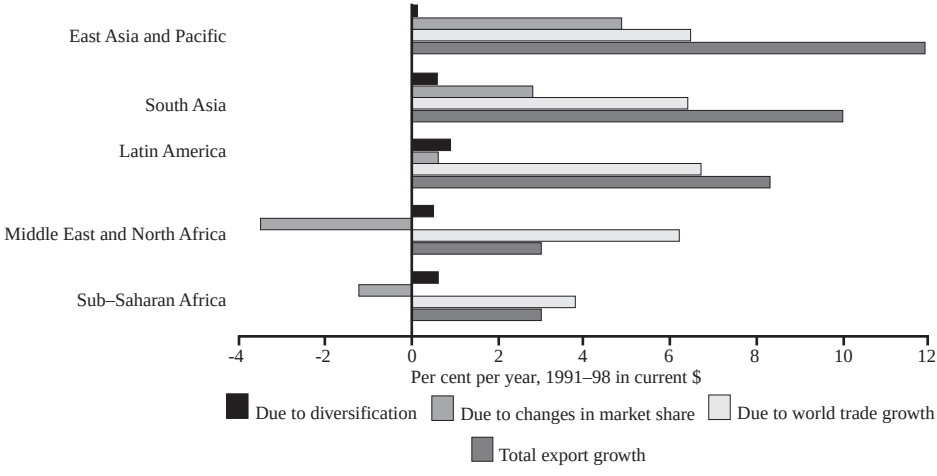
enhanced competition in domestic markets improved the incentives for export market penetration and the search for lower-cost inputs; advances in ICT greatly reduced shipment costs and facilitated marketing and outsourcing of production; and regional and multilateral trade agreements significantly reduced trade barriers.

However, export performance was very uneven across developing countries, with export volumes in sub-Saharan Africa growing at only about 2 per cent a year over the 1990s. Thus, although global market conditions for SSA exports were more favourable in the 1990s compared with those in the previous two decades, the region continued to be marginalised in world trade. Its share in global non-oil exports is now less than half the level in the early 1980s (Ng and Yeats, 1999). Indeed, had sub-Saharan Africa maintained its share of world trade from the late 1960s, its exports and income would be about $70 billion higher today, boosting the region's GDP by more than 20 per cent and helping to make significant progress in reducing poverty (World Bank, 2000).

*A pressing need to remove structural impediments to SSA exports.* Slow export growth in sub-Saharan Africa partly reflects the slow growth of world trade in SSA's export basket because of low income elasticities of demand. However, import barriers in developed economies, especially in textiles, also play a part, as they restrict market access for the exports of the poorest countries (World Bank, 2001).

On the other hand, inflated domestic costs, reflecting poor production efficiency; often appreciated real exchange rates; weak export infrastructure; and high transport costs leave many SSA economies at a competitive disadvantage in export markets. These structural weaknesses, which have been extensively reviewed in this volume, hamper export diversification and impair the export response of SSA economies to reform measures. Structural impediments to competitiveness are reflected in a shrinking market share of SSA exports, which has further reduced growth in export volumes (Figure 1).

Figure 1. **Poor Competitiveness has Hurt Sub–Saharan Africa's Export Market Shares**




*Source:* World Bank, 2001.

The poor economic performance and slow growth of primary commodity exports underscores the need for enhancing export diversification as a long-term policy objective. The policy options explored in the conference, aimed at improving the efficiency of production factors, reducing transactions costs and enhancing overall competitiveness, are key to shifting the comparative advantage toward manufacturing, thus bolstering diversification. Some SSA economies have already begun to diversify, becoming more attractive for private sector investment. SSA countries need to continue these reforms to encourage growth (led by the private sector) in manufacturing industries in which they have a comparative advantage.

Promoting export diversification is all the more needed because the long-term decline in non-oil commodity prices is likely to reflect not only the low income elasticities of demand, but also the unfolding structural trends prompted by rapid technological change (Sachs, 2000). For example, because of innovation, copper is likely to be increasingly displaced by fibre optics, while rubber and jute are being displaced by new synthetic materials. Unless the poorest SSA countries manage to broaden the range of their exports, they may be at risk not only of falling deeper into the "technological divide", but also of seeing their exports lose profitability because of the accelerated pace of technological innovation.

Looking further ahead, two main developments are likely to affect the capacity of SSA countries to diversify their economies, potentially helping to improve their export and growth performance: regional integration and advancements in information and communication technology (ICT).

*Can regional integration in sub-Saharan Africa help promote competitiveness in manufacturing?* Recently in sub-Saharan Africa, as elsewhere in the developing world, regional trade integration has risen high on the agenda for trade liberalisation.

Regional trade arrangements — as opposed to multilateral trade liberalisation — may not be the best approach to globalisation, since such arrangements have the potential for displacing import supply from countries outside the free trade area in favour of possibly less efficient producers within the area. Regional trade arrangements, however, can still help improve the competitiveness of regional producers by increasing their exposure to competition and providing access to larger markets.

On liberalisation of services, a non-discriminatory approach to liberalisation could be combined with a regional approach to regulation (Subramanian *et al.*, 2000). Possible areas of co-operation include domestic regulation — in sectors such as financial services, telecommunications, power and transport — by pooling resources and expertise and by upgrading and harmonising standards. This would help enhance competition, reduce intermediate input costs to industry, stimulate investment and eventually promote competitiveness.

*A window of opportunity from ICT development?* Accelerated progress in ICT may act as a key driver of competitiveness and growth, providing an opportunity for SSA economies to bridge their development gap more rapidly. Investing in ICT has

the potential for greatly improving efficiency and boosting multifactor productivity across industries (IMF, 2000; OECD, 2000*a*). By raising labour productivity and helping companies to organise production and distribution better, ICT development allows companies to save on costs, helping to improve competitiveness. The scope for such efficiency gains is likely to be larger in developing countries, as firms often lag far behind best practices in business organisation and supply-chain management. Business-to-business e-commerce is also likely to improve firms' access to markets operating in sub-Saharan Africa by reducing communication costs between geographically distant partners and by lowering search and marketing costs. Business-to-business e-commerce can also greatly accelerate productivity growth by facilitating technology diffusion (World Bank, 2001).

To take advantage of this opportunity, sub-Saharan Africa needs to intensify efforts to improve telecommunications infrastructure and service pricing, and to promote further emphasis on policies that create an enabling business environment receptive to ICT. Indeed, cross-country evidence suggests that a wide range of complementary policies and institutions are important for ICT development (OECD, 2000*b*). For example, deregulation of telecommunications markets is a main driver of ICT development since it helps to reduce communication costs. Securing a favourable climate for business fosters a sustained investment effort in ICT, while regulatory reform to enhance competition is an enabling factor, because firms invest in efficiency-enhancing technologies when they can expect sufficient returns from doing so. Enhanced ability of the financial system to mobilise capital for risky projects is also key to promoting restructuring, as new firms in emerging industries typically have limited access to finance. Nevertheless, the main enabling factor of ICT development is a pool of skilled people, which sub-Saharan Africa badly lacks. Policies to increase the average skill level of the labour force are crucial for facilitating the adoption and diffusion of ICT and for helping to absorb the benefits from faster technology transfer.

To help the region meet the complex challenges that lie ahead and to take advantage of the expanding opportunities from technology and globalisation, the international community must continue supporting the reform efforts of SSA economies, through debt relief and by providing better and more focused development assistance. Mobilising funding for technical assistance is particularly important to help upgrade product standards and strengthen trade support services and regulations. Concerted action will also be needed to improve market access for the exports of sub-Saharan Africa's poorest countries and to help those countries better diversify their economies and position themselves in the global marketplace.

# Bibliography


INTERNATIONAL MONETARY FUND (2000), *World Economic Outlook*, International Monetary Fund, Washington, D.C., October.

OECD (2000*a*), *Economic Outlook*, No. 67, Paris, June.

OECD (2000*b*), *A New Economy? The Changing Role of Innovation and Information Technology in Growth*, OECD, Paris.

NG, F. and A.J. YEATS (1999), "On the Recent Trade Performance of Sub-Saharan African Countries: Cause for Hope or More of the Same?", photocopy, World Bank, Washington, D.C.

SACHS, J. (2000), "A New Map of the World", *The Economist*, 24 June.

SUBRAMANIAN, A. *et al*. (2000), "Trade and Trade Policies in Eastern and Southern Africa", IMF, *Occasional Paper* No. 196, Washington, D.C., August.

WORLD BANK (2000), *Can Africa Claim the 21st Century?*, Washington, D.C.

WORLD BANK (2001), *Global Economic Prospects and the Developing Countries*, Washington, D.C.

## Contributors

This list includes only the authors of papers published in this volume. Affiliations are as at the time of the conference.

Adenikinju, Adeola
University of Ibadan

Bigsten, Arne
Department of Economics, University of Göteborg

Collier, Paul
University of Oxford and Development Research Group, World Bank

Dercon, Stefan
University of Oxford

Elbadawi, Ibrahim
Development Research Group, World Bank

Fafchamps, Marcel
Stanford University

Fosu, Augustin Kwasi
African Economic Research Consortium

Gauthier, Bernard
Centre d'Etudes en Administration Internationale

Gunning, Jan Willem
University of Oxford and Free University of Amsterdam

Habarurema, Jean
Centre d'Etudes en Administration Internationale

Hakura, Dalia
IMF Institute

Jaumotte, Florence
Harvard University

Mwega, Francis
University of Nairobi and African Economic Research Consortium

Ndung'u, Njuguna S.
University of Nairobi and African Economic Research Consortium

Nsouli, Saleh M.
IMF Institute

Oduro, Abena
University of Ghana

Oostendorp, Remco
Free University of Amsterdam

Pattillo, Catherine
Research Department, International Monetary Fund

Sievers, Sara
Harvard Institute for International Development

Söderbom, Måns
University of Göteborg

Söderling, Ludvig
OECD Development Centre

Soludo, Charles
University of Nigeria

Teal, Francis
University of Oxford

Varoudakis, Aristomène
OECD Development Centre

Zeufack, Albert
World Bank

OECD PUBLICATIONS, 2, rue André-Pascal, 75775 PARIS CEDEX 16
PRINTED IN FRANCE
(41 2001 04 1 P) ISBN 92-64-18705-7 – No. 51951 2001