Towards a Growth Strategy for Africa

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Executive Summary

Now that China and India have found ways of growing out of poverty, attention has again turned to Africa. The purpose of this report is to ask which engines of growth can be activated in sub-Saharan Africa today.

After two decades of stagnation in the continent, discouragement is taking hold. The focus of policy has shifted further and further away from growth-oriented interventions towards welfare assistance. Yet, in the long-run, a growth strategy is the most cost-effective way of dealing with poverty. This is true for two fundamental reasons: first, growth lifts many of the poor out of poverty; second, it generates the government revenues necessary for anti-poverty measures. A donor strategy that focuses exclusively on short-term poverty alleviation is a dead end, condemned to last indefinitely.

Rapid growth, when it happens, is disruptive. Measures are needed to protect vulnerable groups against disruption. In a growing economy, educating the poor is a good way of helping them partake to increased aggregate prosperity. In a stagnating economy, the net effect on poverty reduction is less clear. The rapid increase in education which occurred in sub-Saharan Africa from 1960 to 1990 was not sufficient to generate growth.

Exporting out of Africa is currently the only promising avenue for growth. It is not entirely understood why exporting countries grow faster, why technical progress is more rapid in export oriented countries, and why exporting firms are more efficient. It may be due to knowledge transfers, to the competitive pressures induced by exporting, or to gains from using surplus resources not captured by standard trade models. Whatever the explanation, the link between exports and growth seems indisputable. The further fact that Africa represents a tiny fraction of world trade and that its exports are in many cases below their level of three decades ago means that the potential for expansion is enormous. Experience from various African countries such as Ghana and Uganda suggests that export recovery can generate substantial gains quickly. In this report, we focus on four sectors with significant export potential in sub-Saharan Africa: manufacturing, agriculture, tourism, and mining.

A dramatic rise of exports out of Africa is essential for sustained growth in the continent as a whole. This may come from manufacturing where long-term rates of growth can be much higher than in agriculture. Successful industrialization would draw labour to rapidly expanding cities and relieve the countryside from having to sustain the mass of the poor.

Not all African countries will become manufacturing export platforms in the foreseeable future. For many of them, agriculture, tourism, and mining offer the best prospects for exports and growth. A long-term vision is essential. Africa will not revive its primary exports without identifying new markets and raising productivity so that growth is profitable. This can only be achieved via institutions and adequate technology combined with the incentives to adopt innovations, many of which have long been available.

For growth to take place, technology transfers and investment in physical and human capital are necessary. While the engine of growth may be in the private sector, policy intervention is required to create an environment in which firms can operate. The first component of any such environment is a sound macroeconomic policy based on fiscal balance and low inflation. Albeit there remain important areas of dispute regarding what constitutes an appropriate macro economic policy, these disagreements are primarily about means rather than ends. They are ignored here since we focus on ends.

Successful macoeconomic policy can be regarded as a pre-condition for growth. Public policy is also needed to reduce coordination failure, favour institutional innovation, and minimize commitment failure, all areas where the private market is likely to prove lacking. International donor agencies can assist African governments in this respect, particularly regarding international coordination and the transfer of institutional innovation.

Priorities for intervention should be to address binding constraints. Development experts and practitioners have proposed long lists of prerequisites for growth. These have included the view that a "big-push" in industrialisation is required to jump start growth, that improvements in agricultural productivity are "an essential pre-condition" for developement, that increasing the investment rate is the "key" parameter to change, that growth cannot begin without investment in schools, and that manufacturing should be promoted by trade policies that prevent competition. Most of these policies have been tried in Africa, none have delivered sustained growth. What has worked is economic policies creating an environment sufficiently attractive for investment and technology transfer to begin taking place. Judging from the experience of early industrialisers and newly developed countries, it does not matter too much how this is achieved. Once the growth process is initiated with sufficient vigour, expectations change in such a way that favours the processes that support growth, such as investment in human capital and institutional change.

Spatial coordination of development interventions is required to minimize duplication of effort at the regional and continental level. How this can be accomplished is unclear, given competition between countries trying to position themselves for the future. Given the difficulty of reaching a negotiated outcome, focusing on exports out of Africa is the most promising alternative.

The report discusses manufacturing exports in detail, focusing on the contrasted experiences of selected countries. Policies toward African manufacturing are presented and the possible role for microeconomic policy is outlined. Agricultural exports are also examined. Emphasis is given to agricultural technology and marketing institutions. A productivity increase in key export crops and livestock products is essential to ensure the profitability of these products for producers. Mining and tourism are reviewed in detail as well. The possible pitfalls and advantages of various strategies are discussed. The conclusion is that the profitability of these sectors depends crucially on government policies. With appropriate policies, these sectors hold much potential.

An agenda for research is outlined. Up-to-date knowledge is needed on African regional integration and work migrations to guide policy. Research should also focus on manufacturing to elicit the key factors of international competitiveness. Studies of agricultural markets are needed to ascertain how inputs can be distributed to small farmers with minimal government intervention. More research is advocated on mining and tourism to ascertain which approaches work in a new international environment. Work is also required on the micro-foundations of growth and poverty and on the means to maximize aid effectiveness.

Research directed to understanding the potential sources of growth in Africa need not be confined to Africa. Latin America has been more successful than Africa even though the problems it faces are more similar to those encountered in African than in other parts of the world. If Africa is to become a source of increased supply of agricultural and manufacturing products, it is essential to understand the sources of competitiveness of countries that have either replaced Africa as major exporters or are major producers in markets into which Africa wishes to expand.

The report concludes that there is no alternative to growth as a solution to Africa's problems. The last decades have been disappointing. But let us not forget that Africa has known several periods of intense growth, starting prior to colonization. Some parts of Africa at differing times have experienced rapid growth. The lesson from history is that such growth is not automatically sustained. Getting growth started in much of Africa while keeping it going in other parts of the continent is the policy challenge of the next decades.

Foreword

Now that China and India seem to have found ways of growing out of poverty, the attention of development agencies has again turned to the African continent. Not long ago, the lacklustre economic performance of Sub-Saharan Africa was a source of disappointment, but not of surprise. After all, slow and erratic growth was the plight of most of humanity, except for a few maverick countries. Today, Africa sticks out like a sore thumb.

The purpose of this report is not to explain the current state of affairs. We also do not seek to apportion blame for Africa's failure to grow as fast as, say, China. Our purpose is to identify what needs to be done for Africa to grow and for its people to live better.

Growth, although its nature needs to be qualified, is the key to prosperity. Prosperity, in turn, may come from many sources. Some of these sources have been at work since human societies began to exist – e.g., mutually beneficial trade based on comparative advantage. More recent sources originate in the application of scientific knowledge to production technology. The challenge for undeveloped countries is to access the existing pool of technological innovations. This typically requires combining modern equipment with a schooled labour force capable of utilizing it. This combined process – technology, equipment, and schooling – is the only known engine of sustained long-term growth. Other sources of prosperity eventually run out (see Fafchamps (2002) for a discussion).

Like a car, an economy can only grow if the engine is working. There is no point fixing the brakes if the engine is broken. But many things can prevent the car from moving even if the engine is sound. The same thing is true for economies. As all development practitioners know, many obstacles can prevent engines of growth from being activated. Technology transfers do not take place and investments fail to raise consumption. A thorough discussion of all potential obstacles to sustained growth is beyond the scope this report – it is the purview of development studies as a whole. There is considerable disagreement as to what constraints are most binding in Sub-Saharan Africa. Some emphasize past and current policies pursued in the continent, others point to circumstances elsewhere. For some, finance is the limiting resource. For others, skills and managerial capacity are insufficient. All these explanations may have some grain of truth. We suspect that none, in isolation, accounts for the experiences of some 50 African countries over the last 40 years. Given space constraints, we focus on long-term engines of growth, which revert principally around markets providing access to technology and investment which result in a structural transformation of an economy from one which is predominantly agricultural, with low productivity and low levels of a range of health and educational indicators, to one where the basics of life, education, and health are assured.

It is important to learn from the past. It is also crucial to keep one's eyes on the prize. If growth in Africa is what we are aiming for, we first must ask which engines of growth can be activated and how. This is the objective of this report. When this is done, one may ask which constraints need to be removed first. In our opinion, there is no single answer

to the latter question because it varies from country to country and over time. The removal of constraints is also a matter of sequencing. There is no point trying to remove all constraints at once as this is beyond the limited means of African governments and donor agencies. This is why we suggest that the emphasis be shifted from constraints to engines of growth. Put differently, tell me the engine of growth you seek to activate, and I will tell you which constraint you need to worry about.

A number of issues, such as gender, health, corruption, or environmental issues, are deliberately omitted from this report. These important issues are beginning to receive the attention they deserve. However, for reasons that are discussed in section 1, we chose to focus this report exclusively on growth. We also ignore many implementation details, such as whether the emphasis should be put on small or large firms, what kind of financial intermediation is required, or how business linkages can be fostered. These are crucial policy issues but we cannot cover them here for lack of space. We choose to focus on general strategy instead.

1. The Choice of Objectives

After millions of pounds in development aid and two decades of economic stagnation in Africa, one may be tempted to give up hope. It appears as if Africa is not like other parts of the world, that it is an exception because its politicians are too corrupt, its geography too harsh, and its people too unprepared for development. Discouragement is taking hold. Interventions to develop Africa are seen as a lost cause, a waste of time and money. Disillusion shifts the focus on what can be done to remedial programs that only seek to eliminate the worst effects of poverty. When development aid gives up on growth, it becomes a welfare program.

Food relief, micro-finance, improved wood-stoves, and reforestation are all examples of interventions aimed primarily at helping the poor to deal with their harsh environment.[1] In nearly all cases these interventions correspond to a real need. In many cases they are effective in alleviating the worst effects of poverty. But by themselves they cannot lift the African continent out of poverty any more than food relief, micro-finance, and improved wood-stoves were responsible for lifting England, Japan, or Korea out of their poverty.

Something else is needed, having to do with the application of scientific discoveries to the production of goods and services, the accumulation of human and physical capital, the restructuring of production, and massive urbanisation – not to mention new infrastructures and institutions. All this does not happen overnight. England and Japan are two examples of countries that, for a long period, grew faster than their contemporaries. Some countries in East and South East Asia have outperformed even Japan's growth rate over the 1950s and 1960s. Such countries have grown out of poverty in a fraction of the time it took the older industrial countries to do so.

[1] This is not to deny that these programs also have expected growth benefits. But it is probably a fair approximation to say that their primary effect is poverty alleviation.

The premise of this paper is that sustained and substantial reductions in poverty are not possible without rapid growth. Any development effort must seek to harness the processes that have put England and Japan where they are today. This is their only chance of defeating poverty and durably raising standards of living to OECD level [DfID 2000]. Success is not guaranteed. But the chance of hitting the target is greatly improved if you shoot at it than if you do not.

The implication is that, for a donor agency or a national government, a growth strategy is the most cost-effective way of dealing with poverty [Mosley 2001]. This is because, without growth, anti-poverty measures have to be continued indefinitely. With growth, they can either be lifted or replaced by more ambitious social protection measures. The bottom line is that, without growth, aid assistance to fight poverty will essentially go on forever. The only possible long-term strategy is to foster growth.

This is not to say that targeted anti-poverty interventions are not desirable, that they do not assist growth, or that they should not be introduced to compensate for the ill-effects of growth. What we are arguing is that such interventions -- even if they were pursued for 100 years -- cannot bring African standards of living at par with those in Europe.

Poverty cannot be eliminated without increasing prosperity in general, that is, without growth. This is true for two fundamental reasons. First, growth lifts many of the poor out of poverty. This has been shown most recently by [Dollar and Kraay 2000]. Second, anti-poverty programs are not financially sustainable without increased government revenues and/or without increased personal saving or formal insurance, both of which require economy-wide increased prosperity. Without growth, welfare programs financed from aid remain subject to the vicissitudes of donor fatigue, policy reversals in donor countries (e.g., arrival of Jessie Helms as the head of the US Senate Commission on Foreign Affairs), and political conditionality in general (e.g., Kenya in the 1990's). Besides, aid assistance will never be sufficiently large to support the growing mass of the poor.

Consequently, a donor strategy that focuses exclusively on poverty alleviation and gives up on growth in Africa is a dead end. It is bound to last indefinitely and to require perpetual transfers from rich to poor countries. In the long run, there simply is no alternative to growth.

In the short run, things are a bit more complicated. This is because policies and interventions that are good for long-term growth may take several years to mature. Even when they succeed in generating rapid and sustained growth, they need not benefit the poor right away. Many find the wait unbearable. They want to help the poor right away. The difficulty comes from the fact that there is not enough money to help all the poor today and at the same time make the investments necessary for future growth.

In some cases, the choice is easy: natural catastrophes and refugee crises generate situations in which relief aid cannot wait. In most other cases, the choice is morally very hard. The profession has responded to this quandary by setting for what could be called an intermediate course: interventions that help the poor today but hopefully lay down

foundations for future growth. It is unclear, however, whether such interventions are effective in serving their dual objective. For instance, are growth and poverty alleviation best served by lending small amounts to poor women to set up small businesses? True, micro-finance helps accumulation by the poor, but is it the kind of accumulation that is most conducive to growth? Is a poverty trap at the country level the same thing as a combination of individual poverty traps? We do not think so.

The desire to serve two masters – long term growth and immediate poverty alleviation – at the same time is, in our view, a major reason why neither objective is achieved very effectively. If the objective were poverty alleviation alone, (self-targeting) transfers would be the optimal policy instrument. Aid effectiveness would be maximized by cutting overheads to the minimum and doing away with experts, consultants, and expatriate staff so that, out of 100 pounds of aid, as close as possible to 100 pounds reaches the poor.

If, in contrast, the objective were long-term growth alone, interventions would take a completely different form, focusing on advice, institutions, infrastructure, technology, and the like. Transfers would not be required, except perhaps to pay for investments that are too risky to be financed through commercial sources.

Combining both objectives in individual interventions yields the worst of both worlds. Because the emphasis on growth remains, too much money is spent on experts and too much effort is spent on experimentation. Because the emphasis is on immediate poverty relief, interventions do not take the time to set up the proper environment for sustained growth and thus take forms that, pound for pound, only have weak long-term effects on aggregate prosperity.

A more effective solution to the quandary might be to draw a clear distinction between immediate poverty relief and long-term growth interventions. Part of the aid budget could be disbursed in the form of immediate transfers, with as few overheads as possible (except to deter fraud and to optimize targeting). The other part would be disbursed in the form of assistance and advice for long-term growth. A mix of distinct interventions might achieve better results than interventions that aim at serving both objectives simultaneously. An added advantage is that the donor or national government could choose the mix between immediate and long-term poverty reduction by adjusting the budget mix between the two types of intervention. This issue deserves more research. In the remainder of this report, we focus primarily on growth interventions.

2. Poverty vs. Growth

There is a large literature on the relationship between poverty and growth [see for instance Kanbur 1997 for a survey; see also Easterly 1999]. Albeit relevant and useful, this literature has helped popularise the idea that growth and the eradication of poverty are completely distinct phenomena. This has led some to believe that poverty can be eliminated without growth, or even that growth is harmful to poverty eradication. In our opinion, these are misguided views.

It is possible to find a very small number of countries or regions that have managed to dramatically reduce the worst effects of poverty without growing. Consider Cuba and the Indian State of Kerala, for instance. Both have reduced poverty without growing. What lessons can be drawn from their experiences? Cuba did very well on many human development indicators as long as it received financial assistance from USSR. Once the support was withdrawn, Cuba faltered and the sustainability of its social programs was put in jeopardy. Today, Cuba is trying to get out of its economic difficulties through growth, e.g., the development of tourism and exports.

The Indian state of Kerala is a different story, but with a similar punch line. In the 1970's and 1980's, Kerala was well ahead of the rest of India in terms of human development indicators, with higher literacy, lower mortality, and better health. Today, it is lagging behind other Indian states in terms of growth and industrialisation [Mengistae 2001]. By itself, human development did not bring growth and eventually ran out of steam.

The lesson is simple: a policy of focusing exclusively on poverty eradication does not, by itself, generate growth; consequently, it eventually runs out of money. Growth is necessary to fund social programs to assist the poor that it leaves by the wayside. No one disputes the fact that growth need not benefit all. This is because sustained growth generates massive economic and social upheaval. Millions of people move from their village to the city. Entire professions disappear while new occupations are created elsewhere. Traditional institutions are destroyed or distorted. New values replace old ones and ways of life that had existed for centuries disappear in the space of a single generation. Rapid growth of the type that newly industrialised countries have enjoyed recently is not a leisure stroll and it is not for the faint-hearted [Lipton 1995].

Beijing is a case in point. After more than a decade of 10% national growth per year, Beijing is so 'rejuvenated' that hardly any of its original buildings remain (except for the Forbidden City and the like). Think of what this must have meant for the millions of Beijing residents who had to move probably several times. Think of the many who found themselves separated from their job, their family, or their friends. Growth must have been extremely disruptive for the people involved.

If growth is disruptive, it is likely to hurt many people at the same time that it benefits others. Simply saying that growth will eventually take care of the poor is naïve and irresponsible. There are many countries where the benefits of growth have remained concentrated in the hands of a few while the costs have been borne by the majority. Gabon is a good example.

It is therefore important that governments, donor agencies and NGOs be aware that growth is likely to hurt some people. Identifying those who fail to benefit from growth revolves around a few simple principles. First, income poverty is closely related to asset poverty: the poor are those with few assets (land, labour, capital, and skills). The poor benefit from growth whenever it raises the returns to the few assets they hold, such as unskilled labour, land, and skills in traditional farming and crafts. In this respect, Africa

is at an advantage relative to other parts of the world because the poor often have assets other than their labour alone. For this reason, most believe that market oriented growth in Sub-Saharan Africa would largely benefit the poor, especially those in rural areas. By creating new sources of wealth, growth might also undermine the power of current elites and foster social mobility.

In some cases, however, growth reduces the return to particular assets, e.g., by making particular skills obsolete or by destroying the value of certain assets. The construction of rural roads in Nepal is a good illustration. Given the mountainous nature of the terrain, goods are still carried by porters. The construction of roads into the mountain eliminates the need for porters. Does this mean roads hurt the poor? It all depends whether porters can find something else to do that pays them at least as much. In the case of Nepal, this seems to have been the case [Bajracharya et al. 1990, DEVA 1998].

Education is arguably the most important asset to give to the poor. There is indeed strong evidence that education raises income levels and reduces poverty. But educating the poor is most effective in eradicating poverty when the economy is growing and is ready to absorb people from an underprivileged background into a growing urban working class

If the economy fails to grow, the benefits of education are less clear. Recent evidence suggests that an educated population is a prerequisite for growth. The African evidence demonstrates that it is not a sufficient condition. Put differently, it is quite doubtful that African economies will grow simply because their population is well educated. First of all, there is no historical relationship between the level of education of countries and their growth performance (Figure 1). Second, many African countries suffer from an opposite problem: unemployment of college graduates [Serneels 1999]. If an educated labour force were the scarce resource that constrains growth, then surely college graduates would find employment. Finally, new micro-economic evidence suggests that returns to schooling within African firms are minimal compared to the returns to physical capital. For these reasons, we are doubtful that sending all young Africans to school is the definitive solution to poverty in Africa.

A second principle is the relationship between income poverty and consumption poverty. Seen in a livelihood framework, this relationship is mediated by precautionary savings and entitlements such as access to common resources, risk sharing arrangements, pensions, health care, relief aid, welfare programs, and the like. Growth may undermine certain entitlements such as access to commons or informal risk sharing [Ligon et al. 2000, Foster and Rosenzweig 2000]. It is also capable of reinforcing other entitlements such as formal insurance and public anti-poverty programs. Identifying the effect of growth on entitlements is thus essential to design corrective policies.

Third, certain vulnerable groups are so asset-poor that growth alone is very unlikely to lift them out of poverty. These are what the literature sometimes calls the destitute. Examples of potentially vulnerable groups include: victims of war, drought, and floods; orphans; physically and mentally disabled people; and the elderly. To help them, entitlement programs are necessary, either formal or informal. Growth alone is unlikely

to be sufficient. Growth may even hurt the asset-poor if it undermines the informal arrangements on which they traditionally rely.

Other groups requiring intervention include individuals and households caught in a poverty trap. The conceptual difference between them and vulnerable groups mentioned earlier is that the need for external support is only partial and temporary: with appropriate assistance at the right time, they can get out of poverty. Examples include poor landless farmers, households on heavily eroded land, workers with obsolete skills, etc. Although in some cases growth alone will take these groups out of poverty, micro-interventions might be required, at least for a while, to make the transition possible. Growth is in general good for social mobility. Micro-interventions might be cheaper in the long run than pure entitlement programs because they do not require permanent support. But they also require funds that only growth can sustainably provide.

The concept of a poverty trap has had a deep and durable impact on the development aid community and many aid programs are implicitly based on it. Examples of interventions include community self-help programs, microenterprise training, microfinance, small farmer credit, land reform, and the like. It is important to recognise, however, that pulling some individuals out of a poverty trap cannot, by itself, pull an entire country out of poverty. Put differently, these interventions can work wonders to raise welfare in pre-industrial societies. They would have been fantastic in medieval England, for instance. But they are unlikely to be sufficient to take Africa into the 21st century.

3. Engines of Growth for Africa

Having clarified the relationship between poverty and growth, what are the potential sources of growth in Sub-Saharan Africa today?

First, internal demand in Africa is too weak and volatile to sustain growth [Easterly and Kraay 2000]. Sub-Saharan Africa is made of 50 different countries and is two or three times the size of India or China, but it only has about half the population. Most African countries are in fact smaller than Indian states or Chinese provinces. Because the population is poor, local demand, by itself, is insufficient to reap returns to scale at the firm level. In manufacturing surveys conducted in ten Sub-Saharan African countries other than South Africa, the largest manufacturing firm had 6000 employees. It went bust during the survey in part because it had grown too large for its market. Excluding microenterprises, the average manufacturing firm in Sub-Saharan Africa has less than 100 employees [Bigsten et al. 2000].

The small size of local demand also means that aggregate increasing returns and agglomeration externalities generated by local demand are small. This means, for instance, that firm operating in an African country must be largely self-sufficient. This tends to raise their cost of operation. Many industrial services are not locally available, such as, advertising, warehousing, specialized transport services, quality control, credit reference, product design, and specialized financial services to name but a few. The same is true for many public services such as (reliable) electricity, telephones and

telecommunication, and port and custom facilities. The absence of industrial services and the poor quality of public infrastructure play a determinant role in firm competitiveness.

The continent has inherited from colonisation an infrastructure geared towards exports, not toward intra-African trade [Hopkins 1973]. As a result, African markets are not integrated and intra-African trade is difficult in spite of improvement in road networks. The fragmentation of the continent into many small countries further hinders intra-African trade because of political sensitivities and border disputes. The poor results achieved so far by regional organisations such as ECOWAS and UDEAC in spite of a (nearly) common currency witnesses to the difficulties of increasing trade between countries whose main exports are all primary products.

The purpose of economic integration is to favour regional specialisation so as to capture increasing returns and agglomeration externalities. Given the low level of development in Africa, this usually implies the concentration of activities such as manufacturing and financial services in a small number of countries – and consequently the loss of these activities for others. African governments have resisted this movement. Consequently, the potential benefits of regional integration have typically not been achieved. Intra-African trade too often remains of the smuggling variety [Egg and Herrera 1998, Quarles von Ufford 1999].

This implies that any strategy exclusively based on domestic African demand is likely to result in disappointment. The only possible exception is Southern Africa because it has a good regional rail network spanning from Kinshasa to Lobito, Beira, Harare, Gaberone, and Durban. But even SADCC has had limited success.

While expansion to serve the African market is fraught to difficulties, exporting to the world market is less constrained. It is common to observe that, over the last decades, Africa has barely managed to keep its market shares in the handful of traditional agricultural and mineral exports it exports [The World Bank 2000]. As a result, Africa only represents a minute portion of international trade – less than its share twenty years ago.[2] The reasons for this evolution are many and need not be discussed here. But it is clear that Africa's disappointing economic performance is largely due to its poor performance in exporting.

The fact that Africa represents but a tiny fraction of world trade is both good and bad news. It is bad news in the sense that its low level of trade with the rest of the world marginalizes the continent. It is good news in the sense that the potential for expansion is enormous: exports from Africa could easily double or triple without saturating markets or generating much resistance from other producers. This could be achieved provided Africa can find the right export markets and increase the productivity of its agriculture. For this to happen, Africa must find and implement the right set of policies. The purpose of this paper is to throw light on this process.

[2] Reported figures may be biased against Africa because much intra-African trade goes unreported.

Growth through exports represents other advantages for small countries. By engaging in international trade, access is provided to imported equipment and technology. By forcing African firms to compete on international markets, it also ensures that they remain up to date in production, sourcing, and marketing techniques. Industrialization via import substitution has been tried in Sub-Saharan Africa and it has failed [Steel and Evans 1981, Adei 1990].

A third observation is that Africa will not catch up with developed countries until it expands its manufacturing and modern service sectors. This is because the rates of growth achievable in manufacturing and modern services are much higher than the rate of growth achievable in agriculture and mining. The historical record shows that industry can easily grow at 10-20% a year for extended periods of time, while achieving 4% long-term growth in agriculture is extremely difficult. With very few exceptions, the majority of recent growth miracles have largely relied on the growth of industry and modern services, with manufacturing exports making a central contribution [Chenery et al. 1986, The World Bank 1993]. Manufacturing exports are likely to be a key component of a growth strategy for Africa. Policy requires a proper understanding of the factors determining the competitiveness (or lack thereof) of African manufacturers.[3]

Having said this, not all 50 or so African countries will become manufacturing export platforms in the foreseeable future -- just like not all regions of the UK and not all states of the US export manufactures to the rest of the country or the world. In fact, the first wave of African manufacturing export platforms is likely to be very small, i.e., a handful of countries only. To date, Mauritius is the only country in the Africa region whose exports are predominantly manufactures. Although atypical because of its history and geographical location, Mauritius is nevertheless important because it illustrates how a small primary exporter distant from Western markets managed to achieve high growth thanks to manufacturing. It shows that the economic future of Africa is wide open, that it is not entirely dictated by what happens in African giants such as South Africa and Nigeria. Manufacturing exports have been growing rapidly in Madagascar and South Africa, but still represent less than 50% of export earnings.[4]

It would be nice to have a crystal ball and be able to tell which of the 50 or so Sub-Saharan African countries will be the next manufacturing export platforms of the continent. The truth is that nobody can tell, although landlocked countries such as Chad or Niger appear unlikely candidates. The difficulty is that countries that appeared

[3] Some Sub-Saharan African countries have managed to grow fairly rapidly by exporting minerals. Examples include Nigeria and Gabon during the oil boom, South Africa until the 1980's, and Botswana until the 1990's. While mining can bring unprecedented prosperity to a country and its people, it cannot by itself generate long-term growth. This is simply because there is a physical limit on the exploitation of mineral resources.

[4] South Africa is a test case for manufacturing exports from Africa. On the one hand, it has many of the institutions and support policies required for success. On the other, its wealth of mineral resources raises real wages relative to Asian competitors. Whether South Africa becomes a successful manufacturing exporter depends on the combined effect of high wages and good environment on total costs. Success might require that South African manufacturers relocate some of their production to neighbouring, low labour cost countries.

promising yesterday, such as Kenya, Ivory Coast, or Zimbabwe, are no longer so today. At the same time other countries such as Uganda, Mozambique, or Madagascar, are more appealing places to invest today than in the past. These changes in local conditions are beyond the control of donors. Given the rapidity and frequency with which these changes occur, it is probably necessary for policy makers and the research community to keep their options open. This means focusing on several countries at the same time in the hope of hitting the right one -- and being there to help it gain access to developed markets.

Suppose that this assessment is correct and that in the foreseeable future only a handful of countries can begin exporting manufactures (even though we do not know which ones they are). This implies that the 45 or so other African countries that do not become export platforms must rely on other engines of export growth: agriculture, mining, tourism, or a combination of them.

In this respect, the experience of Latin America is instructive. In terms of broad resource endowments, Latin America is the region that most resembles Africa. This is true, for instance, in terms of land and skill per worker [Wood and Mayer 1998]. Although Latin America's performance does not match that of East Asia, it has been vastly more successful than Africa, having risen into the upper middle-income range from a similar resource base in spite of a messy decolonisation followed by many internal conflicts and ineffective governments [Wood 1997; Easterly, Loayza, and Montiel 1997]. Unlike in Asia, prosperity there still rests largely on exports of primary products. The main difference with Africa is that Latin American is a more efficient primary producer. Even in OECD countries such as Australia or the United States, primary production and exports remain a key source of growth. What these examples suggest is that prosperity in Africa can be increased by expanding and modernizing primary production – i.e., agriculture and mining [Owens and Wood 1997; Wood and Ridao-Cano 1999].

From the above, one may be tempted to infer that manufacturing could be ignored because it is likely to be inessential for most African countries. This is to forget that growth in Africa as a whole will not take place -- or at least not take place at the required pace -- unless some countries industrialise. This is because industrialisation will draw labour to rapidly expanding cities and relieve the countryside from having to sustain the mass of the poor. Export industrialisation will also raise wages, encouraging relocation of industries towards the African interior in search of lower wages. Historical labour migrations to South Africa are a good example of the large-scale movements of workers that will take place once export industrialisation reaches Chinese-level speed. Incidentally, this also means that industrialisation (which by and large happens in cities) might, in the long run, be the best solution to rural poverty.

Turning to agriculture, promoting agricultural exports from Africa requires a long-term vision. External markets for many African traditional exports have stagnated or declined because of rapid productivity increases in Europe and the US. Africa has also lost market shares due to the rise of more efficient primary producers elsewhere, particularly South-East Asia and Latin America. A number of factors internal to Africa have plagued agricultural export performance as well [Collier and Gunning 1999, Dollar and Easterly

1999]. Internal and external factors tend to reinforce each other so as to trigger downward spirals of vanishing export earnings, diminished internal support to agriculture, increased taxation, and further declines in export earnings [Bevan, Collier and Gunning 1989]. The bottom line is that Africa will not revive its primary exports without identifying new markets for the products it can produce and becoming more competitive in its existing markets. These could be traditional tropical crops like coffee and cocoa, or non-tropical crops such as vegetables, livestock, animal feed, or shrimp. Africa also needs a clear strategy for increasing its market share on existing markets (e.g., Europe, the US) and for penetrating new markets in East Asia (e.g., China).

For export promotion and growth to be sustainable in the long run, African economies must be capable of assisting the needs of growing sectors. This means putting in place supportive institutions ensuring that adequate capital, services, and labour flow to the growing sectors of the economy. As manufacturing and modern services rise in importance, human and social capital becomes more critical: business needs the right skills, the right commercial contacts, and the right social norms. The same is true in agriculture, although less pronounced because there is less reliance on hired labour in African agriculture. How the business environment can be set right to trigger growth and to sustain it is the critical research question.

4. Policies for growth

The last two decades have witnessed an evolution in public thinking about the appropriate forms that development aid should take. The time of fertiliser distribution projects is over. It is now commonly agreed that what can be handled by private entrepreneurs should be handled by private entrepreneurs. The role of the state is to provide a suitable environment for growth and poverty alleviation and to assist the population in coping with the adjustments required for and by economic growth. Having said this, another question is raised: what environment for what growth?

4.1 Macro vs. sectoral environment

There is little doubt that certain environment characteristics benefit investment in all economic activity, irrespective of sector. This is true, for instance, for the rule of law, a stable currency, primary health and education, and a sustainable fiscal policy.

While there remains some disagreement as to the precise elements of a good macro environment, there is little dispute that hyperinflation and rapid currency depreciation are harmful to economic prosperity. It is also clear that financing a public deficit through external borrowing is unsustainable in the long run. The immediate implication is that government deficits must be kept under control. The failure to do so can only trigger excessive borrowing, inflation, or both. Many countries have learnt these harsh realities the hard way. The same is true of the rule of law. Civil strife and insecurity hurt most forms of economic activity.

Certain types of economic activities appear more resilient to macro and political instability than others. The fact that Sierra Leone and the Democratic Republic of Congo continue exporting diamonds in spite of massive disruption to their economies suggests that (some level of) diamond extraction is not sensitive to macro and political instability.[5] On the other hand, tourism is unlikely to develop in these two countries today.

We suspect that technology transfer is the source of growth that is most susceptible to instability. This is because technology transfer requires international involvement in the form of foreign direct investment, training abroad, and collaboration in international research institutes. Instability drives foreign investors away and incites trained manpower to flee the country. Collaboration in international research efforts is also hindered by lack of funds to relay findings to domestic producers. For these reasons, we suspect that macro and political stability are preconditions for technology-based growth.

Macro stability, however, is a necessary but not sufficient condition for growth. The devil is in the detail. Even principles that apply to all sectors, such as the rule of law, might require quite different emphasis depending on the sector to be promoted. Manufacturing development calls for less urban crime and corruption; agricultural development requires that the rule of law extends to rural areas and that the theft and destruction of crops be combated and legal contracts enforced.

The bottom line is that most environment variables vary by sector. Providing a suitable environment for manufacturing growth is in general quite different from doing the same thing for agriculture. To make this clear, we discuss two examples: manufacturing and agriculture. Similar examples could be devised for other sectoral growth strategies such as tourism or mining. What these examples illustrate is that any growth strategy is likely to fail without a supportive sectoral environment.

4.2 Example 1: An environment for manufacturing growth

The primary constraint to private manufacturing investment in Africa is the dearth of remunerative investment opportunities. A major reason for this state of affairs is the poor business environment [Collier and Gunning, 1999]. The funds required to finance a first wave of manufacturing exports can be found either from foreign direct investment or from African saving/reversal of capital flight.[6]

Manufacturing is largely an urban phenomenon. To the extent that manufacturing growth is oriented towards exports, at least initially, a policy for manufacturing growth need not seek to improve the business environment in a whole country. Concentrating early intervention on a single chosen location would suffice -- say a major city with easy export and import access. The recent explosion of Malagasy textile and garment exports

[5] It is even suspected that economic activities that are easy to capture trigger conflict to control them. This reasoning has been used, for instance, to explain the initiation, continuation, or extension of conflicts in Sierra Leone, Liberia, Angola, and both Congo's [Collier and Hoeffler 1998].

[6] This is true for Africa as a whole, not necessarily for an individual country. Mozambique entrepreneurs, for instance, need not have sufficient funds to invest. But money can be found elsewhere, e.g., in South Africa, Gabon, or Botswana. One issue, among others, is how to channel it towards investment in Africa.

from a single export processing zone is a case in point. In a matter of a few years, these exports have become the major export of the country.

Manufacturing is likely to benefit from the following:

- local urban infrastructure
- public utilities (electricity, water, garbage collection, industrial waste)
- telecommunications (telephones, email, faxes, internet)
- public transport for workers
- port and airport infrastructure
- rapid custom clearance procedures on imports and exports
- supportive commercial law
- an educated and disciplined workforce
- training in vocational skills
- financial and insurance services

What is unclear at this point is: (1) which of the above (non-exhaustive) wish list is absolutely necessary for manufacturing growth; and (2) in which form, public or private, the above should be provided. These issues require investigation.

4.3 Example 2: An environment for agricultural growth

It is well known that agricultural expansion has been stifled by various attempts by African governments to tax farmers over and beyond what was economically advisable. These ill-guided policies have resulted in large differentials between international and producer prices. In some countries, the deleterious effect of these policies was further compounded by overvalued exchange rates. As a result, incentives to produce have been cut and investment and input use have dropped.

These ill-fated policies have long been criticized [The World Bank 1981]. Many countries have reversed these policies, with the expected opposite effect on output. It is now clearly understood that, with over-taxation of farmers, no agricultural growth can be envisaged. The question now is: what else is needed?

Unlike manufacturing, agriculture is spread out over a large area. High potential agricultural areas, however, often are quite circumscribed -- e.g., the cocoa belt in Ghana, and the peanut basin in Senegal. To the extent that agricultural growth is best achieved via intensification, focusing on high potential areas might be the most promising growth strategy. It presents the added advantage of attracting or retaining population in particular regions of the continent, thereby helping to preserve bio-diversity in other regions.

In general terms, agricultural intensification is likely to benefit from the following [Delgado and Mellor 1984, Matlon 1990]:

- absence of over-taxation of farmers
- rural feeder roads

- agronomic research and extension
- market infrastructure
- grading and quality standards
- import priority for fertiliser
- legal institutions supporting contract farming
- credit for agricultural inputs
- agricultural export promotion, which in turn means the identification of new markets, and lobbying for secure access to new markets (e.g., sanitary and quality control restrictions on imports of agricultural and livestock products from Africa)

If one were to put experts and practitioners around a table, they would probably agree that all items on the above list are associated with agricultural intensification. They are even likely to add to the list. Identifying processes that are correlated with agricultural growth is the easy part. The hard part is to know how a supportive environment for growth in agricultural exports can be put in place in Africa.

In other parts of the continent, agricultural intensification need not be the best option. Livestock production in the Sahel is a case in point. In the long run, extensive livestock raising in large private or communal farms might represent the best option for the area. In Niger, for instance, livestock exports to neighbouring countries have already become a major export [Fafchamps and Gavian 1997a].

A successful upgrading of extensive livestock production requires focusing on another set of factors, such as [Shapiro 1979, Fafchamps and Gavian 1997b]:

- itinerant veterinary services
- breed selection and extension
- protection of common or individual property rights on animals, water points, and dry pastures, and wet (lowland) pastures
- dispute resolution institutions between farmers and livestock producers
- livestock markets in key locations
- road infrastructure to livestock markets
- distribution of animal feed
- no restrictions on cross-border trade

Again, the above list is illustrative only. Its purpose is to show that what environment parameters policy makers should focus on depends on what kind of growth they wish to achieve. What are the main constraints? What are the most critical dimensions of business environment? What are the priorities for research? The answer is likely to differ from country to country and from crop to crop. Rigorous research in these key areas could save millions.

4.4 Business environment and policy

Having clarified the relationship between business environment and growth, we need to clarify the relationship between policy and environment. Take public utilities, for

instance. We have argued that a reliable supply of electricity is essential for manufacturing growth. This does not, by itself, justify policy intervention. Some would argue that, if a market for electricity exists, private electricity companies will simply be created to supply the market. Having recognized that electricity supply is crucial for manufacturing growth does not imply that the government should step in to produce electricity.

What are then the principles according which policy intervention would be justified to affect the business environment? We tentatively identify three of them: coordination failure, institutional innovation, and commitment failure.

Coordination failure arises whenever decentralized actions by independent individuals do not yield an efficient outcome. Coordination failure is a pervasive phenomenon. Free riding, for instance, is an example of coordination failure. Pessimistic expectations can, in some circumstances, also lead to coordination failure, as when investors fear about the future, investment drops, and the economy goes into recession.

To resolve coordination failure, the intervention of some coordinating mechanism is required. This need not be the government: if the number of economic agents is sufficiently small, they may be able to join forces and coordinate their action to improve efficiency. The existence of a dominant firm or agent may also resolve the coordination problem, as when as dominant software or electronic company sets a new standard that others subsequently imitate. However, if coordination failure is not resolved by economic agents directly, outside intervention is required. A government may then step in to either incite economic agents to coordinate their actions or to supply the service directly.

In electricity supply example, this might mean for the government to supply electricity directly, as is often done in many African countries. Another way of achieving a similar outcome would be to establish a regulated market for private electricity provision. This would include, for instance, setting up transparent and enforceable rules regarding electricity contracts, access to physical infrastructures, the issuance of permits to install ground lines, and the like. As the failed deregulation of the California electricity market illustrates, setting up an efficient system is not a straightforward task. Countries with limited governmental managerial capabilities might prefer a simpler system, e.g., with a single public or private monopolist.

Institutional innovation is another possible rationale for policy intervention. Just as one does not expect Kenyan firms to know how to make computer chips simply because they are manufactured elsewhere, one should not assume that institutional innovations introduced elsewhere are instantaneously transferred to Kenya. This reasoning is implicitly behind many forms of public intervention. Examples include setting up stock exchanges and commodity markets, changing contract laws or contractual practices, or switching to the just-in-time inventory system.

As these examples illustrate, institutional innovation does not necessarily require public intervention. The Chicago Board of Trade, for instance, was created by grain brokers, not

by the government – although local authorities lent a hand to solve coordination failure [Cronon 1991]. Many innovations in contract law originate directly from the business community, for instance the spread of leasing or hire-purchase currently under way in Sub-Saharan Africa. The just-in-time inventory system is essentially a private innovation. Institutional innovations need not occur automatically. In many circumstances, external intervention may speed up the process of innovation. As with any innovation, success is not guaranteed.

Commitment failure arises when individual agents fail to achieve a mutually beneficial outcome because promises are not self-enforcing. Credit transactions are a common illustration of this problem: agents might agree to repay but fail to do so ex post. Anticipating this, creditors refuse to lend. Voluntary contributions to a public good is another common example: a village might agree that maintaining the irrigation canal is in the common interest, but be unable to force its members to contribute to maintenance costs.

These instances arguably provide the best rationale for public intervention. This is because the key feature that differentiates the government from private agents is its monopoly on the lawful use of public force. This monopoly has three major economic applications: courts; taxes; and law and order.

It is because the government backs their decisions that courts are capable to enforce private contracts. Without the implicit threat of force, creditors could not foreclose on debtors' property. By setting up courts and other supporting market institutions, governments can facilitate trade and reduce the incidence of market failure.

Taxes play a key role in the provision of public goods whenever voluntary contributions are insufficient. Superficially, this situation is similar to coordination failure, except that in this case agreeing to coordinate actions is not sufficient to eliminate the free riding problem. The capacity to tax economic agents to provide public goods is thus likely to play a central part in the definition of any policy. If voluntary payments can easily be elicited (especially if they are easier to collect than taxes), taxes are not necessary. This explains, for instance, renewed interest in user fees, toll roads, and the like.

Similar principles can be used to identify situations in which international aid is justified. Take coordination failure, for instance. While national governments are in principle better equipped to solve domestic coordination failure problems, donors can assist with international coordination failure [Africa Partnership Team 2000]. The setting up of international research networks is an example of such intervention. Another example of such intervention is the International Task Force (sponsored by DfID, the European Union, and the World Bank among others) that aims to create a market for derivatives to insure poor countries against commodity price risk. A single African country is very unlikely to solve the coordination problems involved in setting up such a complex system without external assistance.

Regarding institutional innovation, donors might be in a position to advise a government by comparing local institutions with institutions they have observed elsewhere, for instance in their own country. Many interventions are of this type. Recent examples of institutional innovation that have spread thanks to donor intervention include micro-finance, the use of auctions to allocate scarce foreign exchange, and the delivery of public services through non-governmental organizations. The difficulty, of course, is to ensure that the proposed institution fits the existing local environment.

Donors can also assist by volunteering their own funds for international public goods, whether global warming, the protection of biodiversity, or the prevention of drug trafficking. Development might be seen as a public good in itself since a better world distribution of income should reduce terrorism, illegal immigration, child labour, sex tourism, and other evils.

Finally, international intervention can be used to put in place international commitment mechanisms. Treaties are examples of such form of action. Used in a non-coercive manner, debt or aid conditionality can also be used as commitment devices whereby a country credibly promises to change its policy environment [Fafchamps 1996]. Unfortunately, conditionality is also often used to influence local events against the will of the existing government. In these cases, the beneficial effects of conditionality are less likely to materialize [Callaghy 1986].

These few principles help determine the scope for intervention by national governments and aid agencies and the form intervention may take. They do not determine the content of intervention. To this we now turn.

4.5 Defining priorities

Defining a strategy is first a matter of vision: one must have a final destination and a way of getting there. We have argued that a sustainable poverty alleviation strategy for Africa must be based on growth. We have also proposed that the emphasis be shifted from constraints to engines of growth. This is because many constraints need not be binding at the early stage of development where most of Africa currently is. Focusing on engines of growth offers a better guarantee of reaching our final destination, which is for Africa to join OECD.

What remains unclear is how such a strategy can be implemented. There remains considerable disagreement in the economic profession as to what steps are required to set a country on a sustained growth path. Some, for instance, argue that an increase in agricultural productivity is a prerequisite for growth [IFAD 2001]. Lately, much emphasis has been put on education and health as essential preconditions for growth. Others yet focus on institutions, corruption, democracy, or warfare and insist that a country cannot grow unless it first gets its house in order.

All these claims make good intuitive sense and there is evidence weighing in their favour [Keefer and Knack 1997, Easterly and Levine 1997]. But the list of prerequisite is getting

rather long. Satisfying all these conditions simultaneously is very difficult for poor countries. Getting the whole population through secondary school, for instance, would be extremely costly for the average African country, both in terms of direct education costs and lost child labour. The same can be said for raising health levels to western standards.

Perhaps not all conditions are necessary. Peace, for instance, seems a reasonable requirement for growth. But many of the countries that grew rapidly over the last 100 years have been through various wars. This is certainly true of United States and Europe during the two world wars and the cold war, but also of recent high-growth countries such as Japan, Korea, and Israel which have all been through major wars in recent history. The same can be said for corruption: Hong Kong, Singapore, Korea, and Taiwan seem to have grown with relatively little corruption, but China today (and Europe, Japan, or the US yesterday) has been growing in spite of widespread corruption. What is required is that the environment be sufficiently attractive for investment and technology transfer to begin taking place.

For these reasons, we propose that policy makers adopt a healthy scepticism towards all prerequisite lists. Our favourite approach for Africa is to bootstrap the growth process. This means initiating growth in one sector or region to affect expectations and investment in other sectors as well. Many of the so-called prerequisites are endogenous to the growth process itself. Once growth sets in, expectations change in such as way as to favour the things that support growth. Parents, for instance, may not send their kids to secondary or technical school if there are no jobs for them. But once demand grows for skills acquired in school, parents will respond accordingly. Rapid growth in one sector may be a cheap way of triggering a virtuous circle by which improvement in one part of the economy improves the environment in other sectors and raises the visibility of the economy to foreign investors.

Does this mean such a strategy is guaranteed to work? Certainly not. Constraints that are not binding initially may become binding later on, albeit it is difficult to predict exactly which constraints will become binding and how fast. But it is counterproductive to worry excessively about future constraints when we still need to demonstrate that Africa can grow as fast and as well as the Asian NICs. Once that is done, we can worry about the next phase – the constraints that affect rapidly growing countries. Right now, it is simply not on the agenda.

Having established that the elimination of all present and future constraints to growth is not a prerequisite, we need to tailor policies to conditions prevailing in particular countries. This raises three types of issues: selection of engines of growth that suit the conditions prevailing in particular countries; identification of constraints likely to prevent an initial growth spurt; and competition between countries. We discuss each in turn.

As we discussed in section 3, not all countries can grow in the same fashion. A growth strategy must be built on the conditions prevailing in a particular country. For instance, it would be futile to propose manufacturing exports as the growth engine for landlocked countries with a poor infrastructure, such as Chad, Niger, or Burkina Faso. By the same

token, prospects for the development of tourism are better in Bostwana with its rich wildlife than in Nigeria with its traffic and insecurity. These are obvious points, although in practice it is often difficult to decide. (For instance, of Kenya and Tanzania, which is the better positioned to serve as manufacturing export platform? What are the prospects for tourism in Cape Verde compared to Tenerife?).

A similar level of imprecision affects the identification of constraints. In this respect, professional and investors from the industry probably are in the best position to assess what causes problem for the development of a particular type of activity, whether charter-based tourism or flower exports. Even so, professional assessment is not entirely reliable because it typically reflects the environment in which the person normally operates. For example, an American businessman might insist on the need for up-to-date communication technology, say, while a Chinese investor would worry about worker productivity. In practice, ingenuity and a can-do attitude can overcome many constraints at the early stages of development – albeit it is impossible to predict when, where, and by whom ingenious solutions will be found.

A potentially more difficult issue for aid agencies is that of competition between countries or regions – what some have called the fallacy of composition [Faini, Clavijo, and S. Senhadji 1992; Martin 1993; McKay, Morrissey, and Vaillant 1997]. This problem affects all sectors of activity and is especially acute for exports. To see how this problem arises, consider an aid agency who must advise Ghana and Ivory Coast on their agricultural strategy. Since together they produce a major share of the world's cocoa, helping one of them to expand exports would hurt the other. The same must be true for exports of flowers, shrimps, or off-season vegetables: the size of the market is limited, so that development by one hurts another. Tourism suffers from a similar difficulty, at least as far as specific market niches are concerned (e.g., safari tours). The issue here is to focus on the long run source of profitability which is ultimately due to the productivity with which enterprises or farms operate.

There may be additional problems if agglomeration effects and other externalities are relevant. Suppose an economy manages to overtake that of its neighbours slightly so that it acquires a comparative advantage in the production of technology-based goods such as manufactures, commerce, finance, and the like. Hong Kong and Singapore are such examples. Once such comparative advantage has been established, it tends to feed itself as trade with neighbouring countries reinforces the pattern of specialization, at least initially [Young 1991; Fafchamps 1997]. As a result, a head start would provide a town or country with a long-lasting (if not permanent) advantage relative to its neighbours. More complex interactions are also possible whereby the biggest gains go to the (temporary) leader but there are still big gains to be had for the lucky neighbours.

This observation has two corollaries. First, countries (or regions within countries) which might resist trade with other countries or regions because they do not want to let them get ahead are fundamentally misguided. While the first African country to export manufactures may get a long-term economic advantage, its neighbours would nonetheless if there is intensive regional trade.

This failure to understand that, in the long run, trade is mutually beneficial underlies African countries' propensity to seal off land borders with their immediate neighbour while they continue to trade with the West (e.g., Kenya and Tanzania, Morocco and Algeria). It might also account for the very poor performance in terms of regional integration. It is often pointed out that economic regional integration fails in Africa because countries have little to trade with each other. This implies that intra-African trade could only increase if some countries began exporting manufactures and services to their neighbours. In practice, this often meets with resistance from lobby groups and politicians alike in the importing neighbour. The rationale for this resistance is partly the fear of falling prey to another country's economic might.

The second corollary concerns aid agencies. The benefits of regional trade are more likely to occur the less publicly they are advocated. In theory, one could bring all the parties around a table and negotiate a coordinated strategy at the African or regional level. This strategy would identify countries targeted for manufacturing development, those for tourism, and those for various types of agriculture. It would also earmark areas for mineral exploration and devise plans for common infrastructure and common institutions such as post-graduate university programs, agricultural research hubs, and the like.

We have serious doubts that such efforts would be successful. Apart from the fact that any regional development strategy would be largely arbitrary – e.g., there are an infinite number of places where to put the next tourist beach resort on the coast of Africa – it is unlikely to be accepted by the countries concerned. For instance, it would make perfect sense to assign to Chad the same role that, say, Nebraska plays in the U.S.: an exporter of food products and an importer of everything else. Such assignment, however, would most likely be resisted by the Chadian government because it implies the country would play a very minor role in African affairs for the foreseeable future.

Given the difficulty of formulating a coordinated development strategy based on intra-African trade, focusing on international exports is not only the best policy, it is the only policy that has the slightest chance of working.. If agglomeration effects are captured anyway, economic forces might become so strong that they can no longer be resisted. In the long run, helping Africa export to the rest of the world would eventually raise intra-African trade, albeit through the back door, so to speak. This is, for instance, what happened in East Asia where Japanese and, subsequently, Taiwanese or Hong Kong investments in neighbouring countries fostered a growth in regional trade despite the absence of formal economic integration agreements (e.g., Taiwan and Hong Kong with mainland China).

Having clarified our views regarding the role for policy and aid in the growth process, we now examine potential sectoral growth strategies for Africa more in detail.

5. Manufacturing exports from Africa

5.1 The Context

Rapid growth has been associated with rapid export growth. Why this is the case has already been discussed. In this section we take up a second element in the link between exporting and growth. This link is that the most successful economies of the last twenty years have been exporters of manufactures. Table 1, which is taken from Söderbom and Teal (2001), puts the magnitude of the success of these economies, over the period from 1965 to 1990, in context. For the countries included in the Table income grew by an average of 10.9 per cent per five-year period. Sub-Saharan Africa (SSA) grew by 2.9 per cent. Not only was this markedly less than other relatively poorly performing regions – South Asia and Latin America (with growth rates of 9.2 and 6.2 respectively) – but massively less than that of East Asia with a growth rate of 28.8 per cent per five year period. In the space of 25 year the East Asian countries went from being poor, with income les than twice those in SSA, to being high income with incomes nearly 6 times greater.

In the Table we present two measures of the openness of the economies. One is taken from the PENN World Table (PWT), the second is the Sachs and Warner (SW) measure. Both have their limitations but they are the best available summary measures of the stance of trade policy. The PWT measure of openness is the share of imports and exports in GDP, the SW measure is a summary statistics of the stance of trade policy. As the PWT openness measure shows for the NICs trade grew much faster than GDP, while for Africa the measure remained unchanged, the low growth of trade being reflected in low GDP growth. It will be noted that in 1965 Africa was as open by this measure as East Asia. This reflects the fact that the economies of Africa and the NICs are generally small. It is in the degree of openness of its trade policy, measured by the Sachs-Warner index, that the divergence between SSA and the NICS is apparent. In 1965 the countries of SSA were much less open and the measure remained unchanged which for the NICS its much higher level of trade openness increased.

There is very strong evidence that this growth in openness was associated with greater growth in total factor productivity. Figure 2 reports the results of taking the data underlying Table 1 and asking if openness is associated with underlying growth. It is quite clear from the figure that there is a very strong association. It can also be shown, we believe, that this relationship can be given a causal interpretation. Openness causes growth, Dollar (1992), Frankel and Romer (1999), Söderbom and Teal (2001).

As is well known in the case of the NICs this growth in exports was dominated by manufactures. This has led to a view that such exports are linked to externalities in learning. It being argued that the new knowledge incorporated in such exports sets up a process for upgrading skills and productivity, conspicuously different from economies exporting relatively staple agricultural products. In this view the association of exporting success and growth is dependent on the nature of the goods that were exported. We will return to those issues. The comparative data we have presented ends in 1990. We next consider both the long term and more recent experience of African economies

5.2 Long term Success and Failure in Africa

As it is largely meaningless to present averages for all of Africa we look, in this sub-section, at four African countries to assess the role of exports as factors in long-term success and failure. We will then narrow the focus to manufactures.

Figure 3 shows an index of the volume of exports, based on 1974=100, for four African countries. Two are long term African export success stories, Botswana and Mauritius. Two are countries that have experienced a continuous long run decline in per capita exports - South Africa and Zambia. These countries span the range of African economic outcomes in the 1990s, from long-term success in the cases of Mauritius and Botswana to long-term failure in the case of Zambia. In Botswana and Mauritius over the period from 1970 to 1998 trend growth of export volumes was 7 and 5 per cent respectively. Indeed these figures understate the performance of Mauritius where growth only began in the early 1980s, following major trade reforms. Milner and Wright (1998) show that trade liberalisation in Mauritius led to a massive rise in employment in the new export industries and that the bulk of these newly created job opportunities went to women.

While in many respects Botswana and Mauritius are atypical of other African countries their relative success means that understanding how they grew may have lessons for other African economies. They are also of interest as Botswana grew by exploiting natural resources, the path which other African success stories have followed, while Mauritius is the only country in sub-Saharan Africa that has seen a very rapid growth in manufacturing exports over more than a decade. The contrast with South Africa is particularly important as in absolute terms South Africa is by far the most important economy in sub-Saharan Africa for exporting manufactures. To see this we turn first to viewing the value of exports, we then consider manufacturing exports.

Figure 4 shows the value of exports, in 1995 US$, on a per capita basis for the same countries as in Figure 3. This figure shows, in effect, how much the exports of African countries could purchase at 1995 prices. In the early 1970s the four countries - Mauritius, Botswana, South Africa and Zambia - all exported about US$ 500(at 1995 prices) per capita. By 1998 both Mauritius and Botswana exported approximately four times as much [US$ 2,400 for Mauritius and US$ 1,800 for Botswana]. In contrast the real value of South Africa's exports was virtually unchanged while that for Zambia had fallen to some one-fifth of its 1970s level. Some of this fall in the purchasing power of Zambia's exports was a decline in terms of trade but the per capita volume of exports in 1998 were about one third of the level of 1970, as can be seen from Figure 3. This decline combined with falling terms of trade ensured that Zambia's per capita exports in the late 1990 were reduced to just US$ 106 (at 1995 prices). So from being on a par in the early 1970s the gap between Mauritius and Zambia by the late 1990s was a factor of 20.

What is the role of manufacturing in these exports? Figure 5 shows, again in 1995 US$, the figures for per capita exports of manufactures from Mauritius and South Africa. In 1980 these were at a similar level about US$ (1995) 200. After a period of stagnation exports from South Africa have started to grow in the 1990s. South African manufacturing exports have developed more favourably than overall exports during the

last decade. However this achievement is markedly less than that of Mauritius where per capita exports of manufactures rose from some US$ 200 to over US$ 1000 (all at 1995 prices). In the case of Botswana and Zambia manufacturing exports are negligible. The growth in Botswana reflects the discovery of diamonds, while the decline in Zambia reflects the contraction of the copper industry.

5.3 Export Recoveries in Africa

In the last section we examined two long-term success stories, Botswana and Mauritius. In this context how successful have been the economies that have recovered in the 1980s and 1990s? If attention is focused on the last decade the trend growth rates for Ghana, Uganda, Tanzania and Mozambique exceed those achieved by the longer run success stories of Botswana and Mauritius. These dramatic improvements in trade performance all follow periods of major trade reform involving a reduction in protection and a liberalisation of the exchange rate regime. Figures 6 and 7 show similar series for Ghana, Uganda and Tanzania as were shown in Figures 3 and 4. Figure 6 shows the volume of exports based on 1974=100 while figure 7 shows the real value of exports in US$ at 1995 prices.

The dramatic turnaround in export volume growth in the mid 1980s in the case of Ghana and in the 1990s in the case of Uganda and Tanzania is apparent from figure 6. It is also the case for all three economies that both export volumes and the real value of their exports at the end of the 1980s still have not returned to their 1970 level. Not only are these substantially lower than they were in 1970 but the gap between these economies and the two successful economies - Botswana and Mauritius - by 1998 was simply enormous. These economies export less than US$150 per capita, as compared with the US$ 1000 of Mauritius. The gap has expanded greatly since 1970 and reflects, not changes in the terms of trade as is often suggested, but differences in the volumes of their exports. In all three cases exports of manufactures are negligible.

5.4 The Secret of Success

So why has success been such a rarity in Africa? This question is posed in two recent survey papers by Collier and Gunning (1999a,b). Their analysis points to poor policy resulting in a nexus of constraints from which escape is difficult but not impossible.

What areas have been ones of policy failure? One has been macroeconomic policy. Overvalued exchange rates and constraints on imports can make exporting unprofitable for nearly all producers not only, or mainly, for manufacturing ones. A large real overvaluation is a common factor in the dramatic decline in exports volumes during the 1970s and early 1980s in Ghana, Uganda and Tanzania shown in Figure 5. It was the reversal of these polices that was the key policy that enabled export volume growth to occur. The evidence seems clear that policies that avoid an overvaluation of the real exchange rate are a pre-condition for the growth of exports. Trade liberalisation and macroeconomic stability are policies that have frequently been adopted at the same time as large nominal devaluations. In these areas of macroeconomic policy there have been

divergent outcomes. Ghana is a good example of a country which has made substantial progress on trade liberalisation but has had very much less success with macro stability. South Africa is a country that since 1994 has moved rapidly in both areas. In terms of export growth generally Ghana has been more successful than South Africa. In terms of manufacturing export growth South Africa has been the more successful economy of the two.

The second central area of policy failure, following the analysis of Collier and Gunning, has been that investment faces high risks in Africa. If there are substantial changes in the real exchange rate, or in the underlying rates of inflation, this can make planning for firms very difficult or impossible. Much behaviour by both small-scale firms and households in Africa can be understood as responses to living in a high-risk environment. Whether risk is the key factor in limiting growth opportunities is an open question. High capital costs and low investment can be equally well explained by poor macro policy as by any risks inherent in investing in Africa rather than elsewhere. Indeed it may be unhelpful to draw to clear a distinction between risks induced by policy failure and risk induced by other factors. Both aspects of the risky environment can be addressed by appropriate policies.

5.5 Policies toward the Manufacturing Sector

The issue as to how sub-Saharan African countries can enter the market for manufactures is one of the most important policy issues facing governments in Africa. Reasons for the low levels of manufactured exports from the continent can broadly be classified as reflecting a focus on either macro or micro economic factors.

The macro view focuses on Africa's low levels of skills and relative abundance of natural resources ensure that exporting manufactures is unprofitable [Wood 1994; Wood and Berge 1997; Wood and Mayer 1998]. It is possible that natural resource intensive economies will be able to efficiently export the goods in processed form, essentially if transport costs are sufficiently high to outweigh other cost disadvantages. Owens and Wood (1997) argue for sub-Saharan Africa that this is not the case. They find that processing requires higher levels of skills than are available in Africa.

The micro-economic view focuses on a range of factors that may militate against manufacturing exports. Collier argues that manufactures are intensive users of services that are particularly expensive in Africa. Some of these costs are induced by inappropriate government policies, some are inherent in doing business in economies where the quality of the infrastructure services is often very poor. It needs to be noted that improving the business environment in Africa is essential for all sectors of the economy - not simply manufacturing. It is possible, as Collier argues, that such improvements will disproportionately benefit the manufacturing sector. In this view, if present policies of openness can be sustained, then export growth, including that for manufactures, can be realised [Collier 1997; Collier and Gunning 1997]. Another micro oriented view sees the problem as the failure of policy to promote technological capabilities, by which is meant firm specific learning, which is seen as the basis for a

successful process of industrialisation [Lall et al 1994]. Finally, a view originating in "new" trade theory, is that the key to successful exporting is the technical efficiency of firms. Such efficiency is determined by policies that encourage innovation, economies of scale, exposure to foreign competition and the availability of new goods [Krugman 1984 and 1987; Grossman and Helpman 1991].

While these two types of explanations are not mutually exclusive, in that both seek to identify the source of costs to manufacturing firms in Africa that prevent their being internationally competitive, nevertheless they point in very different directions for policy. Whether it is comparative advantage, defined in terms of resource endowments, which determine industrial success or whether it is amenable to policy reform or micro industrial policy issues are key issues for a policy agenda directed to promoting the growth of Africa's industrial sector.

5.6 Is macroeconomic policy enough?

To understand manufacturing success it is necessary to understand firm success. How important is macroeconomic policy, relative to other factors, in explaining firm success and failure? There is limited evidence on this point. A comparative study of firms across four African countries, but over a very short time period, found limited evidence that firms responded to real exchange rate changes [Bigsten et al.1999]. Other evidence, based on macro data, suggests that changes in the real exchange rate can have a major impact on manufacturing exports from Africa [Sekkat and Varoudakis 2000]. Macro policy that reduces the real exchange rate benefits exporting firms while it reduces the profitability of firms that are intensive users of imported inputs. So the effects of real exchange rate changes on exporting depends very much on the orientation of the sector. The limited response observed in the micro data may reflect the short time period for which we have data. It may reflect the fact that firms remain oriented to the domestic market and import of much of their raw materials, which will mean that real devaluation will adversely affect their profitability.

Mauritius and South Africa are two countries where trade reform measures have been associated with marked increases in exports of manufactures. As we have already noted the overall increase in Mauritius, on a per capita basis, was much greater. It is possible that the nature of the manufacturing exports differ between the two economies although there is little firm-level information on this issue at present. The intention of the macro economic reforms is to shift the focus towards exporting and in this respect there is little evidence, either at the macro or micro level, of success for most countries in Africa. Most manufacturing firms in most African countries remain focused on the domestic market and in this context they are likely to find trade liberalisation and real exchange rate devaluation problematic for their profitability.

5.7 Micro Policy and Firm Performance

Why do most firms remain focused on the domestic market? What limits their entry into foreign markets? How can improvements in their access be brought about? These are all

questions central to policy making for the manufacturing sector in Africa. Some of the answers can be found from work carried out from surveys of the manufacturing sector [Bigsten et al 1999 and 2000; Söderbom and Teal 2000; Teal 2000].

First it has been found that most large firms (which in this context means firms over 100 employees) do export. Further these firms do not specialise in exporting, they typically export only 20-30 per cent of their output. There is substantial diversity across African countries. Some, like Ghana and the Cameroon, tend only to export from their natural resource sectors, in both cases this is the wood sector. In other economies, for example, Kenya and Zimbabwe, exports are far more diversified across sectors. There may also be important differences between firms that export regionally and those that export to international markets, although this dimension of exporting in Africa is not well understood. Finally there is strong evidence that exporting firms are generally more efficient than non-exporting firms.

None of these findings are distinctive to Africa. The finding that manufacturing firms that export do not specialise in exporting has been found in other studies [Clerides Lach, and Tybout 1998, Table 1 p.915]. Why is there this lack of specialisation? One explanation is that exporters face declines in price when they increase exports. This would mean that exporters were limited by the market for their product. If this is the case then either new markets need to be created or actions taken, either by firms or by government, to expand the size of their market. Policy in this area would need to focus on increasing the market for products made in Africa. An interesting example of policy in this area is the actions of the Australian Wool Corporation to expand the market for wool. The policy was aimed at increasing consumption of wool. As such, while not directly benefiting an individual supplier, it clearly benefits them indirectly by increasing the demand for their product.

The lack of specialisation in export markets may have other causes. It may be the case that regional exports for many firms are close to being an extension of their domestic markets. In this case the failure to specialise may reflect the fact that regional markets in an African context offer only a limited extension to the domestic market. If specialisation does not occur in international markets and the problem is not in the markets for the product then the implication would be that at the margin both foreign and domestic markets were equally profitable and that domestic prices were similar to foreign ones. There is limited evidence on these points but the reasons for the lack of specialisation are clearly a major element in explaining the limited use made of foreign markets by African business.

The finding that exporting firms are more efficient than non-exporting firms is a rather general one. An important policy issue in this area is whether greater efficiency generates exporting or if firms which export become more efficient in doing so. There is some evidence to suggest that both factors are at work [Bigsten et al. 2000], although their analysis is based on only a short run of data, three years in the early 1990s. There is also evidence based on a longer run of data from Ghana to suggest that efficiency plays a role in the exporting decision. Söderbom and Teal (2000) find that while relatively efficient firms are not more likely to enter the export market they are less likely to leave it. These

findings at the moment are rather limited as to the time period, or the countries covered. But they suggest that the efficiency of firms is linked to exporting in important ways.

The finding that exporting firms are relatively large, at least by African standards, has important implications for the type of products that these firms export. Economic theory suggests that African countries should export labour rather than capital intensive manufactures. In terms of the macro data we reviewed above exports from Mauritius have been overwhelmingly from the textile and the garment sector. In fact those two sectors are very different in their use of capital. Textiles are relatively capital intensive while garments are among the most labour intensive of any sector. We would expect that the garment sector, being the most labour intensive, should be among the earliest of the sectors to enter the export market. In fact the data suggest that in the African countries for which we have comparative information the garment sector is among the least export oriented [Söderbom and Teal 2000].

5.8 Manufacturing and Africa's Growth Prospects

That manufacturing will grow if Africa grows is certain. Whether Africa will grow because manufacturing grows is very uncertain. In the last twenty years a lot has been learnt about how not to industrialise. Such knowledge is of only limited value as a guide to more successful policies. The key issue in dispute in the early stages of reform in Africa was whether reforms to the macro economic environment were sufficient to enable manufacturing to expand. The collapse of the manufacturing sector, that accompanied the collapse of the overall economy in many African countries, ensured that recovery would be associated with a recovery in the manufacturing sector. Such recovery does not imply that the fundamental constraints on Africa's manufacturing exports have been removed or addressed.

In the earlier sections we used Mauritius and South Africa as two of our examples. In both, it can be argued, that the issues of macro economic stability have been successfully addressed. In the former this has been associated with growth amply sufficient to eliminate poverty, in the latter it has not. While manufacturing exports from South Africa have expanded strongly the overall performance of the economy has seen little improvement. Certainly nothing that will address the problems posed of low incomes for the majority of the population. In the case of the three recovering economies we have discussed – Uganda, Ghana and Tanzania – substantial improvements in exports were associated with reforms to the exchange rate regime. But, at least in Ghana, macro economic stability was wholly absent. We would conclude from this that certain aspects of macro economic policy, specifically the exchange rate, are crucial pre-conditions for growth. We are left with the question as to why the response has been so limited in Ghana and Tanzania.

Is the failure of these economies to export manufactures a limitation on their growth prospects? The answer to that question depends, in part, on the issue raised at the beginning of this section, as to whether the nature of what is exported is important for the overall performance of the economy.

6. Agricultural exports from Africa

As we discussed in Section 3, most of Africa is likely to continue to rely on primary exports over the next 50 years. This is not a surprise and should not, by itself, be regarded as a bad thing. After all, if we consider the 50 states constituting the United States, the majority of them export primary commodities as well. If we ignore tourism and military bases, US exports of manufactures and services to other states (and to the rest of the world) are concentrated in a few states – most notably the Eastern seaboard and the Chicago-New York corridor where industrial production initially settled [Krugman 1991]. California has only emerged recently as a major exporter of non-agricultural products.

The same spatial organisation of production is likely to arise in Sub-Saharan Africa once it starts to grow: of the 50 or so countries, most will continue to export primary products. Consequently, much of the equalisation of standards of living with the rest of the world will depend on an intensification of cross-border migrations. But let us ignore this for now and let us concentrate on what needs to happen for Africa to increase agricultural exports.

Our first observation is that it is difficult if not impossible to promote agricultural exports if farmers are overly taxed – implicitly or explicitly [Bevan, Collier and Gunning 1989]. When farmers receive only a small fraction of the international price for the crop they produce, they have little incentive to invest in the crop by expanding production and purchasing inputs. The problem is further compounded by the fact that farmers' lack of interest undermines input delivery and agricultural research institutions. This is now well understood and many African governments have taken steps to raise producer prices [Kherallah et al. 2000]. In the rest of this section, we assume that taxation of farmers is kept to a reasonable level and focus instead of the other conditions required for agricultural growth.

6.1 What to grow? What to sell?

It is difficult to guess precisely what agricultural products Sub-Saharan Africa should seek to export. Any recommendation is likely to be challenged for what it is – an educated guess. It is doubtful that research could eliminate all guesswork, just like even the best research could not predict which IT stock will go up in value tomorrow. This is because conditions change and the nature of competition evolves. Take cocoa, for instance. Until recently, a significant share of the world production of robusta coffee came from Sub-Saharan Africa. Today, Vietnam is the main exporter of robusta coffee, having captured a major share of the world market.

Keeping these important caveats in mind, it is nevertheless possible to brainstorm on the kind of crops where African exports could grow. African agricultural products for which the international market is the largest face ferocious competition and lobbying from farmers in developed countries. This covers sugar, coarse grains such as sorghum and

millet, and roots and tubers for animal feed. Consider sugar, for instance. Technically, Africa could easily produce all the sugar Europe needs at less cost. This is because sugarcane is a more efficient way of obtaining sugar than sugar beet. But the European market is unlikely to open to African sugar imports. In fact, the expansion of the European Union de facto closes alternative markets to African sugar exports.

The situation is different for coarse grains and for animal feed from cassava or yam. The bulky nature of these products makes them uneconomical to ship to the West to feed animals there. It is probably better to export them in processed form, that is, as livestock. Here the major constraint Africa's inability to satisfy quality and product safety standards to penetrate developed markets [Henson and Loader 2001]. Sub-Saharan Africa is a major livestock producer, with hundreds of millions of cattle, goats, and sheep grazing the semi-arid belt. In many countries, the number of animals has been steadily rising [Jarvis and Erickson 1986]. And yet Africa exports little livestock – except to Arab countries.

We suspect that this situation has much to do with restrictions on imports from Africa based on animal and human disease risk. Meat quality is also in question – few animals proposed for sale in Africa have been properly 'finished', that is, fattened before sale. Yet Africa manages to export some of its livestock to Gulf countries, probably because of easier safety controls. This suggests that Africa might be able to sell its livestock to other emerging countries. The best export prospect for Africa is to take a share of the rapidly growing East Asian market. As exports rise, investments in animal feed processing can be made to improve meat quality and raise value added. Vaccination campaigns can help control livestock diseases, but eradication is likely to be difficult unless undertaken at a regional level. This is because livestock is often trekked across porous borders to take advantage of pasture or price differentials [Fafchamps and Gavian 1997b, Eddy 1979]. Being an island, Madagascar is an exception in that it could potentially eradicate animal diseases in isolation from the rest of Africa.

Africa's main agricultural exports remain exclusively tropical crops such as cocoa, coffee, tea, vanilla, and other similar crops. Off-season vegetables, a recent addition, can be included in this list as well. Other tropical crops, such as vegetal oils -- groundnut, palm, coconut -- have been progressively displaced by temperate crops --soya, colza. Prospects for these crops are therefore not promising.

All tropical crops have in common that they are best grown in the tropics.[7] Given that the bulk of Sub-Saharan Africa is in the tropics, it is not surprising that it specialises in tropical crops. What is less easily understood is why it represents such a small share of world production of tropical crops while it accounts for a major share of the tropical landmass. Although Africa is the birthplace of coffee, most coffee is produced in Latin America. Africa has also systematically lost market shares to other parts of the world, most notably to South-East Asia (Malaysia for rubber, Vietnam for robusta coffee, Indonesia for vanilla).

[7] We are told that this may change for coffee: research is underway to engineer genetically modified coffee that would grow in temperate zones.

Given these features, opinions diverge regarding the wisdom for Africa to invest in tropical crops. One concern is the so-called fallacy of composition: while it might pay for one country to invest in exporting more cocoa, say, it would hurt cocoa producers as whole by driving prices down. As long as most cocoa production was coming from Africa, the argument had some validity. Now, however, as tropical crop production is increasingly dominated by other parts of the developing world, the argument has lost its appeal. For all crops for which Africa represents a small or shrinking share of world production, more prosperous regions of the world would bear the brunt of lost revenues due to lower prices – just like the Ivory Coast economy was badly hurt after Vietnam began exporting its cocoa. Maybe the time has come for Africa to do onto others what has been done to it.

This leaves food crops. There is no doubt that the production of staple grains could be greatly improved in Africa. This is true most notably for maize and rice because the stock of scientific knowledge on these two crops is large and improved varieties are readily available. Improved techniques and varieties are not immediately transferable to Sub-Saharan Africa because of soil deficiencies, pest populations, and the specific ecological conditions that prevail in Africa. This is particularly true for rice because it is grown differently in Africa from elsewhere. But from an agronomic perspective, the prospects are excellent provided money is spent on adapting varieties to local conditions. The experience of maize is, in this respect, quite encouraging: improved maize has been successfully introduced among smallholders in several parts of East and Southern Africa. In this case, the problem rests more in the failure to adopt complementary inputs such as irrigation water and fertiliser and in the gradual collapse of the institutional framework that supported modernisation of maize production.

In our opinion, one important problem with staple grains is that increased output would result in a rapid decline in prices. Given that Africa currently imports food and that transport costs within Africa are large, producer food prices might fall a lot before Africa exports staple grains. International grain sales from the US and Europe at prices de facto lower than domestic prices keep international grain prices artificially low. China, however, offers some interesting prospects: prosperity raises the demand for meat there, and thus the demand for maize and other coarse grains. International maize prices could rise as a result. This might offer an opportunity for African countries to begin exporting maize.

Africa is also a suitable place for growing illegal drugs. Although we do not advocate that this should be encouraged, one should keep in mind that the failure for Africa to grow is bound to foster more illegal crop production. Preventing the spread of illegal crops should be a strong additional motivation for agricultural development aid.

6.2 How to grow more?

Having decided what to export is only half the question. One also have to decide how to export it, that is, how to produce it in competitive manner. So far, many different

approaches have been tried. The most effective ones have focused on high potential areas with established commercial crops – whether these crops are food or non-food. The least effective efforts have been in low potential areas where much of the poor live. The effect has been to retain people in areas that are not very suitable for agriculture, instead of favouring their migration to cities or more suitable areas.

In the view of many, intensification of African agriculture is essential [Eicher and Baker 1982, Mellor 1986]. This means focusing initially on a small number of high potential areas, even if this means encouraging migration out of low potential areas. Trying to fix populations in low potential areas is both expensive and, in general, misguided. In the long run, many areas of Africa will revert to wildlife and livestock. This is particularly true for much of the Sahel, many parts of which were settled by sedentary farmers only very recently.

Intensification requires an African green revolution [Thirtle et al. 2000; IFAD 2000]. This revolution calls for (1) water control; (2) better seeds; and (3) fertilisation. These three components are required for success. Crops can be thought of as machines that turn sunshine, soil nutrients, and moisture into valuable output. A green revolution is the application of science to crop production. Historically, this has meant many different things. Some agricultural innovations, for instance, did not require any external inputs – e.g., crop rotation, improved field maintenance, or manuring techniques (green manure, mulching, mixing animal manure with hay, etc). They could be achieved through pure 'extension services', that is, by convincing farmers to adopt new practices.

In modern times, this is no longer the case. Spreading the good word no longer suffices. Science has found new ways of changing agriculture. These are essentially of three types: better control over sunshine, soil nutrients, and moisture; mechanisation; and better seeds.

Control over sunshine may be important in the temperate zone, but it is generally not an issue in Africa. Control over nutrients, on the other hand, is critical because tropical soils are poor. This is not surprising given that rainfall runoff is high, resulting in leaching of nutrients.[8] Soil scientists typically agree that the problem is particularly severe in Sub-Saharan Africa, except in the East African highlands where volcanic activity has led to better soils (e.g., Rwanda, Burundi, Uganda, Ethiopia, Kenya).

Any sizeable increase in crop output thus requires better nutrients, both in terms of quantity and in terms of quality. Voortman, Sonnerveld and Keyser (1999), for instance, argues that Africa soil fertility cannot be understood without paying attention to micro-nutrients deficiencies which, by definition, are location specific. Nutrients can be put back into the soil in various ways, some of which do not require purchased inputs (fallow, manuring, and crop rotation). The rapid integration of livestock and crop production in much of the semi-arid zone can be seen as an indigenous response to falling soil fertility. Chemical fertilisers are also an option, provided they are fine-tuned to suit local conditions.

[8] Dry areas of Sub-Saharan Africa often receive more rainfall than wet temperate regions. They are dry because proximity to the equator means that evapo-transpiration is much higher.

Water control is important because plants grow by combining moisture and nutrients. If crops are provided with one but not the other, yields are disappointing. This explains why farmers who apply more chemical fertiliser but keep other farming practices unchanged only achieve a small percentage of promised yield gains.

There are many different ways by which soil moisture can be improved. Irrigation is obviously one of them; we get back to it shortly. Other methods focus on reducing water runoff which, as we have seen earlier, is quite large in tropical Africa. Runoff reducing techniques nevertheless exist and are quite varied – e.g., tied ridges, terraces, rock bunds, hedges, and other obstacles to slow down water and force it into the ground. They all have in common that they require a lot of labour to construct and/or maintain. These methods may raise yield, but they do not always raise returns to labour. This explains why they are seldom adopted by African farmers, except in more densely populated areas. The mechanisation of water harvesting techniques (e.g., tied ridges) would undeniably assist an African green revolution.

Irrigation can be seen as a water control method undertaken on a massive scale: instead of storing moisture into the soil, it is stored behind dams and other structures – or pumped directly from the water table. The sheer size of irrigation investments means that they are typically out of the reach of poor farmers [Fafchamps and Pender 1997]. The public good nature of irrigation also raises a whole set of additional complications having to do with free riding and failure to co-operate. The literature is replete with examples of African irrigation schemes that have failed to reach their objectives because of organisational difficulties. The schemes that have been the most successful are those small enough to be operated by a small group of farmers [Adams 1990].

We have discussed water control and nutrients. We now turn to mechanisation. Tractors have bad press in Sub-Saharan Africa. Most tractor programs have proved unsustainable and the tractors that were distributed or sold to African farmers have mostly turned to rust. As a result, development efforts have turned towards more ‘appropriate technologies’ such as animal traction. After a slow start, animal traction is beginning to spread to many areas of semi-arid Africa [Sargent et al. 1981; McIntire et al. 1988].

The failure of tractor programs is a puzzle. Given that Sub-Saharan Africa has a lot of land, one would expect labour to be a scarce factor. Consequently, a technology that replaces labour should be welcome – even if some of the obstacles are formidable (e.g., credit, fuel and spare parts distribution, and mechanical skills). But the same obstacles apply to trucking, and yet they have not prevented thousands if not millions of Africans from investing in trucks. Why aren’t African farmers interested in tractors?

The reason has much to do with what tractors can do and what tropical farming requires. Having been designed for temperate agriculture, tractors focus mostly on land preparation. In tropical agriculture, land preparation is quite light. This is because soils are shallow. Deep tractor ploughing damages soils. The most labour intensive activity is weeding – especially when more nutrients and better water control are applied. Big

tractors are typically useless at weeding because they are too large. Animal traction, in contrast, can be used for weed control because animals are small enough to walk between plant rows [Jaeger 1986]. In many areas where animal traction has spread, farmers have used the implements they received not for land preparation but for weed control [Fafchamps and Matlon 1989]. This simple observation suggests that small (two-wheel) tractors fitted with weeding equipment for shallow soils might prove a better sell than large tractors.

An alternative approach worth investigating is herbicides. Because herbicides are expensive, it may not be cost effective to use them on domestic food crops. But they may pay for themselves on export crops.

The next most labour intensive task is harvesting. Big tractors are useless at harvesting small fields (except to transport the output). Moreover, harvesting with tractors requires additional equipment that is typically not distributed because it is expensive. This suggests that research should focus on a simple harvesting implement that can be fitted onto a two-wheeled tractor. Simple threshing equipment could also be distributed. These examples are given to suggest that efforts to mechanise African agriculture might have been abandoned too early.

Finally, we turn to the most critical element of any green revolution effort: the seed. Better seeds are a key component to any green revolution. The seed is like a machine. There is no point feeding more nutrients and water to a plant if it has not been designed to take advantage of more nutrients and water. It is like wasting premium petrol in a car that is not designed for it. Coming up with seeds that benefit from more water and nutrients but are suited to local conditions is the key to a green revolution.

Before discussing improved seeds, a few points are in order. First, it is important to recognise that African farmers have been surprisingly good at adopting seeds from other parts of the world. Maize, for instance, is now grown everywhere in Africa even though it is not a native plant. Maize was adopted before colonization and it spread to many parts of Africa largely on its own with little or not state support. The same is true for cassava and for most export crops. Other crops such as coffee have spread way beyond their initial range in Ethiopia. The adoption of new crops goes back long before colonisation. [Hopkins 1973], for instance, argues that it is because 19th century African farmers had demonstrated they could grow peanut and palm for export that colonial powers decided to invade West Africa. It is therefore erroneous to claim that African farmers are opposed to new crops or new seeds.

The second point is that African farmers constantly experiment with seeds. It is customary for farmers to select the best-looking plants as source of seed for the next season. Millions of farmers doing this every year lead to the rapid adaptation of seeds to local conditions. Farmers also keep a portfolio of seeds with different traits and borrow or buy seeds from other farmers and villages. The downside is that, as a result of farmer experimentation, land races are extremely varied from region to region or even village to

village. This complicates quality control and makes grading difficult [Fafchamps and Minten 1999, 2001].

Having established that African farmers are willing to try new seeds but also quite sophisticated in their approach to seed selection, we now discuss scientific seed selection. Here the record is better than with mechanisation in the sense that, over the years, Africans have demonstrated a willingness to adopt a variety of hybrid and improved seeds [Eicher and Baker]. The problem is elsewhere. A complex series of institutions are required to develop new seeds, adapt them to local conditions, reproduce them, and sell them to farmers. If all goes well, this institutional set-up does not just produce an improved seed then stops. It produces a stream of ever better seeds, progressively building on the knowledge it accumulates.

The research institutions must also define strategies to deal with pests (insects, fungus, and diseases). This can be done in many different ways: to breed pest resistant varieties; to disseminate natural predators; to apply pesticides (either in a preventive or curative fashion); or to genetically engineer pest resistant seeds. None of these strategies is a definite answer. Fighting pests is like fighting diseases: the war is never won as pests adapt to changing plant populations, albeit with a lag. This is a similar story to antibiotics or anti-malaria medication. The research network must therefore remain active to keep ahead of the pest population. If research stops, pests win.

To achieve their objective, research institutions must act in a co-ordinated fashion [Barghouti and Hazell 2000]. At the core there must be a well-equipped research station that feeds a network of applied stations with seed material and pest-control strategies. The job of the applied stations is to adapt the seeds and pest-control strategies to their specific environment and to disseminate them in their respective regions. Given that African countries are small and often similar in climate and ecology, it is not cost effective for each country to fund a core research station. This is why, in Sub-Saharan Africa, CGIAR research stations often play the role of core station while national research centres are in charge of local adaptation and dissemination.[9] This set-up has replaced colonial systems that also were international in nature but were organised around their respective colonial power that manned and funded core research stations (sometimes located in the home country, e.g., INRA in France).

Today the African set-up is weak [Alston et al. 2001]. National centres are supposed to relay information from international centres to farmers and from farmers to researchers and they should adapt varieties to local pests and soils. They also must identify suitable water control and fertilisation technique. Without effective national research apparatus, the system cannot work. Unfortunately, in too many countries, national research stations are under-funded and cannot perform their role adequately.

[9] This is an oversimplification. Much of the core research is not undertaken by CGIAR centres but by laboratories and research centres in developed countries. CGIAR centres essentially occupy an intermediate position between pure research and continental adaptation. CGIAR also have regional stations in charge of local adaptation and they run regional networks pooling feedback from various national research centres.

Even when it operates smoothly, the current organisation is outdated. The technology to improve seeds is currently going through a major revolution: genetically modified seeds. This revolution has wrested power away from agronomic research centres to give it to private biotechnology corporations. CGIAR centres are not sufficiently well funded to compete with private laboratories in this area. The end result is that the biological revolution currently bypasses Sub-Saharan Africa.

One solution is to better fund the CGIAR centres. Another is to incite private corporations to invest in developing seeds suitable for African farmers – perhaps in collaboration with CGIAR centres and their networks of national centres [Lipton 2000]. Solving this organisational problem is arguably the most important challenge for agricultural technology in Africa.

The current system also has another major drawback. CGIAR research centres focus almost exclusively on food crops. There is no comparable international agronomic research network for export crops. Individual countries are pretty much left to their own device. This is paradoxical since Sub-Saharan African countries derive much of their foreign exchange from export crops. It is also a departure from the colonial period when much research was devoted export crops. Whatever international knowledge and local capacity existed for African export crops, it has now been largely dissipated.

In our view, the neglect of agronomic research on export crops is largely responsible for Africa's loss of market shares to other developing countries. International trade is simply too competitive. One cannot sit back and relax thinking that cocoa production will always be the same, because it will not. If Africa has been marginalized in international trade, it is primarily because it has not kept up with international best practices for the crops it exports. And it has not kept up because 50 small countries with very limited agronomic research resources cannot keep up with the Brazil and Malaysia of this world. Donor's neglect of export crop research is partly responsible for this state of affairs – and stands in stark contrast with colonial successes when the emphasis was on export crops.

Things are changing, however. CGIAR institutions have begun thinking about partnership with private research organizations. The United Nations has recently taken position to support research on genetically modified seeds and has urged developed countries to temper their opposition to testing as it might hurt their food security in the long run. DfID has just commissioned a study of the opportunities to stimulate private investment in research, development, and technology transfer in agriculture and other rural enterprises in developing countries.

So far we have discussed the green revolution exclusively in terms of crops. This is partly misleading. Livestock must be an integral part of any green revolution [Ehui et al. 2000]. This is for two reasons. First, livestock already is a major export for many African countries (e.g., Niger, Somalia, Ethiopia, Burkina Faso, Chad, Mali, Botswana, and Namibia). Livestock production can be upgraded in a way very similar to crops. This involves breeding programs, vaccination campaigns, and market infrastructure.

Livestock is also called to play a critical role in combination with crops [Pingali et al. 1987]. Animals provide a number of services to crops (e.g., manure, animal traction) at the same time as they make good use of crop by-products (e.g., hay, fallow pastures). There is an indigenous agricultural revolution going on in Africa, and it is the integration of crop and livestock production. Supporting this movement can only help.

A successful green revolution also raises rural incomes and hence the demand for animal products such as milk and meat. This is for instance the pattern observed in the Punjab [Fafchamps and Kurosaki 2002]. At some point, fodder is likely to become a binding constraint on the continued growth of a mixed crop-livestock agricultural system. The agronomic research community should keep an eye on this possibility and explore various alternatives – from long-stem cereals and leafy legumes to fodder sorghum and processed roots and tubers.

6.3 What about markets?

So far we have discussed agricultural technology as the primary engine of growth. Does it mean that technology is sufficient by itself? What about agricultural markets? A few observations are in order.

First, for agricultural markets to matter, farmers must have something to sell. There is no point developing market infrastructures if nothing can be sold. Consequently, imperfect or missing markets cannot hurt agricultural growth unless a farmer surplus is being created. Seen in this perspective, a focus on markets arises once a farmer surplus exists but cannot get out of the countryside. Of course, there is a bit of a chicken and egg problem because it would be ridiculous for farmers to produce a surplus if they cannot sell it. So in that sense a market must exist before production starts. But there must be a 'potential surplus' for market imperfections to be an obstacle to agricultural growth.

This potential surplus may have various origins. One possibility, associated with Myint's vent-for-surplus theory, is that a potential surplus exists but cannot exit because infrastructures do not exist. The construction of roads and railway lines by colonial authorities and, more recently, by many development projects is often implicitly based on this idea: African farmers have lots of things to sell, all we need to do is build a road to let it out.

As research has shown, not all African farmers have crops to sell [Matlon 1977, Strauss 1985, Barett and Dorosh 1996]. Of course, once a road is built some surplus will be produced and offered on the market. But quantities are often low and dispersed. This explains why many rural roads do not pay for themselves – or at least do not generate enough revenue and lobbying by local populations to ensure proper maintenance. Put differently, volume is not there. To get volume, agricultural technology is required.

There are occasional exceptions to this observation, namely when the construction of a road (or other link) enables farmers to specialise in something new and valuable. This was the case, for instance, with palm and peanut in the middle of the 19th century in West

Africa: opening European markets to African oil products through maritime transport triggered massive investment in these new crops – without much technological support apart from seed distribution [Hopkins 1973]. These experiences were renewed later during the colonial period with cocoa, tea, coffee, etc: land was found that was suitable for these crops, and roads and colonial markets made it possible to grow them in Africa. Seeds were brought in and after an initial testing period plantations or smallholder farms were established. This was comparative advantage at work with a relatively small investment in technology.

There have been a few similar experiences since independence but on a much reduced basis. Off-season vegetables are a good example – again the focus was on seed distribution and market links. The recent development of pineapple exports from Ghana is another one. Vegetable production in Niger and Burkina Faso for coastal cities and livestock exports from Somalia and Ethiopia are other examples.

Although remarkable, none of these recent examples generated foreign exchange revenues of a magnitude comparable to the introduction of cocoa, coffee, and the like during the colonial era. This is because opportunities for trade based on static comparative advantage have essentially been all discovered. Sometimes a new one emerges because of market changes outside of Africa (e.g., increase in demand for fruits and vegetables combined with increasing production costs in Europe; oil boom and increased demand for livestock products in the Gulf states). But these opportunities are few and far between. Besides, more often than not, changes elsewhere work against Sub-Saharan Africa. This is true for instance of the replacement of peanut and palm oil by soya and colza production within Europe and the US, or of the replacement of pyrethrum as a natural pesticide by chemically engineered ones. Africa cannot just sit and wait for new market opportunities to arise. It must take its future into its own hands. This means agricultural technology.

Having established that building roads and opening markets cannot by themselves generate the kind of agricultural growth Africa needs, we now discuss how markets failures can hinder technology-based growth. We begin by noting that, for markets to exist, roads and bridges must be present and fuel must be available. This is obvious, but there have been plenty of cases in Africa where these conditions were not satisfied.

Infrastructure is but a piece of the puzzle. Research on agricultural markets in Sub-Saharan Africa has taught us that unorganised markets need not be efficient. Economic agents are very good at identifying arbitrage opportunities. Spatial price differentials are likely to be spotted and traders converge onto surplus areas to buy and deficit areas to sell. In this sense, markets emerge without external intervention other than providing roads, a currency, and rule of law.

Spontaneous agricultural markets have been described numerous times in Africa [Meillassoux 1971, Fafchamps and Minten 1999]. They all share similar features best described in the work of Geertz, Geertz, and Rosen (1979) for the Moroccan market of Sefrou in the late 1950's: networks of traders based on personal relationships. Trade is

typically conducted on a cash-and-carry basis. Short-term supplier credit is occasionally observed but only between traders who know each other well. Quality inspection is conducted at each transaction. Trading enterprises are small. Interaction with formal institutions such as banks or courts is minimal.

There is nothing intrinsically wrong with this kind of market set-up. After all, it currently feeds millions of African every year. It is nevertheless doubtful that it is sufficient for a rapidly growing agriculture. This is best illustrated with two examples.

Our first example is grading. The price of agricultural products on international markets depends on quality.[10] To identify quality, grading systems have been put in place. The advantage of grading is that it eliminates the need for visual inspection by the buyer at the time of purchase. If an exporter buys a thousand tons of grade A coffee, for instance, he knows the international price of grade A coffee and can calculate his margin. Of course, subsequent inspection may be required to ensure that the coffee delivered is of the promised quality. But grading makes it possible to conduct trade by telephone, fax, or email. Without grading, the buyer must inspect first to assess quality, and this means a lot of unnecessary travel [Fafchamps and Gabre-Madhin 2001].

The existence of grades in turn makes possible the organisation of commodity exchange. In a modern commodity exchange, trade in agricultural products is dissociated from the physical transfer of possession. This means, for instance, that coffee assembled and properly graded in Jimma (Ethiopia) can be shipped directly to Calais.

The existence of a commodity exchange in turn generates other benefits. Prices for different grades become publicly observable. Dissemination of price information, e.g., on the radio, is greatly facilitated: price information is less costly to collect; it is available instantaneously; and it is clear for which quality a price is quoted. A commodity exchange also forms a firm basis on which to develop trade in futures, that is, contracts for future delivery of agricultural products. As is well known, futures markets are a powerful form of insurance as they enable farmers and processors to hedge against future price movements. The existence of futures markets can in turn be used to create other types of insurance contracts, such as derivatives. They also may facilitate agricultural credit markets if lenders can take the crop as collateral and sell it forward to reduce their exposure. In this case, a futures market serves a role of reinsurance.

The technology of commodity exchanges is now well known and can, so to speak, be purchased ‘off the shelf’. This is, for instance, what many Chinese cities are currently doing: creating modern commodity exchanges overnight. The major prerequisite is the existence of a local grading system.

Our second example is input delivery. In many Sub-Saharan African countries, market liberalisation has dramatically reduced input delivery. This is largely a result of contract enforcement problems. Because they are poor and cannot shoulder much risk, African

[10] Quality control is also a major concern of farmers regarding the purchase of inputs such as seeds, fertiliser, and pesticide.

farmers are reluctant to pay cash for agricultural inputs. They prefer the delivery of agricultural inputs to be organised with two key features: no (or little) cash payment up front, and repayment at harvest conditional on output [Fafchamps 1999]. Three commonly observed input delivery systems to poor farmers share these features: sharecropping, marketing boards, and contract farming.

The first illustration is that of sharecropping. In many sharecropping contracts it is common for the landlord to provide cash inputs and to take part of the output as compensation [Braverman and Stiglitz 1986, Shaban 1987]. This does not eliminate risk for the producer, but it provides credit: the inputs are given at the beginning of the cropping season, and they are repaid at harvest. Furthermore, sharecropping eliminates bankruptcy risk: if the crop fails, nothing is paid.

The second illustration is taken from the input delivery practices of agricultural marketing boards during and after the colonial period. It is (was?) common practice for agricultural marketing board to provide farmers with inputs at the beginning of the season and to recoup the cost of these inputs at harvest time. Input credit is recovered in such a way that farmers are responsible for input costs only up to the value of crop output. This is accomplished in various ways but the end result is the same: in case of crop failure, producers pay nothing.[11] For this system to work, a monopsony on the crop is essential so that farmers cannot abscond by selling to someone else.

The third example comes from contract farming. In many ways, contract farming works in the same way as agricultural marketing boards: a grower on contract is supplied with seeds and inputs and is guaranteed to sell all or part of its output, at which time inputs are repaid. The crop itself serves as collateral for the inputs and the contractor often has the right to harvest the crop to recoup the cost of the inputs. Although in theory contractors could seek to recover all input costs on growers' assets in case of crop failure, they hesitate to do so not to antagonise their growers [Jaffee and Morton 1995, Conning 2001]. So, de facto, growers pay nothing in case of crop failure.

These three input delivery schemes have two features in common: payment at harvest, and no payment in case of crop failure. Other details of input repayment vary: in sharecropping, costs are paid as a share of harvest; with marketing boards, costs are deducted from the output price or paid jointly by villagers; in contract farming, costs are deducted from the value of the harvested crop. The existence of this variation indicates that these contractual details matter less than the two principles listed above.

These two examples – grading and input delivery – illustrate two fundamental principles: (1) there often exist private sector solutions to institutional problems; (2) unaided, the private sector often fails to implement these solutions. This is true for grading. Private corporations can in theory introduce grading in their dealings with African traders. But this does not always happen because of externalities and co-ordination failure – the effort undertaken by one corporate buyer benefits all. This is true also for commodity

[11] Sometimes input costs are deducted from a pan-territorial output price, sometimes villagers as a group are held collectively responsible for the payment of inputs used in their village.

exchanges. Public intervention is nearly always required to convince traders and brokers to come together and set up an exchange. In fact, private efforts to organise an exchange might be combated by authorities as a form of collusion. This is also true for input delivery: efforts to introduce contract farming in Africa as a substitute for marketing boards has met with limited success largely because courts and political authorities fail to enforce contracts they see as 'exploitative of farmers' [Otieno 1996].

6.4 Priorities for action

The priority is to rehabilitate the research apparatus to bring it to the level of East Asia and Latin America. This is particularly urgent for export crops. It is absurd that Latin America produces 80% of the world's coffee when Africa has the best land for arabica production. Africa cannot compete if its farmers are not supported by up-to-date research network. This probably requires brokering a deal between private biotech corporations and national research stations. For such a deal to be cost effective, it must involve several countries and include an international interface organisation ensuring the circulation of information. Donor countries and international agencies have a major role to play in brokering such a deal.

Research priorities should focus on high-potential crops and areas first. The intensification of agriculture is the key objective. With proper support, the African population can easily be fed with a small share of its enormous arable land resources. There is no need to increase agricultural productivity everywhere. In all likelihood, spending scarce resources breeding high-yielding millet is a waste of time when it is probable that, in the long run, millet-producing areas will be primarily devoted to livestock. Livestock should be included in any long-term technology strategy for Africa.

Research should be smallholder friendly. This means devising technology packages that are divisible. A green revolution technology based on a seed-fertiliser combination typically satisfies these requirements. To be fully effective, it must be complemented by appropriate water control technique. Small tractors with weeding and tied-ridging implements should be investigated anew.

African agricultural markets must be upgraded. The two priorities are input delivery and grading/quality control. In both cases, this means working in collaboration with private traders and international corporations. Institutions for the enforcement of contracts should be improved. This means improving courts but also favouring the sharing of market information among traders.

Africa's growth opportunities in agriculture are curtailed by the heavy subsidisation of agriculture in OECD countries. This is an area that governments and donors need to address. Aid agencies should be directing more resources at lobbying for decreased OECD agricultural subsidies and for a more level playing field in international agricultural markets.

7. Mining and tourism

7.1 Mining: Overcoming "the minerals curse"

Mining has considerable potential to assist growth in Africa. Africa is as well endowed as other continents with mineral resources (including oil), if not more so. The full extent of reserves, however, cannot be known, since knowledge of physical reserves depends on the intensity of exploration, and the extent of commercial reserves varies with minerals prices. In fact, expenditure on exploration in Africa has tended to lag behind such expenditures in other continents, where companies perceive the environment for mining to be more welcoming. So known reserves may well be underestimates of potential.

Exploitable reserves have, however, been discovered in countries that were not traditionally large minerals exporters, such as Benin, Niger, Sudan and Ethiopia, so that a more aggressive exploration strategy would probably widen the circle of countries for which mining is a potential source of growth.

African mining is marked by the growing percentage of high value minerals in production and exports. Diamonds, gold, gemstones and rare earths are growing in importance relative to low value metals like copper. This is a mixed blessing. It both reduces the ancillary infrastructure costs, speeding up the process of exploitation, but it at the same time makes the trade vulnerable to growing illegality and abuse.

The recovery of metals and minerals in Africa is characterised by reliance on large investments of foreign capital. There is relatively little indigenous small-scale mining in Africa, compared with Bolivia or Thailand. Employment for Africans in large-scale mining projects was originally as wage labour only, but now extends to the technical and managerial cadres. New capital, however, still comes from large foreign enterprises or investment banks.

This fact complicates a strategy of accelerating economic growth by promoting mining investment. International mining investment tends to follow its own boom-and-bust cycle, with an abnormal price rise provoking fears of scarcity followed by substantial new investment induced by the higher price. This in turn leads to prolonged excess capacity and a price decline below the original level. Like other primary products, metals and minerals tend to suffer both price volatility and secular price decline, unless some countervailing action is taken. In the case of diamonds, countervailing action has been taken privately through a central selling organisation.

When excess capacity prevails in an industry, facilities have to be closed down or mothballed, and the mines affected should be those with the highest unit costs at the margin. However, although African capacity is often vulnerable on a labour cost/productivity criterion, in the past uncompetitive capacity has often been kept in production. This has contributed to a longer-term decline, as in the case of the Zambian copper industry.

Foreign ownership of mining assets often has provoked inappropriate policy responses from African governments, such as Zambia's nationalisation of the copper mines. Though the lessons of that mistake have been learned, the potential for government-investor conflict remains, given widespread government ownership of mineral resources (though not in West Africa) and government responsibility for the preservation of the environment. These factors make it hard to exclude political antagonism and allow normal commercial negotiation of contracts to prevail. There is thus scope to explore the possibility of governments creating new 'agencies of restraint' to limit in advance their own negotiating discretion, perhaps with the help of international organisations like the W.T.O. [see Mash, 2000].

The rents that accrue to governments from the minerals agreements that they negotiate are double-edged in their effects. One the one hand, they generate a stable, and relatively large revenue stream from which to finance government expenditures in sectors favourable to growth (e.g. physical infrastructure, human resources development). Sierra Leone, Guinea, Botswana and the Congo Democratic Republic all rely very heavily on mining to provide their tax revenue. On the other hand, government spending of rents bids up demand in the non-traded sector of the economy and, when resources are fully employed, undermine the export competitiveness of other economic sectors through relative price effects. They can also, through a form of moral hazard, induce laxity in government efforts to raise revenue through ordinary forms of taxation, and thus lower concern about the security and welfare of their citizens.

If royalties vary with the export price, there is also scope for the government to cause macroeconomic instability by using temporary price rises to make permanent increases in its expenditures, and then borrowing to maintain the increases once the price falls. When borrowing reaches an unsustainable level, a debt crisis occurs and requires structural adjustment. This suggests that, even for an uncorrupted government, a large mineral export sector makes considerable demands on economic management skills.

This is not the full extent of the potential "minerals curse". Because the payment of mineral royalties is a non-transparent act that involves a small number of people, it can spawn corruption. Government elites can siphon off rents into private bank accounts abroad. When this happens, their opponents begin to see the physical capture of the mining facility as their only way of sharing in its benefits. Natural resources piracy then becomes the aim of internal conflicts, often misleadingly called civil wars, in which the secession of a mineral-rich part of the country is the objective of warlords and rebel groups. [Collier and Hoeffler, 1998]. An example is the role that diamonds played in the recent conflict in Sierra Leone.

Nevertheless, in spite of all these potential pitfalls, minerals rents can provide the basis for both growth and a more equitable distribution of income, as the example of Indonesia before the Asian crisis indicates. The poor hardly benefit directly, but they can benefit indirectly. For this to happen rents have to be re-invested (and not consumed abroad) and they have to be re-invested productively [Auty, 1990]. Nigeria's windfall oil wealth, by contrast, was invested in a way that failed to generate significant and sustainable

growth – too much was invested at once, too much was invested domestically and insufficient care was taken to ensure the efficiency of investments [Bevan, Collier and Gunning, 1999]. A minerals-led growth strategy could not succeed without economically sound investment planning.

The Nigerian case has a striking counter-example in Africa. Botswana is the fastest growing economy in Africa (and arguably in the world), and – more remarkably - its sustainable growth has been built on the mining and export of diamonds. This success has been built on two main foundations. The skill of Botswana politicians and civil servants in macroeconomic management is relatively well known and its sources have been relatively well researched [Healey, 1995]. Less familiar is Botswana's participation in a number of supportive international economic institutions. For example, the central selling organisation for diamonds operated as the private equivalent of an international commodity stabilisation scheme. The World Bank has recently suggested that developing countries should operate on commodity futures markets. Further research on how new international arrangements can be designed to protect countries from the worst ravages of the "minerals curse" would be desirable.

7.2 Tourism

Tourism also has considerable potential to assist economic growth. Africa's natural resources include many virtually empty coastlands, rangelands and mountains of outstanding beauty, which could in principle become attractive centres of tourism. Since independence, the number of tourist arrivals in Africa has increased rapidly. Tourism is now greater in Africa than in South Asia or the Middle East. But in comparison with European, American and Pacific destinations, Africa is still well short of their levels of absorption [Harrison, 1995].

The economic consequences of tourism are much less easy to establish than the economic consequences of mining. The industry sells a package of different kinds of services, and the national accounts do not distinguish between sales to visitors and to non-visitors. Second, tourist revenues accrue partly in the country of destination and partly abroad, and it is hard to trace how much of the latter finds its way back into the country. Third, there may be multiplier effects on other domestic incomes that would be lost in the absence of tourism. Fourth, there are ill-defined environmental and cultural effects often said to be hidden costs of the industry. Research to establish a sound methodology for calculating the costs and benefits of tourism in Africa would be a rewarding endeavour.

Lack of good economic studies of the impact of tourism indicates the existence of another problem. It is unlikely that the industry is being taxed optimally. Whereas the tax technology for mining is now pretty well developed, that for tourism is not. Relatively wealthy foreign visitors are a suitable object for taxation, but the principles on which it should be done to avoid perverse incentives and other inefficiencies need to be clarified.

The supply of services to tourists is a far from insuperable problem, even in Africa. The task of developing a tourist industry does not require a country to have or to set up a

national airline, although countries (like South Africa, Kenya, Ethiopia, and Zimbabwe) that are able profitably to operate air transport to international standards, will be able to gain additional benefits from tourism. The main point is that the policy applied to airport access for charter operators should be a liberal one.

Because the capital required to set up a hotel complex is not so large that it necessarily requires foreign or state investment, opportunities exist for local private enterprise. Labour requirements do not pose severe problems, although training is certainly needed for supervisory and managerial grades. In fact, investment in hotel accommodation has tended to run well ahead of demand.

The supply of leisure facilities has presented more of a problem. African game reserves and beach resorts are as good as any, but there has been widespread neglect of historic buildings and cultural sites. There is also scope for tourist excursions to be multiplied. In the past, the lack of investment in these leisure facilities has frequently been at odds with the aspiration to occupy the upper end of the tourist market.

Many African countries still have virtually no tourist industry. The Central African Republic, for example, receives only a few thousand visitors each year, and its current plan to restore the former palace of Emperor Bokassa as a tourist attraction seems unlikely to change matters. Swaziland has developed its tourism, but the industry remains highly monopolised, by corporations owned by the royal family. The prime example of the development of a successful tourist industry in the last two decades is Mauritius. Tourism earnings were negligible before 1980, but by the mid-1990s had reached US $ 400 million a year [Dabee, 2001]. In this growth, Mauritius was undoubtedly aided by the fact that it is an island off the African mainland, and thus distanced – actually and psychologically - from the general negative image of Africa.

It is clear that the demand for tourism is vulnerable to negative images. This was seen in the 20 per cent drop in tourist arrivals in China in the year after the Tianamen Square massacre. It is equally evident from the fact that two of the countries that had historically made the most progress in the development of tourism (Kenya and Zimbabwe) are now rapidly feeling the ill effects on their tourist facilities of escalating internal conflicts. Neighbouring countries are likely to pick up the slack (e.g., Tanzania, Uganda, Botswana, Namibia), provided that they do not fall victim to similar conflicts. The overall lesson, however, is the need to find ways to assist Africa either to shed its negative image, or to create “safe havens” where tourism can continue regardless of events in the remainder of the country – the Jamaican solution to the negative image problem.

When extraneous negative influences are absent, European and North American tourists can be persuaded to visit apparently unlikely places in large numbers, as the experience of Dubai confirms. So the long run prospects for the growth of external demand for Africa as a tourist destination are good. But in any case, South African demand for and supply of tourism is the likely spearhead for the next wave of growth of the tourist sector in Africa. South African tourists are more likely both to seek African destinations and to invest in facilities elsewhere in the continent.

Compared with mining, the development of tourism has some obvious advantages in the context of African economic growth. It is more open to local capital. It is more labour-intensive and therefore more directly poverty alleviating. It is likely to have greater backward linkages to infrastructure and human resource development [Kweka, Morissey, and Blake 2001]. It does not create such severe difficulties of macroeconomic management. On the other hand, precisely because it is more integrated with the rest of the economy, it does sometimes cause social and cultural difficulties. However, such problems can be overstressed, and they should not be allowed to obstruct the vigorous further development of tourism in Africa.

8. An Agenda for research

Defining a general strategy is not the whole story. The challenge remains how to operationalize this strategy. We identify five areas in which research could pay off handsomely.

Research 1: Regional integration and geography: what, where, when

We have argued that a growth strategy is most likely to succeed if it focuses on high potential areas (cities for manufacturing, regions with good soils and sufficient humidity for agriculture, etc). Economic potential is largely shaped by geographical location and infrastructure investments (ports, roads, rail). This implies that a successful growth strategy for Africa must take geography and infrastructure into account.

With over 50 countries for only 600 million people, Africa is highly segmented. As pointed out earlier, not all 50 countries can grow at the same time using the same growth engines. Specialisation is essential and inevitable. A growth strategy for Africa must consequently be thought as a regional strategy, taking into account geographical proximity as well as regional integration forces and institutions. There is also an issue of proper sequencing of supportive institutions and infrastructures: there is no point building a motorway years before activity picks up. White elephants often are the result of improper spatial and temporal positioning -- i.e., at the wrong place at the wrong time.

A growth strategy for Africa can only succeed if these elements are taken into account in a rigorous and objective manner and if they are refined via a dedicated research project. It is particularly important to investigate the complementarity between industrial and rural development strategies, as well as other macro issues. More work is needed on regional integration and the interface between cities and the countryside in a development context.

Research is also needed on African internal migrations. Industrialization will require massive movements of population from the countryside to urban centres located on the coast or in industrial basins. These migratory flows have already begun, e.g., towards South African cities or coastal cities of West Africa. History has shown, however, that immigration is no less politically sensitive in Africa than elsewhere (e.g., recent events in Cote d'Ivoire; expulsion of foreigners in Ghana, Nigeria, Gabon, Uganda, etc).

Resistance to internal migrations might hinder industrialization because, as a result of geography, some of the most densely populated areas of Africa (e.g., the volcanic soils of Rwanda and Burundi) offer the least potential for early industrialization. Research is needed to identify factors and policies that would lift obstacles to movements of population.

Research 2: Manufacturing and competitiveness

We have argued that manufacturing may play a central role in the future growth of Africa. The question is: how can African manufacturers become sufficiently competitive to penetrate international markets. Research is needed regarding the most important constraints facing African firms and the type of supportive environment that is needed to promote African manufacturing exports.

It has already been argued that understanding manufacturing success requires an understanding of the factors that make for firm success. In the last decade there have been important advances in our understanding of firm behaviour in SSA. We know that the characteristics of its exporting firms are in many respects surprisingly similar to those found in other regions. In particular most large African firms (by which is meant those employing more than 100 employees) export. This is entirely consistent with very few firms exporting as very few are large. Further those firms that do export do not specialise in exporting and there is little evidence to suggest that those that do export grow faster than non-exported.

Exporting also tends for the most part to follow a regional rather than international pattern. Why export success, even for those firms in the export market, has been so limited is not well understood. Our view is that understanding the limitations on longer run export success requires two new sorts of data. The first is longer runs of the panel that have already been constructed. Investigating how exporting affects long run firm performance and whether it allows firms to grow faster, and if not why not, are all questions that cannot even be posed without relatively long runs of data. These are becoming available but their extension is a key factor in enabling a new range of questions to be addressed.

The second sort of data that is required is that which enables a comparison between successful rapidly growing export sectors and those that have not been successful. It is not possible to understand success by only studying failure and the comparative data sets that have been constructed so far are dominated by failure. Extending this work will enable issue of the sources of firm competitiveness to be addressed in a way that is at the moment simply impossible.

Research 3: Agriculture and markets

Agriculture is to be the main engine of growth for most African countries for years to come. The question is, how can agricultural productivity be improved and how can agricultural exports be promoted? One constraint that has been identified by many

observers is the low productivity of agriculture. Interpretations for this state of affairs vary. But they all emphasise that, unlike other parts of the world, African agriculture has by and large failed to benefit from scientific advances in agronomic practices and agro-business technology. Fields are planted to land races; local breeds dominate in livestock production; intensive agriculture is practised only in few areas. This is in part because varieties and breeds developed for other ecosystems do not transfer easily to the African tropical conditions, with poor soils, high incidence of parasitic infestation, and high leaching. The experience of maize in East and Southern Africa nevertheless demonstrates that these obstacles can be overcome. To this effect, research is needed on the policies needed to incite private corporations to invest in developing and distributing seeds and other technologies suitable for African farmers. This is arguably the most important challenge for agricultural technology in Africa.

A second important constraint is the form that rural markets take: how are agricultural output marketed and by whom; who controls and guarantees quality; are agricultural products traded in an efficient manner that maximises the returns to farmers while keeping consumer/export prices low; who, if anyone, supplies credit to small African farmers; are rural factor markets efficient and dynamic; have institutional solutions been found to the demise of state marketing boards for the distribution and sale of seeds and fertiliser? These issues deserve investigation.

Research 4: Mining and tourism: what works and what does not

Africa has historically been very successful in exporting mining products. It remains the primary source for several of the world's mineral resources (diamonds, bauxite, phosphates, etc) and plays an important role in many other minerals (oil, gold, copper). Large coal and iron deposits essentially remain untouched. The continent also offers a prime site for the development of sun-based electricity generation. Yet little recent research has been devoted to mining as a potential engine of growth. Work is urgently needed to update our knowledge in this area with a view of advising policy makers.

Africa has a lot to offer in terms of sites of immense beauty and exoticism. Its wildlife is unsurpassed. Its mountains may not be many but they are magnificent. Unfortunately, exoticism often rhymes with lack of comfort and infrastructure, poor health facilities, and an unsafe environment for unsuspecting tourists. A small number of African countries have managed to develop tourism to the point that it becomes a major export industry/foreign exchange earner. Although important in practice, tourism has attracted relatively little attention from the research community. As a result, to date little is known on the conditions required for tourism to be successful in Africa and on the repercussions on poverty alleviation. Research is urgently needed in these two areas -- mining and tourism.

Research 5: The micro-foundations of growth and poverty

Whatever the form growth takes, some of the poor will be left by the wayside. These will typically be those with few or no marketable assets (including labour) who are entirely

dependent on informal entitlement programs that get eroded by growth, such as mutual insurance (replaced by bank saving), common pastures and forests (replaced by enclosures), social capital (replaced by formal associations and reliance on the rule of law), etc. Some households may also be caught in a poverty trap that prevents them from accessing the benefits of growth.

Research is needed to identify which groups are most at risk of being left by, and what can be done to assist them. This would be a multifaceted research focusing in part on vulnerable groups and children, in part on the conditions required for growth to encompass those caught in a poverty trap. It would also emphasize entitlement programs, notably in health delivery. From our experience, lessons can be learned regarding the most important constraints facing African rural and urban households and the type of supportive environment that is needed to ensure that the poor partake to the benefits of growth.

Research 6: how to maximize aid effectiveness

Growth promotion in Africa requires a suitable policy environment. Donors have no direct control over policy. Attempts at conditioning aid on domestic policy have met with resistance and limited success. Yet, aid given in the absence of supportive local policies is often ineffective.

Research is needed to identify better ways of ensuring that donor assistance is not wasted because of local policies are either not appropriate or not adequately enforced. Better ways of building partnership between donors and recipient governments are needed. This means, among other things, investigating ways of reinforcing the capacity and integrity of Africa bureaucracies. Ways of linking aid programs across countries to reduce duplication and capture externalities should also be investigated.

Alternative ways of disbursing aid, e.g., through non-governmental organizations, foundations, or local government, should also be studied. Work is also needed on the enforcement of laws and regulations in an environment dominated by the weakness of governments' administrative capacity (e.g., privatisation of customs or courts).

Finally, factors should be identified that favour the emergence of 'enlightened' African governments, that is, of governments that work for the long-term interest of their people, whether they are despotic or democratic. We are not suggesting that donors engineer enlightened despots (this has been tried in the past but has failed). What we have in mind, rather, is ways of making local elites more alert to the potential of their countries.

9. Conclusion

Africa will, in all likelihood, surprise us. It is a place full of potential and energy. One of the last regions of the world to have been colonised and decolonised, it is slowly emerging from a 'growing pains' era. For several decades, local autocrats could blame the West for Africa's shortcomings and convince their population that different rules

applied to the continent. This era is now over. Africans know that they want the same thing as everyone else -- a decent standard of living, civil liberties, protection against disease and violence. They know that, to get it, they must join the global village, they must compete in the marketplace. What is still unclear is how they can fit in. This calls for answers to two intertwined questions: How can Sub-Saharan Africa catch up with the rest of the world? How can the rest of the world help Africa in this process?

This paper provides elements of an answer. First, we argue that a growth strategy is the only one that can sustainably defeat poverty. The only long-term poverty reduction strategy is to favour growth. Corrective policies might be required to protect vulnerable groups against the disruptions engendered by growth. But growth must be harnessed. Without it, Africa will forever remain poor and dependent on foreign assistance. There is simply no alternative to growth.

A corollary of the above is that, if international aid is devoted to short-term poverty alleviation programs, it should not come as a surprise if it has no noticeable effect on growth. Africa's failure to grow over the last two decades may in part reflect that international agencies have largely given up on growth in Africa. Under pressure from national constituencies, they have broadened their agenda to include objectives that are further and further removed from the promotion of growth itself. These objectives are bona fide welfare objectives. Pursuing them in a growing country can correct the worst effects of growth disruptions on vulnerable groups. Pursuing them when a country is not growing is not an entire waste of money – after all, the welfare benefits are still there. But it is not cost effective: promoting growth would serve these welfare objectives better, either directly by eliminating poverty or indirectly by generating funds for social programs.

If growth is to be promoted in Sub-Saharan Africa, what forms should international assistance take? The report discusses a variety of possibilities and speculates on their relevance for various parts of Africa. One strong conviction that runs through the report is the idea that exports are essential for growth in the African continent. This is because growth and exports have been shown to be inextricably linked. The export-based strategies adopted by small countries such as Hong Kong, Singapore, Israel or Taiwan show what can be on offer.

Several types of export strategies have been discussed. Manufacturing exports from the continent to the rest of the world are likely to be part of successful growth in Africa as a whole. This is because manufacturing is capable of creating the rapid transformation required for catching-up with the West. This does not imply, however, that all African countries should seek growth through manufacturing exports. In the immediate term, such strategy is likely to be successful only in a handful of countries. To date, Mauritius is the only country in the region that has followed this path. In the last few years, Mauritius textile and garment manufacturers have begun relocating factories in Madagascar and Mozambique where labour costs are lower. If successful, this process of contagion might drive the first wave of African dragons. Relocation of enterprises from Europe or Asia could trigger a similar process elsewhere in Africa.

For the bulk of African countries, however, manufacturing exports are not yet in the cards. Their best options are elsewhere: agriculture, mining, and tourism. We discuss these three sectors in detail. As far as agriculture is concerned, the main constraint today is technological. In terms of its key export crops, Africa is losing its edge relative to other parts of the world, mainly developed nations for temperate crops (e.g., oilseeds) and South-East Asia and Latin America for tropical crops (e.g., cocoa). In order to preserve market shares, Africa must keep up with other producers. This requires a massive effort in upgrading local technological capabilities.

In terms of mining, long term prospects are excellent. Except for oil and precious metals, little mineral exploration has taken place in Sub-Saharan Africa. What is needed is an upgrading of existing mining facilities and a clarification of the legal environment to encourage exploration.

Tourism offers great potential. Sub-Saharan Africa has much to offer in this respect. Arguably, it is the last place in world where large mammals and their natural predators can be found walking freely in the wild. It is also a continent of great natural beauty with a diverse and little known landscape. Finally, it is relatively close to Europe in terms of air travel time and could become a common destination provided it can provide adequate facilities. The experience of a handful of countries – Kenya, Zimbabwe, South-Africa – suggests that tourists can be lured to Africa in large numbers provided sufficient infrastructures are put in place.

The last 25 years have been disappointing for Sub-Saharan Africa. Many have given up hope – including numerous African governments who too often behave as if there was no tomorrow. Let us not forget, however, that Afro-pessimism is a recent and probably transient phenomenon. Over the last 200 years, Africa has known several periods of intense growth, starting in the mid-19th century, prior to colonization [Hopkins 1973]. The last period of growth lasted from the post-war recovery until the mid-1970's. Africa has also known period of decline, essentially from the early 1930's until the late 1940's. The lesson from history is thus: slumps have happened before, but they do not last forever. Eventually the tide will turn.

In spite of 25 years of stagnation in the continent as a whole, many Sub-Saharan African countries still have GDP per head superior to those in Asia. Despite the absence of growth, Africa continues to modernize and to urbanize. Africa today is not what it was 25 years ago. Africans are better educated and more in sync with the rest of the world than they have ever been. African musician, for instance, have demonstrated that they can adopt all the trappings of modern music making without losing their identity. African producers in other sectors can follow the same route.

It is only a matter of time before Africa starts growing again. When it does, the Asian experience suggests that growth will be rapid and that it will spread progressively from country to country. International agencies can help speed up the clock. They can and they should.

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TABLE 1
DESCRIPTIVE STATISTICS (MEANS): OPENNESS, HUMAN CAPITAL, INCOME AND CAPITAL

	PWT		SW		Years of Education		
	1965	1990	1965	1990	1965	1990	Growth Rate
Africa	72.8	71.9	0.17	0.17	2.1	3.7	11.9
South Asia	43.6	43.1	0.0	0.0	3.0	5.1	10.9
East Asia	72.4	138.4	0.67	1.0	5.3	9.0	11.9
Middle-East	32.9	44.2	0.50	0.0	1.6	4.5	24.2
Industrial	48.3	64.9	0.90	1.0	6.6	8.5	5.1
East Europe	28.9	45.5	0.0	0.5	3.8	5.4	10.1
Australasia	38.7	44.9	0.5	1.0	9.5	10.8	2.2
South East Asia	36.6	68.7	0.5	1.0	4.1	6.3	6.3
Latin America	39.7	55.9	0.36	0.64	3.5	5.5	8.5
All	47.9	64.5	0.56	0.72	4.8	6.8	8.2

INCOME AND CAPITAL

	Income per Worker		Capital per Worker		Rates of Growth (%)	
	1965	1990	1965	1990	Income	Capital
Africa	2,777	3,377	1,861	1,763	2.9	7.3
South Asia	2,565	4,489	2,477	5,441	9.2	16.7
East Asia	4,650	19,086	3,929	18,826	28.8	33.0
Middle-East	9,620	13,636	6,211	15,271	9.6	21.8
Industrial	15,856	27,484	13,601	34,453	13.8	20.3
East Europe	4,543	9,320	2,409	8,076	15.5	24.2
Australasia	22,452	27,863	19,249	35,467	5.3	12.2
South East Asia	2,809	5,769	1,776	4,305	14.6	19.7
Latin America	7,996	9,238	4,979	9,157	6.2	13.7
All	10,361	16,781	8,194	19,554	10.9	17.6

Table notes.

Definitions: The PWT measure of Openness is taken from the PENN World Table (Mark 5.6) data, Summers and Heston (1991). It is the share of exports+imports in nominal GDP. The figures given in the table are percentages.

The SW measure of Openness is that derived by Sachs and Warner (1995). It is a zero-one dummy which takes the value 0 if the economy was closed according to any one of a set of criteria related to tariffs, non-tariff barriers to trade, the treatment of exports, the type of economy and the size of a black market premium. There were some observations for which it was not available. We interpolated the following values: ICELAND open=1 for all years, MALAWI in 1965open=0; MAURITIUS in 1965 open=0; PANAMA open=1 for all years**.** The years of education figures are taken from the Barro and Lee data and are a measure of the average schooling yeas in the population aged over 15. The figures for Income per

worker and Capital per worker are also from the PENN World Tables. Both figures are expressed in 1985 international prices. The capital stock figures is for non-residential capital stock. The growth rates for income and capital given in the table are the means of the differences in the logs of these variables for the five years period used in the regression analysis. The means are thus for five year periods.

REGIONS AND COUNTRIES INCLUDED IN THE SAMPLE

AFRICA

Kenya
Malawi
Mauritius
Sierra Leone
Zambia
Zimbabwe

AUSTRALASIA

Australia
New Zealand

EAST ASIA

Hong Kong
Republic of Korea
Taiwan

INDUSTRIAL

Austria
Belgium
Canada
Denmark
Finland
France
West Germany
Greece
Iceland
Ireland
Israel
Italy
Japan
Netherlands
Norway
Portugal
Spain
Sweden
Swtizerland
U.K.
U.S.A.

LATIN AMERICA

Argentina
Bolivia
Chile
Colombia
Dominican Republic
Ecuador
Guatemala
Honduras
Jamaica
Mexico
Panama
Paraguay
Peru
Venezuela

MIDDLE-EAST

Iran
Syria

MIDDLE-EUROPE

Turkey
Yugoslavia

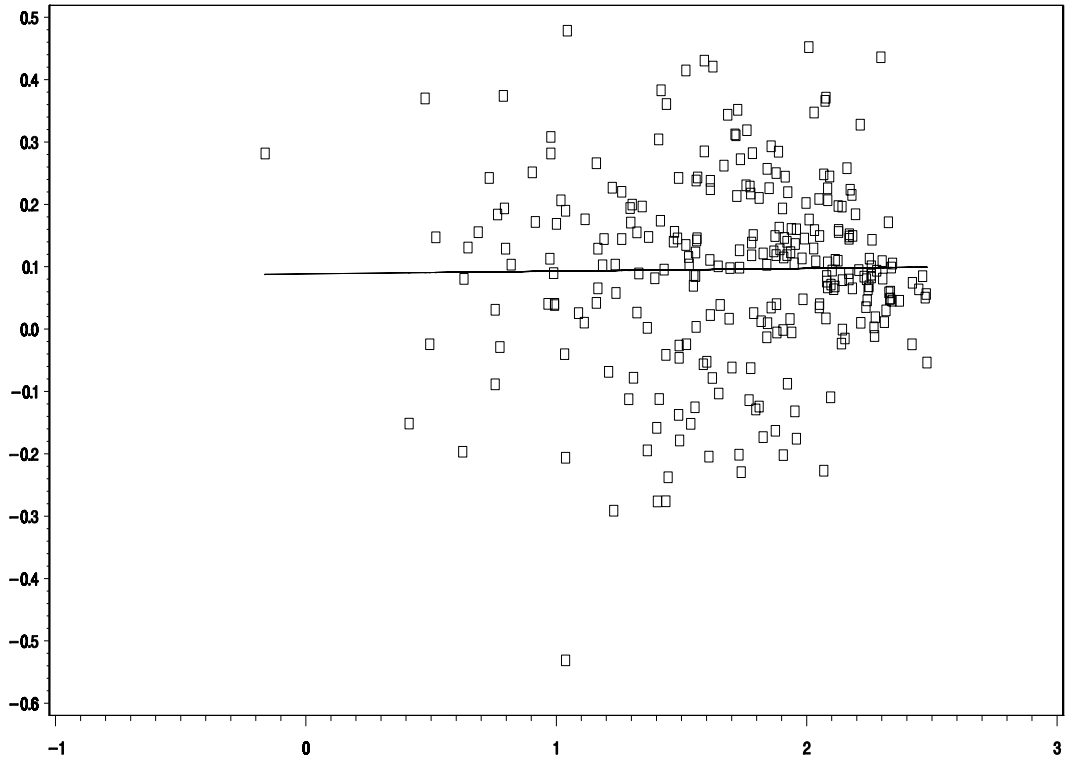
SOUTH ASIA

India
Sri Lanka

SOUTH EAST ASIA

Philippines
Thailand

Figure 1
GROWTH RATE OF INCOME PER WORKER AND THE LEVEL OF HUMAN CAPITAL



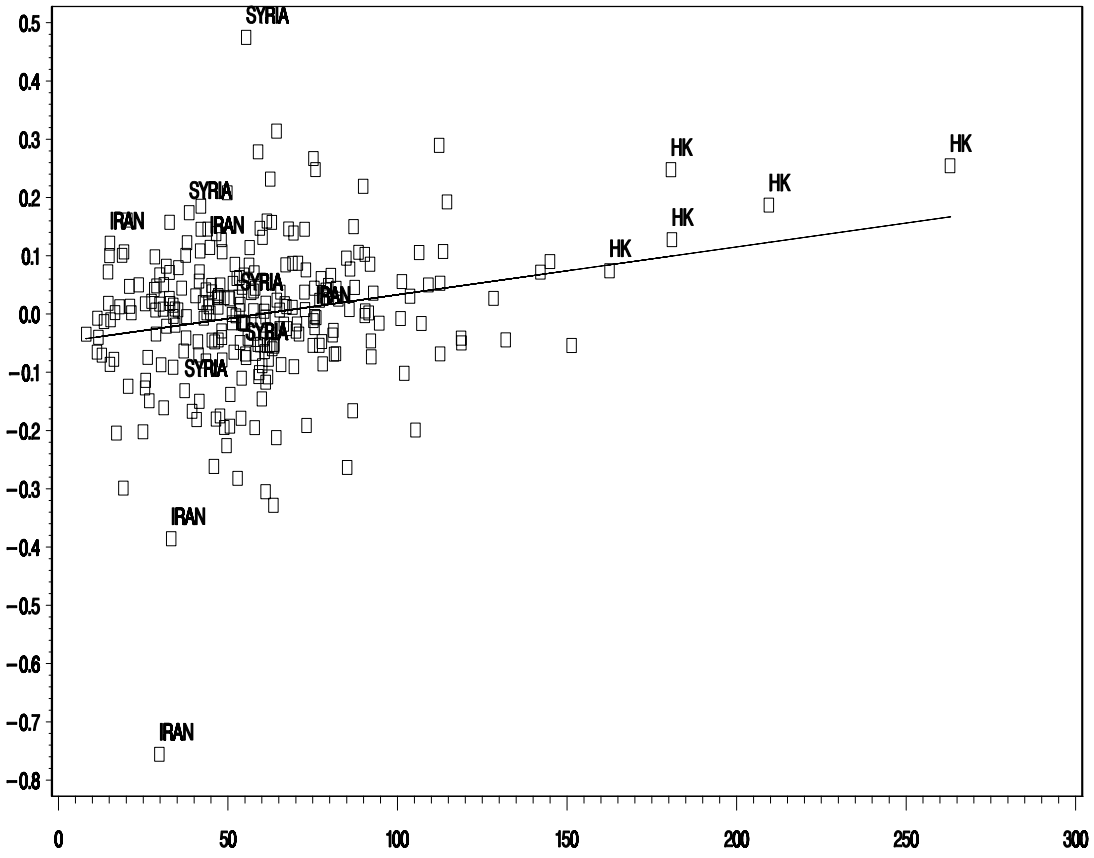
Note: The OLS results are

$$\Delta \ln [\text{ Income per capita}]_{it} = \underset{[2.63]}{0.09} + \underset{[0.23]}{0.004} \ln [\text{ Average years of education }]_{it}$$

where Δ is the difference operator and numbers in [ ] are *t*-statistics. The R-squared from this regression is 0.00.

FIGURE 2

TECHNICAL PROGRESS AND THE PWT MEASURE OF OPENNESS



Note: Technical progress is measured as the residual from the estimated OLS regression

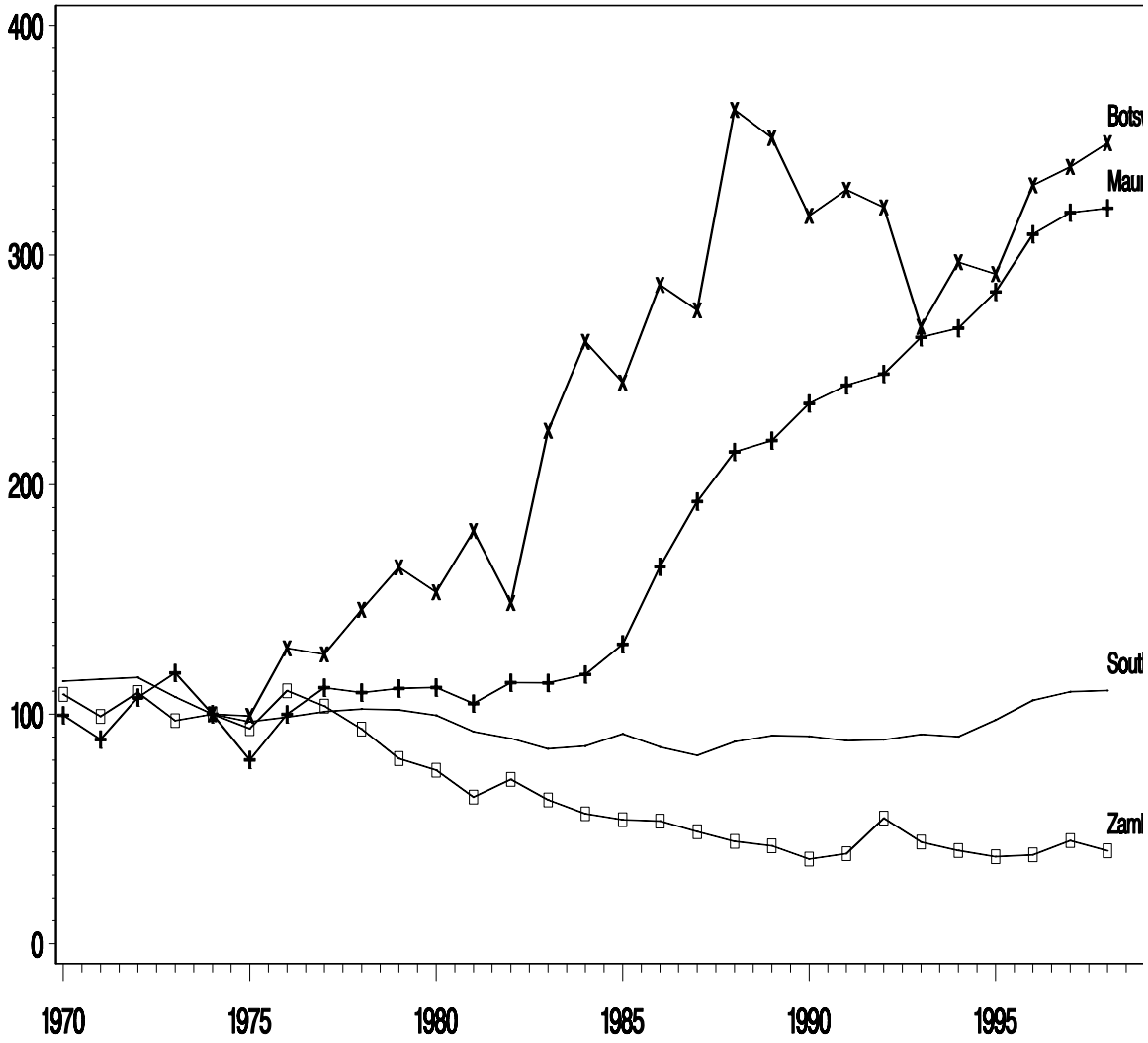
$$\Delta \ln [\text{ Income per capita}]_{it} = \underset{[1.12]}{0.01} + \underset{[11.7]}{0.48}\, \Delta \ln [\text{ Physical capital per capita}]_{it} + \varepsilon_{it}$$

where Δ is the difference operator and numbers in [ ] are *t*-statistics. The adjusted R-squared from this regression is 0.33.

FIGURE 3

INDEX OF EXPORT VOLUMES PER CAPITA (1974 = 100)

BOTSWANA, MAURITIUS, SOUTH AFRICA AND ZAMBIA

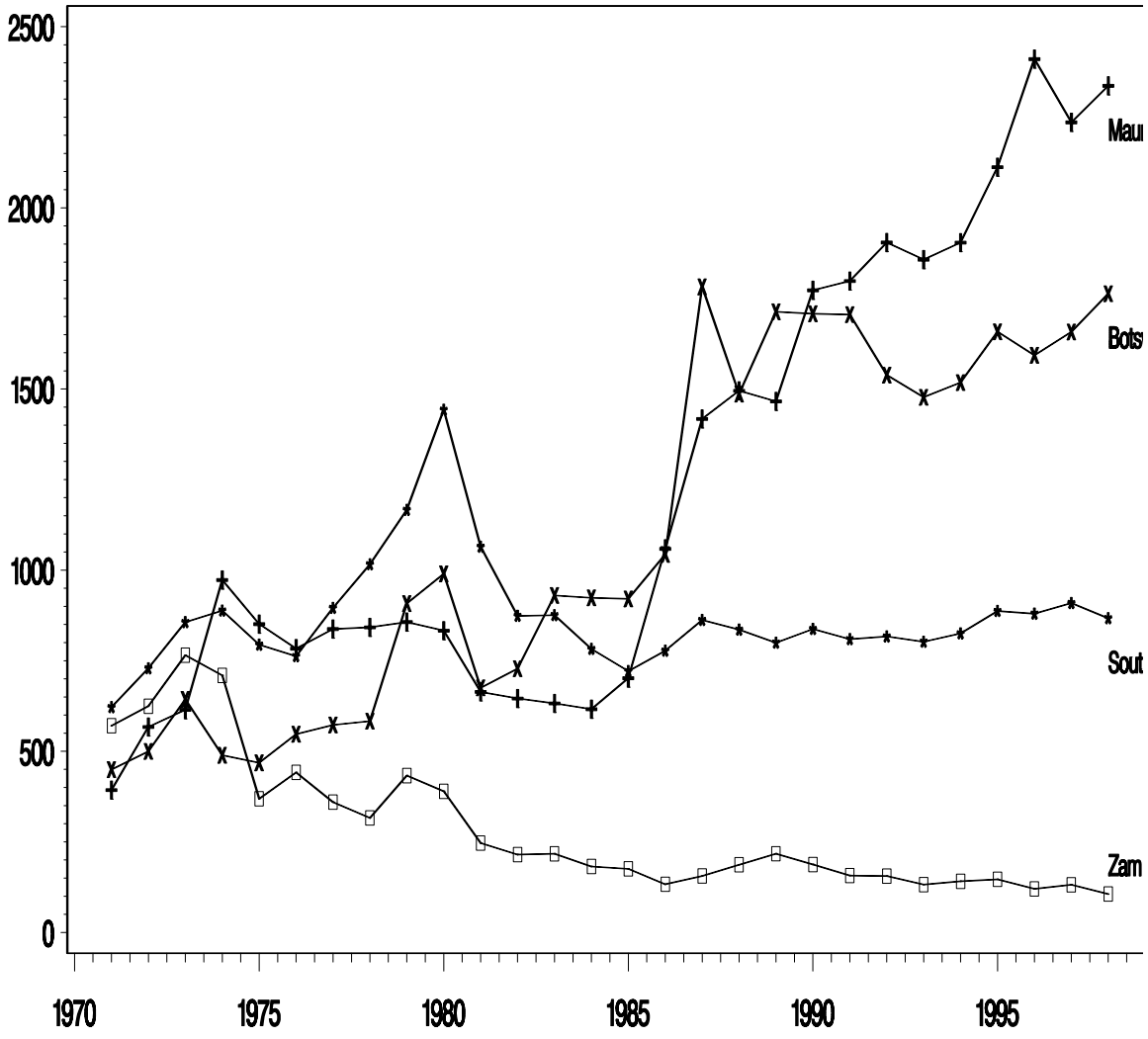


Notes: The export volume figures, for all the countries except South Africa, are obtained from the World Bank Data Base published in World Development Indicators for 1999 with updates on volumes from World Bank Africa 2000 Database. For South Africa the volume index from the South African Reserve Bank Quarterly Bulletin for June 2000 was used for the more recent data as this seemed more reliable than the data published in the World Bank. For all countries the volume number is obtained from the series for total exports of goods and services in constant local prices figures divided by the country's total population. These figures are then converted into index numbers based on 1974=100.

FIGURE 4

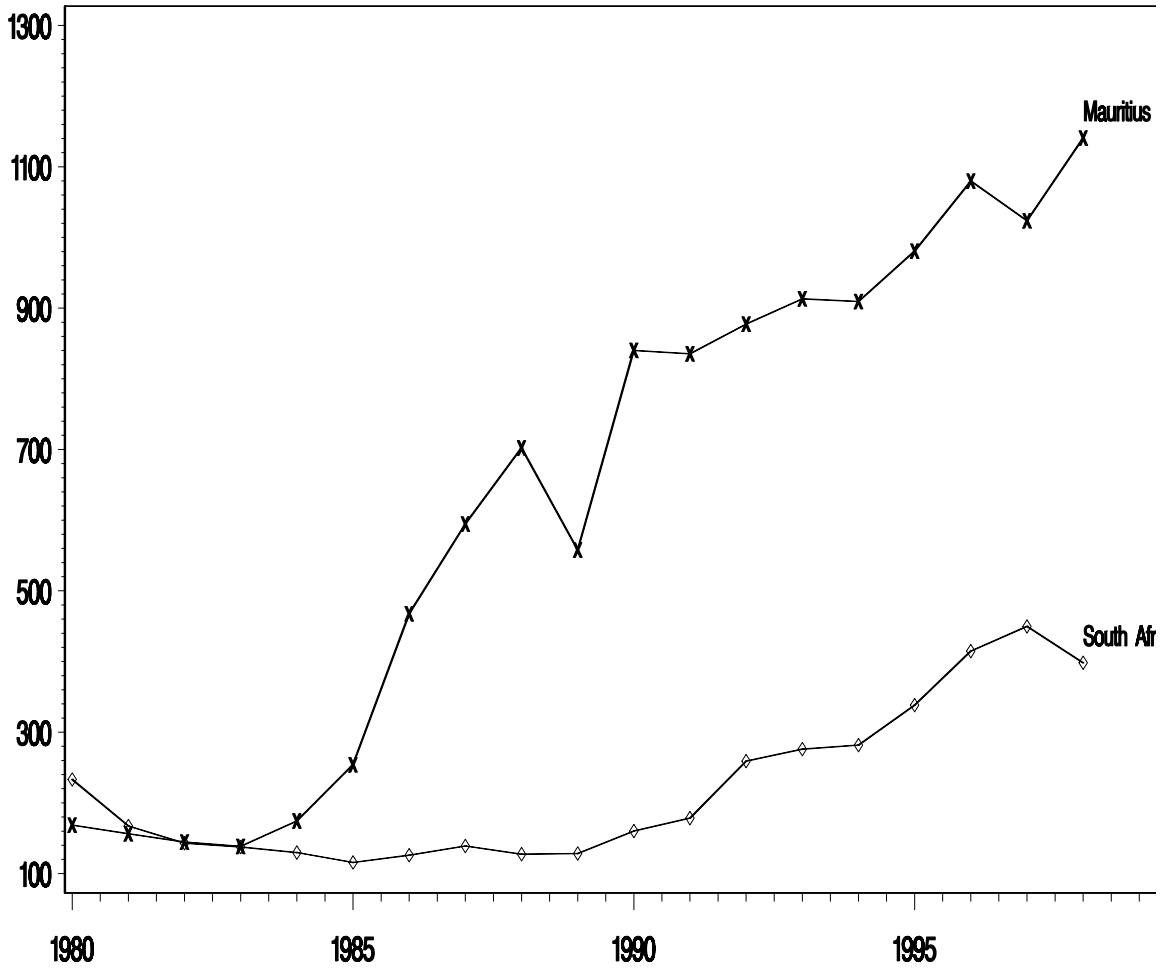
EXPORTS PER CAPITA IN US$ 1995 PRICES

BOTSWANA, MAURITIUS, SOUTH AFRICA AND ZAMBIA



Notes: The figures for exports in US$ for all the countries were obtained from World Bank data published in World Bank Africa 2000 Database. These figures were deflated by the unit price of exports from the US obtained from the IMF Financial Statistics converted to an index number based on 1995=100. The export numbers are divided by the total population to give the per capita numbers shown in the figure. In 1995 prices all four countries exported approximately US$500 per capita in the early 1970s.

Figure 5
EXPORTS PER CAPITA OF MANUFACTURES IN US$ 1995 PRICES
MAURITIUS AND SOUTH AFRICA

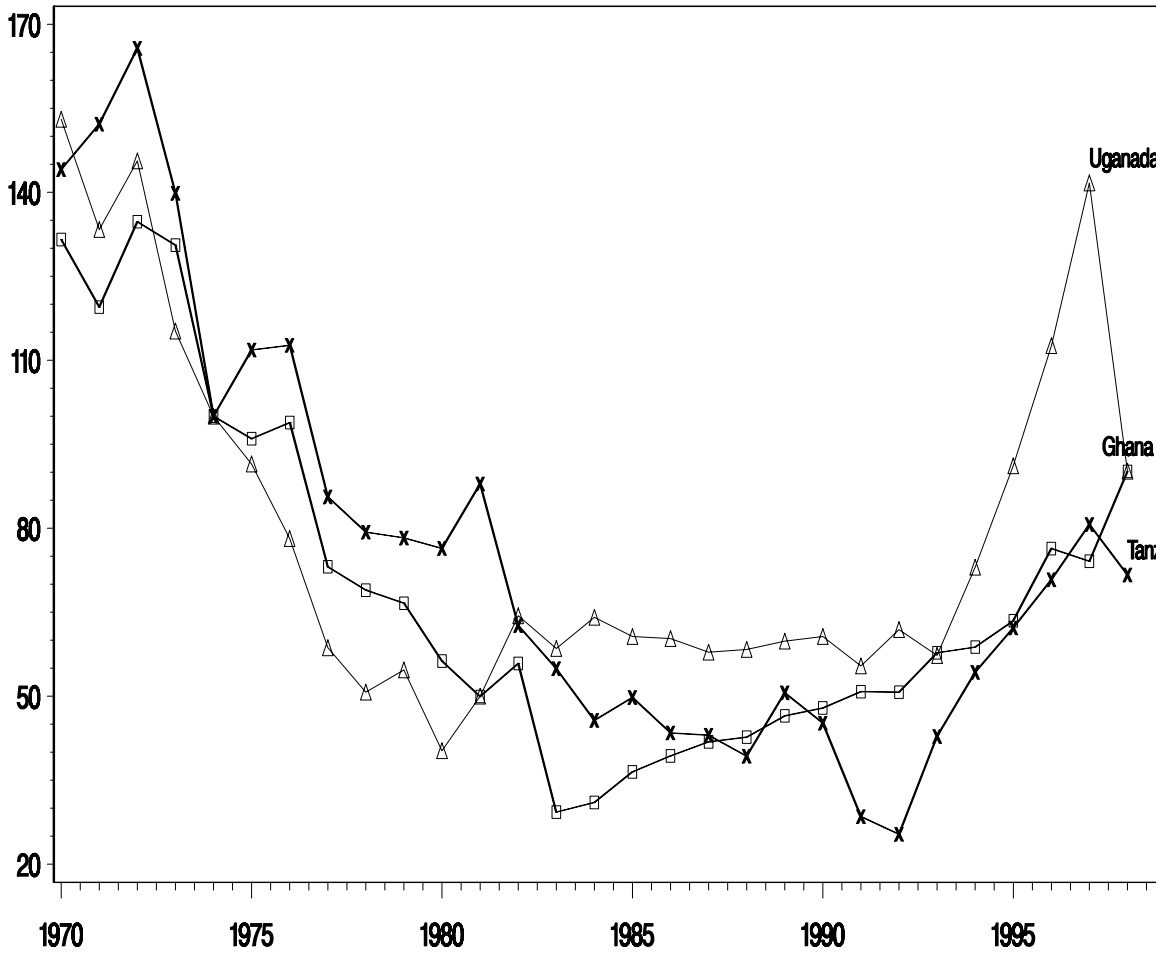


Notes: The data in the figure was obtained from World Bank sources. The World Bank Development Indicators give the percentage of merchandise exports which are manufactures. This percentage is only available for some countries and for some, which includes South Africa, it can differ substantially depending on which version of the World Development Indicators is used. We use the figures from the World Development Indicators for 2000. These show for South Africa that manufactures were 54 per cent of merchandise exports. This figure seems more consistent with the number used by Wood and Mayer (1998, Table a.2, p.85) than World Bank figures given in earlier version of their data.

FIGURE 6

INDEX OF EXPORT VOLUMES (1974 = 100)

GHANA, TANZANIA AND UGANDA

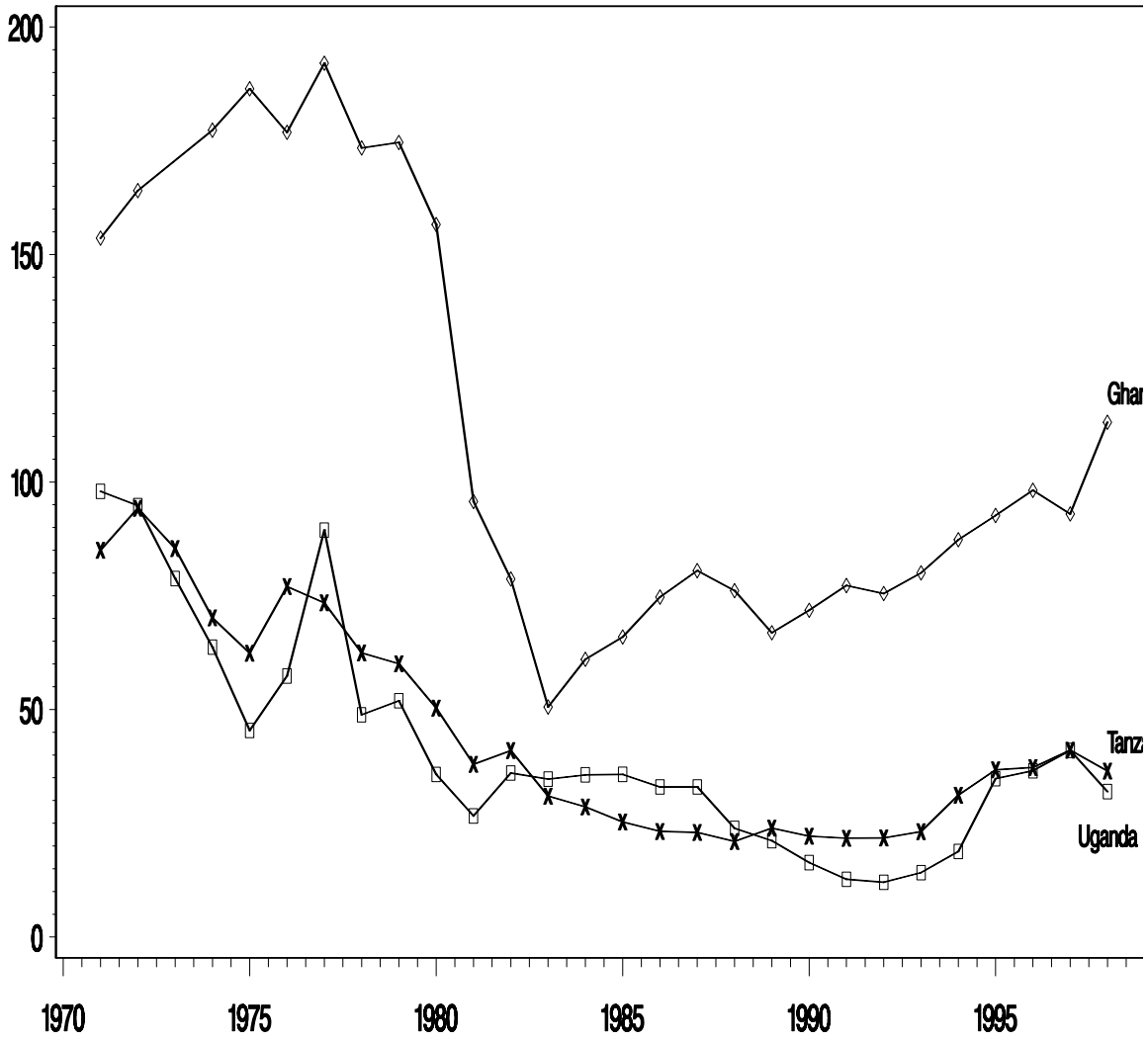


Notes: The data presented in this figure was obtained from the same sources as those given in Figure 2.

FIGURE 7

EXPORTS PER CAPITA IN US$ 1995 PRICES

GHANA, UGANDA AND TANZANIA



Notes: The data presented in this figure was obtained from the same sources as those given in Figure 3.