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Assessing the Impact of One Aspect of Globalization on Economic Growth in Africa

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Abstract

Using panel data, this paper explores the effects of openness to international trade and foreign direct investment (FDI) on economic growth. Fixed-effect and adjusted fixed-effect (regional-effect) estimations yield results consistent with the hypothesis of conditional convergence. FDI has a significant positive impact on economic growth in all specifications. However, openness to trade does not seem to enhance growth in poor countries. The empirical findings fail to substantiate the proposition that greater openness facilitates convergence to higher income levels. On the contrary, there is evidence that greater openness to international trade promotes economic growth primarily in higher-income African countries, implying that threshold effects may be crucial to the effectiveness of openness. Furthermore, the results from the *adjusted* fixed-effect estimation appear to validate the claim of convergence clubs within Africa.

Keywords: Africa, conditional convergence, convergence clubs, economic growth, globalization, openness, trade, panel estimation

JEL classification: C23, F43, O24, O55

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Tables appear at the end of the paper.

UNU World Institute for Development Economics Research (UNU/WIDER) was established by the United Nations University as its first research and training centre and started work in Helsinki, Finland in 1985. The purpose of the Institute is to undertake applied research and policy analysis on structural changes affecting the developing and transitional economies, to provide a forum for the advocacy of policies leading to robust, equitable and environmentally sustainable growth, and to promote capacity strengthening and training in the field of economic and social policy making. Its work is carried out by staff researchers and visiting scholars in Helsinki and through networks of collaborating scholars and institutions around the world.

What we do learn is that growth generally does benefit the poor as much as everyone else, so that the growth-enhancing policies of good rule of law, fiscal discipline, and openness to international trade should be at the center of successful poverty reduction strategies.

David Dollar and Aart Kraay
(*Growth* is *Good for the Poor* 2001)

1   Introduction

Dollar and Kraay's study of the relationship between growth and poverty reduction (2001) emphasizes two important findings. First, it argues that contrary to the proposition that growth exacerbates income inequality, economic growth does benefit the poor (growth is pro poor). Second, the authors claim that openness to international trade benefits the poor as much as it does the non-poor. There have been many interesting debates about these findings and the empirical research on the question of whether growth reduces or worsens income inequality remains inconclusive.[1]

The present paper argues that, even if we were to accept the two major findings in Dollar and Kraay's study at face value, we still need to ponder the question as to whether openness to international trade (and globalization) benefits poor countries unconditionally. In particular, in Africa where economic growth figures are often dismal and cross-country income disparities are large, does increased openness to international trade and foreign capital benefit poor countries as much as it does non-poor countries? The question is extremely pertinent and quite timely. For over a decade, African countries have been increasingly urged (sometimes coerced) to improve openness to international trade by reducing tariff and non-tariff barriers, and instituting an array of other liberalization programmes. Yet, after several years of policy changes and attempts to integrate in world markets, many countries are still showing meagre progress. During the same time span, East Asian economies have produced high growth rates, allegedly as a result of their greater openness to international trade.

While it is widely upheld that increased openness to international trade and foreign capital promotes economic growth, there are plausible arguments to support the proposition that the benefits may require threshold levels of income and human capital. Poor countries may not be able to compete against multinational firms (from wealthy nations) in world markets. Moreover, poor countries must compete with non-poor developing (emerging) countries to attract foreign direct investment (FDI). Thus, while a poor country abolishes import duties and other barriers to trade, it might find itself unable to export its manufactures. Similarly, a poor country with low levels of human capital will find it difficult to attract FDI. The country may wind up, at least in the early

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[1] The effect of economic growth on inequality within countries has been the subject of a large body of the literature ever since the seminal work of Kuznets in 1955. In addition to Dollar and Kraay (2001), other recent studies have re-examined this link and reported different findings. For example, Timmer (1997) reports that income inequality worsens as economic growth proceeds. While Deininger and Squire (1996), Roemer and Gugerty (1997), Chen and Ravallion (1997) and Easterly (1999) did not find any significant link between changes in income and changes in inequality.

years of liberalization, with high openness to imports but very low inward FDI and exports.

The purpose of this paper is to explore the linkages between economic growth and globalization in Africa (including North Africa). We do not delve into the debate of whether high economic growth is desirable or structurally disruptive as argued by the pioneers of development economics (Clark 1940; Chenery and Syrquin 1986; and Syrquin 1988). Rather, we assume that high economic growth is a desirable outcome and proceed to explain why some (most) African countries have been incapable of achieving high growth rates. The study follows the spirit of research in Mankiw *et al.* (1992), in that it tests for conditional convergence by including human capital and other variables susceptible of affecting income convergence. The bulk of the literature on economic growth, trade openness, and the issue of convergence is based on cross-country data. Among the few exceptions are the studies by Islam (1995), Savvides (1995), and McCoskey (2002). This research builds on the work of Savvides (1995), which is the only existing study that has focused on these issues using panel data from all Africa. The present paper contributes at least two innovations. First, while the time period studied in Savvides (1995) is 1960-87, we cover the period 1980-99. The 1990s, in particular, involved many economic and policy reforms in Africa. Thus, including the 1990s helps to capture the extent of openness to international trade (and globalization) better than the 1960s or 1970s. Second, while rooted in the same econometric theory on panel-data estimation, the methodology employed introduces an improvement to the fixed-effect model used in Savvides. In addition to the fixed-effect model, a panel estimation technique suggested in Caselli and Coleman (2001) is also used. This model combines both random—and fixed-effect features to remedy the large loss in degrees of freedom associated with the standard fixed-effect estimation.

The remainder of the paper is organized as follows. Section 2 provides a brief discussion of the determinants of economic growth and the links between growth and globalization. Section 3 analyses selected economic indicators and outlines some stylized features related to economic growth and openness in Africa. In section 4, data and methodology issues are tackled. Section 5 presents the empirical estimation and discusses the results. The final section contains concluding comments and suggestions for future research.

2   Globalization, openness and economic growth

2.1   On the determinants of economic growth

Country data indicate that there are wide cross-country disparities in economic growth. Understanding the determinants of growth is an important step towards explaining this heterogeneity. The investigation of the major sources of economic growth can be conducted in a number of ways and at different levels. As discussed in Scott (1993), the early models focused on examining the effects of the main inputs (labour and capital) and, subsequently, the impact of technology. Then, the growth of inputs itself was examined. Research began to focus on the determinants of changes in capital and labour, and the behaviour of input productivity. Policy variables began to be incorporated in empirical models. At a third level (current stage of economic growth literature), institutions began to be included in growth models in order to investigate

why some policies are effective in certain countries but fail to produce the expected results in other countries.

Since the 1980s substantial research was carried out to try to tackle the question of what explains growth. Traditional models have tried to link economic growth—where the rate of increase of real gross domestic product (GDP) is often used as a measure of economic growth—to capital accumulation. More recent line of research (Feldstein 1974, Kormendi and Meguire 1985, Ram 1986, Barro 1990, and Rebelo 1991) has focused on the link between economic growth and other variables, such as government size and policies. For instance, Rebelo (1991) tries to explain the differences in growth rates by the differences in government policies across countries. His main conclusion argues that countries with high income tax rates and poor property rights enforcement have lower growth rates. Ram (1986) argues that there are positive effects of government size—proxied by the share of government consumption in GDP—on growth. On the other hand, Barro (1990) finds an inverse relationship between the rate of economic growth and the share of government consumption. There are also models that have incorporated geography and institutions. To account for the potential effect of geography on economic growth, some studies[2] have included measures such as land area, climate, distance from the equator, and whether the country is landlocked. Ramirez and Loboguerrero (2002) used spatial econometrics to test whether a country's economic growth is influenced by the economic growth of its neighbours. When using levels of income rather than growth rates, the authors find empirical evidence of spatial dependence.

Several other authors emphasize the degree of openness of the economy to international trade. For instance, using an endogenous growth framework, Dollar (1992) studies the effect of outward orientation. He investigates sources of growth in 95 developing nations over the period 1976-85 and reports that, while per capita income for this period grew at an annual average of 3.4 per cent for 16 Asian countries, it fell at a rate of 0.4 per cent in Africa and 0.3 per cent in Latin America. Dollar's conclusions emphasize that Asian developing economies were more outward oriented than African and Latin American countries. Numerous studies (Balassa 1978; Tyler 1981; Bhagwati 1988; Quah and Rauch 1990; and Edwards 1993) have examined the link between import and export shares in GDP, and economic growth. Other research explored the relationship between *human* capital accumulation and GDP growth (Barro 1991; and Mankiw *et al.* 1992). It is worth emphasizing that the contribution of endogenous-growth models to the literature on economic growth is very significant. Endogenous growth specifications allowed researchers to examine the effects of policy variables and human capital, and to articulate the hypothesis of conditional income convergence. This helped to resolve some puzzling results derived from traditional Solow growth models.

In view of the large number of regressors that have been used in growth equations and the explosion of studies on economic growth, a more recent line of research with focus on testing the robustness of different results has enhanced the empirical growth literature. Using extreme-bounds analysis,[3] Levine and Renelt (1992) show that the only

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[2] See Sachs and Warner (1995), Gallup *et al.* (1998), Acemoglu *et al.* (2001a), and McArthur and Sachs (2001).

[3] See Leamer (1985) and McAleer (1994) for additional discussion of the Extreme-Bound analysis. It is worth noting that the EBA technique was criticized by, among others, Salai-i-Martin (1997).

correlations that were significant in growth equations were the ones between the share of investment in GDP and growth, and between the ratio of international trade to GDP and investment share. Similarly, Florax *et al.* (2002) used meta-analysis and response-surface analysis to assess the robustness of the estimates in the empirical growth literature. The authors analysed the significance and magnitude of the estimated coefficients, and the sign variability in the empirical growth regressions. They reported that, of the 61 variables used in the regressions, only three variables –years of openness, equipment and non-equipment investment, and human capital—were robust. Another strand of the literature focused on explaining why developing countries stagnated during the last two decades of the twentieth century; what has been referred to as the 'lost decades' (Easterly 2001).

2.2 Globalization and economic growth

It is evident from the literature that many scholars and policymakers are convinced that globalization—represented mainly by openness to international trade and FDI—serves as an 'expressway' for the engine of growth (Dollar 2001; Martin 2001; World Bank 2002; and Nunnenkamp 2002).[4] Yet, although endogenous growth models tend to yield specific predictions on the impact of trade, it is not obvious which policy instruments would ensure the kind of integration capable of leading to growth-promoting linkages. Consequently, a new strand of the literature began to tackle these issues. Dani Rodrik's highly pertinent work emphasizes specific aspects of globalization that have been ignored in the literature. In particular, Rodrik (1997 and 2002) emphasizes policies and institutions as major determinants of a successful integration in the global economy.[5]

As argued in Pritchett (1994), measuring outward orientation, is not a straightforward undertaking. If one takes, for instance, the magnitude of inward FDI—a widely used proxy for globalization—it is not evident what effects increased FDI has on resource depletion (if it is mainly for raw material sectors); an issue quite relevant in many African nations (Winter-Nelson 1995). Consequently, the impact on long-term economic growth may be ambiguous. Openness to international trade is the other major indicator of whether an economy is *globalizing*. As argued in the literature, the sharing of ideas plays a key part in the relationship between trade (globalization) and economic growth. For example, new growth theory emphasizes the role of increasing returns from new knowledge (Rivera-Batiz and Romer 1991). However, it is not possible to obtain an adequate measure of idea-sharing resulting from international trade in the group of countries under study.

In its simplest representation, the openness indicator is defined as the ratio of the sum of imports and exports to GDP. The ratio rises as a result of increases in imports and/or exports. Suppose a country increases exports of state-owned natural resources (assuming there is no adverse effect on the price) and its government uses the revenues to sustain its current consumption expenditure or, as in some African countries, military

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4   The World Bank (2002), for example, proclaims that 'between countries, globalization is now mostly reducing inequality', implying that globalization helps to reduce the gap between poor and rich countries; an argument that is not, in general, corroborated by the economic performance of many African countries.

5   Edwards (1993) provides a very good review of the literature on the role of trade liberalization in growth.

expenditures. In this case, what would the effect on long-term economic growth be? A somewhat better measure of integration in the world economy may be the share of manufacturing in merchandise export. This indicator can capture the ability of an economy to deliver products to world markets. The role of export composition is important in growth models focusing on the impact of openness (see for example Balassa 1985; and Fosu 1990, 1996 and 2000). It is argued in these studies that, while exports have a positive effect on long-term growth, the manufacturing share could be the key determinant of this relationship. Unfortunately, data on the share of manufacturing in total merchandise exports in Africa, for the period 1980-99, are rather scant. Interestingly, there are more data points both on a cross-country and time series basis, in the 1970s and early 1980s than there were in post 1982-83. Only 5 countries (Algeria, Egypt, Mauritius, Morocco, and Tunisia) have consistent time series data from 1980 to 1999 (1997 for Morocco). Most other countries have large gaps in the series or no data since the mid-1980s.

Some authors have examined a set of trade openness measures and their correlation with each other and with economic growth. For example, Harrison (1996) looked at a number of openness indicators that turned out to have a positive 'association' with economic growth while they had weak correlation with each other. Furthermore, a VAR specification in Harrison's paper produces evidence in support of bi-directional causality between openness (trade share) and economic growth. The role of human capital has been emphasized in many studies. Growth-promoting outward orientation may require high levels of human capital. Feenstra (1996) raises an interesting issue in this regard. He points out that in the absence of a simultaneous international diffusion of knowledge with the growth in international trade, we will witness divergence, not convergence—as implied by most endogenous growth models—of growth rates. A major corollary of this proposition is that the gap between countries where human capital is so low that they may not be able to use *knowledge-based products* and those with high knowledge diffusion (non-poor countries) will widen.

3   A review of recent economic performance in Africa

Table 1 displays per capita income in selected countries and regions. In 1975, the ratio of per capita income in the richest developed countries (high-income OECD countries) to income in China was 24 to 1. In 1995 the ratio was brought down to 8.7. During the period 1975-95, China's income increased almost 10 folds, while in high-income countries per capita income increased 3.5 times. On the one hand, Sub-Saharan Africa's income in 1995 was less than double its level in 1975, leading to a widening in the gap vis-à-vis industrial countries. In fact, this gap rose significantly (almost doubled) in the 20 years since 1975. The unconditional convergence hypothesis does not find support when the sample includes countries at different levels of development. However, some empirical growth models (for example, Mankiw *et al.* 1992) suggest that, once we control for certain country features, convergence holds (conditional convergence). Another line of empirical research has examined the proposition of convergence clubs (Ben-David 1996; Quah 1997 and 1999; and McCoskey 2002). These two forms of convergence (conditional and club convergence) can be informally gauged by verifying whether incomes in the poorest countries are catching up with the high per capita incomes in Africa (Table 2.a). In 1975, the highest per capita income (PPP values) was US$ 4,593.20 (in South Africa) and the lowest income was US$ 231.78 (in Malawi).

Twenty years later, Malawi's per capita income rose to US$ 545.83 (the second lowest in Africa) while South Africa's income increased to US$ 8,631.20. While the ratio of South Africa's income to the per capita income in Malawi has declined from 20 to 16, the closing of the gap is occurring very slowly. At this rate, it will take Malawi a century in order to reach South Africa's current per capita income. When we examine the changes in per capita incomes in Africa over the period 1975-95,[6] we note the following. In 1995 there are eight countries with per capita income exceeding US$ 4,000 (South Africa, Mauritius, Gabon, Botswana, Namibia, Tunisia, Algeria and Swaziland). All, but Botswana, were among the top seven countries with income exceeding US$ 1,400 per inhabitant in 1975. This group also includes four countries with per capita income in 1995 in excess of US$ 2,000 but less than US$ 4,000. The group with the lowest per capita incomes defined as less than US$ 1,000 includes 18 countries. Most countries have remained within their 1975 income group. Thus, there is no inter-group movement between the high-income group and the low-income group. The middle-income group contains countries with per capita income in 1995 between US$ 1,000 and US$ 2,000. There were only two inter-movements between the middle-income and the high-income group. Botswana experienced an impressive income growth (750 per cent); while Egypt's per capita income more than quadrupled. These changes have allowed both countries to move to the higher income group. If convergence within Africa were taking place we would have seen more countries ascend from this level of income to the higher one.

The ratio of average per capita income in 1995 to income in 1975 was highest in the high-income group; 2.48 versus 1.70 for the low-income group and 1.99 for the middle-income group. This fact seems to be consistent with the proposition of convergence clubs. Most studies consider Sub-Saharan Africa as a homogenous region or a 'club', and hence, expect some type of income convergence among Sub-Saharan African countries. One exception is McCoskey (2002) who explores the idea of convergence clubs within Africa. The foregoing discussion was based mainly on a description of observed changes in per capita income over a twenty-year period. Yet, the data appear to support McCoskey's conclusions.

3.1   Some stylized features about openness and growth in Africa

First, the bulk of the literature maintains that countries which undertake measures to liberalize their trade and abolish impediments to inward FDI grow faster. Let us consider the period of 1990-94 (Table 3.a). During this time span there were thirteen countries with average rates of GDP growth greater than 3 per cent. In the top half of Table 3.a, we place these countries in a group called 'group of relatively high economic growth' (columns 1 and 2), then we put information on the thirteen countries with the highest openness index and highest FDI-to-GDP ratio in columns 7-10. We note that ten countries in the first column are also among the top thirteen in column 7 and/or column 9. In other words, they were among the thirteen countries with highest openness index and/or highest FDI ratio.[7]

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[6]   Lesotho, Libya, Liberia, Djibouti, Somalia and Eritrea are not included for lack of data. Countries with population less than one million are excluded.

[7]   One might argue (as Matti Pohjola rightly pointed out) that since this is a short period of time, the behaviour of economic growth is determined by random factors. This certainly would be the case if

Second, we argue that countries that have low openness to trade and/or insignificant inward FDI achieve lower economic growth. The data reported in the second (lower) half of Table 3.a indicate that, of the fifteen countries that had negative or very low (less that 0.5 per cent) growth, eleven were also included among the countries with the lowest openness index and/or lowest inward FDI ratio. In fact, five countries (Burundi, Central African Republic, Cameroon, Niger and the Democratic Republic of Congo) were in both columns; 7 and 9. However, Sierra Leone, Angola, Togo and Zambia are in column 1 but not in columns 7 or 9.

Third, some studies have argued that higher openness allows faster convergence; in the sense that more open low-income countries grow faster than closed low-income countries (Sachs and Warner 1997b). In contrast to this view, we argue that there might be a threshold effect. In the case of Africa, particularly in poor countries with high illiteracy rates, the effects from higher integration in world markets may be insignificant or negative, at least in the short run. Thus, we postulate that globalization may be good but only for those countries that are not among the poorest group. This implies that countries which are quite open to international trade and foreign capital, *and also* have relatively high per capita income (we may view income as a proxy for human capital) grow faster. Columns 3-6 of Table 3.a display information on per capita income in 1975 (initial income) and in 1990. The top half of Table 3.a shows that eight countries that are in column 7 and/or column 9, are excluded from the high-growth group. Three of these countries have negative growth (the Republic of Congo, Angola, and Zambia). Gabon and Angola are both in the high-income group. However, in 1990-94 Gabon had divestment equal to 0.5 per cent of its GDP, while Angola was in a state of civil war (post-election war of 1992-95).

In sum, if a country is not poor, is quite open to international trade and/or receives reasonable amounts of FDI, then it will potentially achieve stronger growth. Provided the country is not in war. Obviously, the opposite does not necessarily hold true. Poor countries can also achieve high economic growth if there are other ingredients, other than trade openness and FDI. This framework does not take into account aid and borrowing. Uganda, for example, received average aid amounts equivalent to 20.13 per cent of its gross national income (GNI) in 1990-94 (Table 2.b). This may help to explain the impressive growth rates in Uganda during this period. Benin and Guinea-Bissau (also included in the high-growth group) received, in 1990-94, aid equivalent to 15.55 per cent of GNI and 54.16 per cent of GNI, respectively. Similarly, Guinea received aid in excess of 10 per cent of its GNI. All other countries, that are both in the high-growth and the high openness group received amounts of aid lower than 10 per cent of their respective GNI.

Greater integration of world economies implies higher competition in international as well as domestic markets. This may suggest that globalization could change the linkages between openness and economic growth. In other words, as globalization intensifies, to be able to grow at the same rates as before, countries may need to be more open to international trade and/or attract higher amounts of foreign capital. Table 3.b displays the same variables shown in Table 3.a, but covers the period 1995-99. First, we note that the highest openness index has increased from approximately 163 to 185, with

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the focus were on a single country or a small group of countries. To minimize the probability of such outcome, the paper also examines the behaviour of the same indicators in 1995-99. More importantly, the empirical estimation involves panel data from two decades (1980-99).

Swaziland retaining the lead. The lowest index also increased from about 22 to 28. The increase in the highest index was 13.5 per cent, while the increase in the lowest index was approximately twice as much (27.3 per cent). In both periods there are six countries with an index in excess of 100. Similarly, the highest level of FDI as a per cent of GDP increased from 7 per cent to about 13 per cent. The figures in Table 3.b indicate that, during 1994-99, fifteen African nations achieved an average growth rate of at least 5 per cent (Botswana achieved 4.8 per cent but is also included in the group). Rwanda achieved the highest growth in the group. This country received an average amount of aid equivalent to 27.36 per cent of its GNI in 1995-99. In fact, the only countries in the high-income group that received negligible amounts of aid (less than 3 per cent of GNI) were Botswana, Egypt, Mauritius, and Tunisia. All other countries received amounts of aid in excess of 10 per cent of GNI. We should also point out that among the top five most open countries, four countries had less than two million inhabitants in 1999. Likewise, among the top five nations with high per capita income (greater than US$ 5,000), four had less than two million inhabitants.

In both periods, there is no country that is open to trade and foreign capital, and relatively high income, included in the negative-growth group, except for Angola in 1990-94. The foregoing analysis suggests that, in order to benefit from increased openness, a country needs to have a threshold level of income. In fact, income may be transmitting the influence of education or other indicators of human capital. In the next section we develop an econometric model to formally test these propositions.

4   Variable selection, data and methodology

This paper uses panel-data to try to examine the effects of several variables on economic growth. Most of these variables are either indicators of the extent of integration in world markets or tend to be influenced by globalization. For the most part, the correlation among the explanatory variables is rather weak. The set of explanatory variables includes trade shares, FDI, expenditure on education (per cent of GDP), illiteracy rates, economic freedom, property rights, and financial development indicators. We also include initial per capita income to assess the empirical validity of the convergence hypothesis (conditional income convergence). Appendix A provides a detailed description of the data and variable definition.

FDI and trade shares are commonly used as indicators of globalization. In general, countries that are integrated in the world economy tend to have high FDI ratios and significant openness to international trade (when we control for country size). Recent empirical research that has examined the links between openness to international trade and economic growth has employed a variety of openness indicators (Sachs and Warner 1995; Savvides 1995; Edwards 1993; and Harrison 1996). The present paper uses, as a measure of openness, the ratio of export and import to GDP. There are two justifications for the choice of this measure. First, this indicator is, implicitly or explicitly, included in most studies. Second, one needs to decide whether the emphasis should be on policies or outcomes. The openness indicators developed by Sachs and Warner (1995) are based mainly on policies. However, liberalization policies alone may not lead to greater integration if the country has other negative (not policy-related) features that make it *unattractive* to foreign investors and markets.

The ratio of FDI to GDP is used as a measure of integration in world markets. Inward FDI can be a vital source of capital, but more importantly, it can provide the host country with access to advanced technology. The impact of FDI on economic growth in the host economy has been examined in numerous studies. Several researchers have emphasized the role of human capital in determining the magnitude of this impact. For example, Borensztein *et al.* (1998) show that FDI does enhance growth but human capital is crucial in this relationship. Fosu (1990 and 2000) demonstrates that the share of manufacturing in merchandise exports is what matters for economic growth. However, due to the lack of data (as explained earlier) on this variable, the model includes the share of manufacturing in GDP (value added) as a proxy for the share of manufacturing in exports.

Globalization has also been associated with improved financial development. We use two indicators of financial development; the ratio of broad money to GDP (commonly used as a measure of financial deepening) and credit to the private sector. The effect of financial development on economic growth was documented in Bencivenga and Smith (1991) Levine and Zervos (1993), King and Levine (1993), Levine *et al.* (2000), and Benhabib and Spiegel (2000). Several other studies (Edwards 1992; Harrison 1996; Levin and Raut 1997; and Ben-David 1997) have emphasized the role of human capital in the effectiveness of trade openness. It has been posited in the literature that human capital facilitates the diffusion of imported technologies and thus helps to make openness more effective in promoting economic growth. However, some studies have failed to find empirical evidence to support this claim. For example, Harrison (1996) did not find support for the effect of human capital on the effectiveness of openness. In the present paper, expenditure on education as a percentage of GDP, and illiteracy rates are used as indicators of the stock of human capital.

Recent empirical literature also underscores the role of institutions in promoting economic growth and development, particularly in this new era of globalization (Acemoglu *et al.* 2001a; and Rodrik 2002). This study uses two proxies for institutions; economic freedom and property rights (Gwartney *et al.* 2001). It is worth noting that property rights and economic freedom can be determinants, as well as outcomes of economic growth and greater openness to the rest of the world.

Finally, to test the hypothesis of conditional convergence, initial income is also included in the model. The unconditional convergence hypothesis (traditional neoclassical models) implies that countries with low ratios of capital to labour tend to grow at higher rates (diminishing marginal returns). However, Barro's seminal work (1991) shows that poor countries, indeed, grow faster if they were endowed with high levels of human capital (proxied by secondary and primary school enrolment). This type of convergence has been termed in the literature as 'conditional convergence'.

It is worth pointing out that some variables, including fertility, life expectancy and information and communication technology (ICT), have been justifiably left out. Fertility and life expectancy are often used as proxies for human capital in developing countries. The empirical models in this study exclude these variables due to their particularly high correlation with initial income and other proxies for human capital. On the other hand, ICT is considered to be a major indicator of globalization and was found to have a strong effect on economic growth. However, consistent data on ICT indicators were not available for most African countries in the 1980s. Furthermore, ICT can also be influenced by openness to international trade and economic growth (see for example,

Baliamoune 2002; and Kiiski and Pohjola 2002). In addition, investment ratio is not included as an explanatory variable for two reasons. Firstly, the investment ratio is highly correlated with FDI ratio and, in many cases, with initial income. Secondly, this is consistent with the approach in Sachs and Warner (1997b), as their study did not incorporate the investment ratio.

Table 4 displays economic and social development indicators (10-year averages) for the last three decades of the twentieth century. While the means, in general, have improved over time, the standard deviation for most indicators has increased. Financial development indicators improved significantly in the 1990s relative to the 1970s. However, the disparities among countries are substantial. Some indicators have changed only slightly during these three decades. The changes in government expenditure, the share of the industrial sector and gross fixed capital formation were negligible. Similarly, expenditure on education as a percentage of GDP and female's participation in the labour market remained almost at the same level. Furthermore, while there was a noticeable increase in the share of imports, the change in the share of export was insignificant. It is also useful to examine the share of manufacturing in merchandise exports. The data reported in Table 4 indicate that this share has increased over time from about 10 per cent to 21 per cent. Again, the variation across countries is quite large.

These comments imply that, when we look at the group of African countries in general, we often observe stagnation. Yet, the magnitude of the variability measures suggests that there are large cross-country disparities. Therefore, any attempt to study the effects of integration in world markets on economic growth must take country effects into account. Panel estimation using fixed-effect models is consistent with this view.

We first use a standard fixed-effect model, then we use the transformation suggested in Caselli and Coleman (2002) in order to avoid the large loss in the degree of freedom caused by the estimation of the separate (N-1) country effects. Caselli and Coleman's version of the fixed-effect model does, in fact, allow one to test the proposition of convergence clubs, which has been examined in Quah (1997 and 1999) and McCoskey (2002).

The basic fixed-effect equation is as follows:

$$y_{it} = a_i + b'X_{it} + e_{it}$$

where a_i is the individual (country) effect. The fixed-effect estimation treats a_i as a country specific intercept. This is in contrast to the random-effect model which views a_i as a country specific disturbance.[8] The vector X includes the explanatory variables introduced earlier.

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[8] See Baltagi (2001) for a detailed textbook discussion of fixed- and random-effect panel estimation.

5 Empirical results

Table 5 reports the results from the estimation of the standard fixed-effect model. Economic growth is measured as the average growth rate in a five-year period beginning in 1980 and ending in 1999. This yields four periods of equal length. Equations (1)-(3) use income at the beginning of the period. This specification follows Islam (1995) and Savvides (1995), and is fairly common in the long-term growth literature using panel data. We have also estimated an equation using per capita income in 1975 as initial income. The results of this estimation are shown in column (4). It is important to note that the inclusion of 1975-income introduces some inconsistency, as the time span between the year of initial income and each of the four periods is no longer constant. As discussed earlier, the use of initial income allows testing for convergence in Africa. The coefficient on the variable 'initial income' is negative and significant at the 1-per cent level (or lower) in all equations using 'income in the beginning of the period' as initial income. This coefficient is significant at the 5-per cent level in the equation using per capita income in 1975.

Regarding the effect of globalization measures, we note that the estimates in all four equations indicate that the coefficient on FDI is positive and significant. The results suggest that increases in inward FDI relative to GDP enhance economic growth. On the other hand, openness to international trade has a negative coefficient, implying that increased openness may subject countries to adverse effects. While we would expect openness to enhance economic growth through market linkages (export sector) and improved firm productivity and competitiveness, an argument in support of a negative relationship can easily be made. As explained earlier, a poor country that abolishes import duties and other barriers to trade may find itself unable to export its manufactures or benefit from advanced technology if its human capital and/or physical capital stocks are too low. In some cases, the competition effect resulting from increased inflow of FDI may be stronger than the technology effect (domestic firms access to imported advanced foreign technologies), causing a decline in the productivity and/or output in the domestic sector. Additionally, international macroeconomic shocks tend to affect small open economies more intensely than they do closed economies. The finding of a negative influence of openness on economic growth is in contrast with most findings in the literature. However, this finding also suggests that openness may require other ingredients in order to become growth enhancing. Equations (2)-(4) include a term that reflects interaction between openness and initial income. The inclusion of this term tests the proposition that open economies converge faster to steady-state income (Sachs and Warner 1997b). The present empirical evidence does not lend support to this hypothesis. The positive coefficient on the interaction term implies greater openness alone does not allow countries with lower initial income to grow faster. Sachs and Warner (1997b) find support for the hypothesis that greater openness accelerates convergence in a cross-sectional study that measured openness by the number of years countries were open.[9] In contrast, the current findings imply that countries with relatively high income tend to benefit most from openness. This is a plausible result,

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[9] Sachs and Warner (1995) define trade liberalization in terms of the absence of specific barriers to open trade. Thus in the sample of developing countries they study, only countries that were open in 1970s and 1980s grew faster. Obviously this excludes most African countries. Sachs and Warner (1995) did not find support for the convergence hypothesis in the entire sample. However, Sachs and Warner (1997b) have found support for conditional convergence and also for the proposition that openness increases the speed of convergence.

given the intense global competition that developing countries face. Moreover, income may be transmitting the effect of the stock of human capital (not just education or literacy rates) as the latter tends to be highly correlated with the former. The stock of human capital, however, may not always be readily measurable.

The results displayed in Table 5 also indicate that there is empirical evidence in support of conditional convergence to a steady-state income. This contrasts with the findings in Sachs and Warner (1995) where the authors show that there is no evidence of convergence in the entire sample. Perhaps, the hypothesis did not appear to be valid because heterogeneity in the large sample was too great. It is worth noting that the difference in the present result concerning the interaction between openness and initial income and the finding in Sachs and Warner (1995) could be due to the difference in the definition of openness.

There is no econometric evidence in favour of a strong positive relationship between expenditure on education (relative to GDP) and economic growth. This is hardly unexpected for the group of countries under study, as the efficiency of education expenditures is often low. On the other hand, improved literacy or reduced illiteracy (the model uses illiteracy rates) seem to enhance economic growth as shown by the result associated with equation (1). However, when we differentiate between female and male illiteracy, female illiteracy has a positive coefficient. This is consistent with some findings in the literature using other proxies of education (Barro and Lee 1994; Barro 1996).

Greater integration of developing countries in world markets tends to be associated with a higher share of manufacturing (this variable could also proxy for the share of manufacturing in merchandise exports), hence the inclusion of the variable 'manufacturing' in equations (3) and (4). The coefficient associated with this variable is positive in both equations and significant at the 10-per cent level lower.

The variables economic freedom and property rights are proxies for the institutional environment. The empirical results indicate that both variables are significant and have a positive influence on economic growth. This is hardly surprising, given the findings reported in the empirical literature (see, for example, Sachs and Warner 1995 and 1997b).

Finally, the coefficients on the indicators of financial development provide mixed evidence. Financial deepening measured as the ratio of broad money to GDP enhances economic growth, whereas credit to the private sector appears to have a negative impact. Perhaps this can be explained by the fact that many banks in Africa, in most of the 1980s and early 1990s, were state-owned and did issue high levels of bad loans.

While the fixed-effect model is consistent, it is nonetheless less efficient relative to the random-effect model. Johnston and DiNardo (1997: 403) argue that 'many researchers find a precisely estimated fixed-effects estimate more persuasive than a precisely estimated random-effects estimate'. Although Hausman's tests[10] (not shown) for each equation are in favour of the fixed-effect specification, the large loss in degrees of

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[10] Baltagi (2001: 20) points out that the rejection of the null hypothesis under the Hausman test does not necessarily imply adoption of the fixed-effect specification, and non-rejection does not unequivocally indicate that one should adopt the random-effect estimation.

freedom constitutes a serious concern. The fixed-effect model estimates country dummies (N-1 parameters) which imposes a significant loss in the degrees of freedom and may cause high multicollinearity (Baltagi 2001: 13). Caselli and Coleman (2001) propose an approach that combines features from the fixed-effect and the random-effect estimations. The authors include fixed region effects in the form of dummy variables for specific regions and consider the residual country effect as random. This adjustment enhances the efficiency of the fixed-effect estimates.

Table 6 displays the results of the estimation from Caselli and Coleman's specification. The econometric results are in general consistent with those reported in Table 5 (fixed-effect estimates). The regions were defined in terms of their proximity to Europe, implying that region 1 includes North Africa with the most southern region of Africa being region 5. The estimated coefficients of regional dummy variables are not shown but, for the most part, are significant. In general, the results confirm the findings from the standard fixed-effect estimation.

Several studies (Edwards 1992; Harrison 1996; Levin and Raut 1997) have emphasized the role of human capital in making trade openness affect growth. For example, Harrison (1996) tested for this effect through use of a variable reflecting interaction between openness and school enrolment but obtained ambiguous and insignificant results. Equation (3) includes a term, representing the interaction between FDI and adult illiteracy rates (a proxy for the state of human capital). Surprisingly, the coefficient is positive, implying that inward FDI is positively correlated with illiteracy. One plausible explanation may stem from the fact that in many developing countries FDI tends to target industries that use non-skilled cheap labour. Alternatively, the finding may reflect poor measurement of literacy (or illiteracy) rates.

6   Concluding comments

This paper has examined the effects of two major indicators globalization on economic growth in Africa. To test different hypotheses, the study has employed panel data and fixed-effect estimation, as well as an *adjusted* fixed-effect specification that was proposed in Caselli and Coleman (2001). In general, the estimation yields results consistent with the conditional income convergence (Mankiw *et al*. 1992) and the conditional effectiveness of openness to international trade. Furthermore, the empirical evidence from the *adjusted* fixed-effect estimation is in support of the hypothesis of 'convergence clubs' in Africa as shown by McCoskey (2002). On the other hand, some findings in the present paper contrast with those in Sachs and Warner (1997b). While Sachs and Warner find that openness facilitates convergence, we show the opposite. Openness actually helps 'relatively rich' countries in Africa more than it does poor countries. In fact, globalization, measured by greater openness to international trade, may be harmful to economies with very low per capita income. Perhaps the influence of income conveys the effect of human capital, as these two variables tend to have a strong positive correlation.

The results are by no means surprising, particularly when we consider that the last two decades of the twentieth century, which had witnessed intensified globalization, had also been marked by a slowdown in economic growth in many parts of the world. More

importantly, they were characterized by a widening gap between the group of industrial and newly-industrialized countries, and the group of least-developed countries.

The fact that the empirical results in this paper show that increased openness does not promote economic growth *unconditionally*, does not imply that we refute the recommendations of international finance and development institutions such as the IMF, the World Bank and UNDP. In particular, for many African countries, the recommendations pertaining to the role of different types of governance and institutions could be the key to the gate that leads away from the stagnation cycle. It is worth emphasizing that the theoretical literature and empirical data have demonstrated that, in general, a closed economy does not grow faster than an open economy. The present findings do not dispute this claim but argue that the effects of openness may be contingent upon income and human capital. The sharing of ideas and knowledge that is essential to the impact of trade may not materialize under certain conditions (see Feenstra 1996). Moreover, the present findings may reflect the effect of changes in other variables that are not explicitly incorporated in the model. For example, shocks to terms of trade can be a major determinant of the variance of growth. In fact, these shocks may be more important than country features in explaining long-run growth (Easterly *et al.* 1993).

This study does not pretend to provide an exhaustive analysis of these issues. The following are suggestions for future research. First, it would be very useful to explore what matters for openness. Is it the fact that tariff and no-tariff barriers in a country are very low or nil, regardless of the level of international trade? Or is it that international trade is substantial (high import and export ratios relative to GDP or per capita), although the barriers to trade are still relatively high? Second, the direction of causality between economic growth and the variables on the right-hand side of growth equations did not receive much attention in the literature. One notable exception is the study by Harrison (1996) who uses Granger-causality tests and finds support for bi-directional causality between growth in GDP and trade shares. Third, the bulk of the empirical literature on economic growth uses cross-section models. There are very few studies that use panel data. It is important to try to capture the long-run and short-run dynamics of economic growth. The relationship may be one of cointegration, implying that openness to international trade and economic growth rates move together over the long run in response to changes in other variables that may very well be institutions or human capital. Fourth, some countries have had great economic performances measured by high growth rates and growth-inducing policies. Research on two African countries in this group—Botswana (Acemoglu *et al.* 2001b) and Mauritius (Subramanian and Roy 2001)—indicates that the institution-based explanation could provide some convincing arguments. It would be interesting to explore the factors that influence or define institutions. The literature from political science and history of the modern world could lend a very helpful hand in this type of research.

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Appendix A

A1   Source of data

−   Index of economic freedom and index of property rights are from Gwartney *et al.* (2001), *Economic Freedom of the World: 2001 Annual Report*. Published by the Fraser Institute. Retrieved from www.freetheworld.com

−   All other data are from *World Development Indicators* (WDI) database produced by the World Bank (2001).

A2   Variable definition[11] (see WDI for more details)

−   GDP growth: Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 1995 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.

−   GDP per capita, PPP (current international US$): GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the US dollar has in the United States.

−   Openness index = [(Exports + Imports)/GDP] x 100. We consider the index without the per cent sign. For example, an index of 120 means that the sum of exports and imports is 120 per cent of GDP or that the ratio of openness is 1.2.

−   Inward FDI ratio: Foreign direct investment (FDI) net inflows (per cent of GDP). Net inward FDI represents inflows of investment to acquire a lasting management interest (10 per cent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows in the reporting economy.

−   Education expenditure (per cent of GDP): Education expenditure refers to the current operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment.

−   Adult illiteracy rate: Adult illiteracy rate is the percentage of people ages 15 and above who cannot, with understanding, read and write a short, simple statement on their everyday life.

−   Manufacturing, value added (per cent of GDP): Manufacturing refers to industries belonging to ISIC divisions 15-37. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.

−   Money and quasi money (M2) as per cent of GDP: Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government.

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[11] Source: WDI.

− Domestic credit provided by banking sector (per cent of GDP): Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits).

Appendix B

List of countries

Country	Acronym	Country	Acronym
Algeria	ALG	Angola	ANG
Benin	BEN	Botswana	BOT
Burkina Faso	BKF	Burundi	BUR
Cameroon	CAM	Central African Republic	CAF
Chad	CHD	Congo, Dem. Rep.	CDR
Congo, Rep.	COR	Cote d'Ivoire	CDI
Egypt, Arab Rep.	EGY	Ethiopia	ETH
Gabon	GAB	Gambia, The	GAM
Ghana	GNA	Guinea	GUI
Guinea-Bissau	GBS	Kenya	KNY
Madagascar	MAD	Malawi	MLW
Mali	MAL	Mauritania	MRT
Mauritius	MRS	Morocco	MAR
Mozambique	MOZ	Namibia	NAM
Niger	NGE	Nigeria	NGA
Rwanda	RWD	Senegal	SEN
Sierra Leone	SRL	South Africa	SAF
Swaziland	SWZ	Tanzania	TZN
Togo	TOG	Tunisia	TUN
Uganda	UGN	Zambia	ZAM
Zimbabwe	ZIM		

Table 1
Per capita income in selected countries and regions (1975, 1995 and 1999)

GDP per capita, PPP (current international $)	1975	1995	Ratio 1 (1995/1975)	1999	Ratio 2 (1999/1995)[a]
China	273	2,681	9.81	3,618	6.75
India	464	1,871	4.03	2,248	6.01
Indonesia	468	2,911	6.22	2,857	4.91
Korea, Rep.	1,613	13,759	8.53	15,712	5.71
Mexico	2,606	7,222	2.77	8,297	5.74
Singapore	2,856	19,406	6.79	20,767	5.35
Thailand	809	6,260	7.74	6,132	4.90
United States	8,192	28,173	3.44	31,872	5.66
European Monetary Union	5,820	20,291	3.49	22,345	5.51
High income OECD	6,564	23,450	3.57	26,028	5.92
Latin America & Caribbean	2,324	6,375	2.74	6,817	5.35
Middle income	1,261	4,614	3.66	5,317	5.76
Middle East & North Africa	1,975	4,666	2.36	5,109	5.47
East Asia & Pacific	395	3,101	7.86	3,824	6.17
Low income	539	1,725	3.20	1,918	5.56
Lower middle income	875	3,668	4.19	4,346	5.92
Upper middle income	2,688	8,190	3.05	8,970	5.48
Sub-Saharan Africa	823	1,527	1.85	1,600	5.24
World	1,967	6,283	3.19	6,941	5.52

Note: [a]   For consistency in making comparisons, the ratio is divided by 4 (four years of growth from 1995-99) and multiplied by 20.

Source: World Bank (2001).

Table 2.a
Income groups within Africa [a] (1975-95)

	Income in 1975	Income in 1995	Ratio	
High-income countries				
South Africa	4,593.20	8,631.20	1.88	
Mauritius	1,422.20	7,592.50	5.34	
Gabon	3,615.00	6,258.50	1.73	
Botswana	773.62	5,843.30	7.55	
Namibia	4,217.00	5,232.30	1.24	
Tunisia	1,451.80	4,943.40	3.41	
Algeria	1,952.60	4,698.30	2.41	
Swaziland	1,499.00	4,085.10	2.73	
Morocco	1,009.70	3,126.10	3.10	
Egypt	657.58	2,941.90	4.47	
Zimbabwe	1,117.30	2,547.60	2.28	
Angola	1,091.00	2,105.10	1.93	
Average	1,950.00	4,833.78		2.48
Middle-income countries				
Guinea	1,273.50	1,746.90	1.37	
Ghana	801.30	1,709.80	2.13	
Côte d'Ivoire	900.07	1,533.50	1.70	
Mauritania	699.12	1,526.90	2.18	
Gambia	650.26	1,450.60	2.23	
Cameroon	676.48	1,446.00	2.14	
Togo	745.04	1,371.30	1.84	
Senegal	638.35	1,292.20	2.02	
Central Africa	647.41	1,127.50	1.74	
Kenya	401.37	1,027.30	2.56	
Congo Rep.	243.18	1,016.10	4.18	
Average	697.83	1,386.19		1.99
Low-income countries				
Uganda	681.09	998.93	1.47	
Dem. Rep. of Congo	980.72	945.40	0.96	
Guinea-Bissau	327.88	855.05	2.61	
Benin	334.95	845.93	2.53	
Burkina Faso	294.99	836.19	2.83	
Chad	414.28	828.64	2.00	
Nigeria	405.42	824.99	2.03	
Madagascar	511.83	801.19	1.57	
Zambia	579.89	754.37	1.30	
Niger	458.09	736.41	1.61	
Rwanda	377.79	736.35	1.95	
Mali	311.66	678.39	2.18	

Table 2.a (con't)
Income groups within Africa [a] (1975-95)

	Income in 1975	Income in 1995	Ratio
Mozambique	404.34	657.75	1.63
Burundi	282.47	644.41	2.28
Sierra Leone	395.42	613.62	1.55
Ethiopia	411.63	563.01	1.37
Malawi	231.78	545.83	2.35
Tanzania	429.99	472.31	1.10
Average	435.23	741.04	1.70

Note: [a] The groups are formed based on per capita incomes in 1995.

Source: World Bank (2001).

Table 2.b
Aid (% of GNI)

Country	1990-94	1995-99
Algeria	0.77	0.62
Angola	9.62	12.21
Benin	15.55	11.24
Botswana	2.98	1.86
Burkina Faso	19.07	16.76
Burundi	26.50	13.38
Cameroon	6.03	5.36
Central African Republic	15.05	12.64
Chad	15.70	14.60
Congo, Dem. Rep.	5.28	3.22
Congo, Rep.	10.22	14.69
Côte d'Ivoire	10.74	7.96
Egypt, Arab Rep.	9.12	2.65
Ethiopia	19.39	11.62
Gabon	2.87	1.83
Gambia, The	28.51	9.82
Ghana	10.77	8.89
Guinea	12.40	9.45
Guinea-Bissau	54.16	48.83
Kenya	13.67	5.29
Madagascar	13.23	13.36
Malawi	30.14	23.30
Mali	18.56	17.36
Mauritania	24.97	22.51
Mauritius	1.68	0.82
Morocco	3.45	1.67
Mozambique	57.99	28.10
Namibia	5.48	5.61
Niger	18.95	13.96
Nigeria	1.05	0.63
Rwanda	32.24	27.36
Senegal	13.21	12.04
Sierra Leone	22.03	17.27
South Africa	0.22	0.33
Swaziland	5.36	2.53
Tanzania	25.42	13.27
Togo	12.77	9.79
Tunisia	2.23	0.83
Uganda	20.13	10.99
Zambia	26.71	26.34
Zimbabwe	7.46	4.96

Source: World Bank (2001).

Table 3.a
Trade openness, FDI and economic growth (1990-94)

Country (1)	GDP growth (2)	Country (3)	Income in 1975 (4)	Country (5)	Income in 1990 (6)	Country (7)	Openness (8)	Country (9)	FDI (10)
Relatively high GDP growth rates									
UGN	6.04	SAF	4,593.20	SAF	8,323.6	SWZ	162.78	SWZ	7.03
MRS	5.43	NAM	4,217.00	MRS	5,638.9	GAM	131.54	NGA	4.4
TUN	5.03	GAB	3,615.00	GAB	5,207.4	MRS	127.92	ANG	3.41
BOT	4.66	ALG	1,952.60	BOT	4,930.5	NAM	120.83	ZAM	2.37
NAM	4.4	SWZ	1,499.00	ALG	4,544.5	ANG	105.39	TUN	2.32
GNA	4.15	TUN	1,451.80	NAM	4,332.1	COR	104.56	GAM	2.03
BEN	3.97	MRS	1,422.20	TUN	3,915.2	MRT	96.71	GNA	1.46
SWZ	3.87	GUI	1,273.50	SWZ	3,703.7	BOT	92.69	EGY	1.39
GUI	3.72	ZIM	1,117.30	MAR	2,899.9	TUN	89.4	MAR	1.38
NGA	3.63	ANG	1,091.00	EGY	2,517.0	GAB	84.1	MOZ	1.12
EGY	3.61	MAR	1,009.70	ZIM	2,366.4	NGA	80.67	UGN	0.81
GBS	3.52	CDR	980.72	ANG	1,593.6	ZAM	74.23	MRS	0.73
MAR	3.25	CDI	900.07	CAM	1,581.4	TOG	67.63	CHD	0.73
Very low or negative growth rates									
SAF	0.2	TZN	429.99	MAD	820.82	GBS	48.42	ETH	0.19
CDI	0.1	CHD	414.28	CHD	768.21	GNA	47.80	MLW	0.15
NGE	0.03	ETH	411.63	NGA	767.02	CAM	46.3	COR	0.13
MAD	0.01	NGA	405.42	COR	751.86	BEN	43.93	CAM	0.09
BUR	-0.07	MOZ	404.34	UGN	746.75	MAD	43.86	SAF	0.08
COR	-0.12	KNY	401.37	NGE	741.96	CHD	41.52	CDI	0.08
CAF	-0.78	SRL	395.42	BUR	725.84	SAF	40.59	BUR	0.06
ZAM	-0.83	RWD	377.79	BKF	707.32	CAF	40.58	NGE	0.03
ALG	-0.85	BEN	334.95	BEN	703.53	CDR	40.07	MAL	0.03
TOG	-1.01	GBS	327.88	GBS	703.29	BUR	38.031	ALG	0.02
SRL	-1.85	MAL	311.66	MAL	584.83	BKF	37.77	NAM	0.00
CAM	-3.74	BKF	294.99	MOZ	543.65	NGE	36.30	CDR	-0.01
ANG	-5.42	BUR	282.47	ETH	488.51	RWD	33.15	CAF	-0.27
CDR	-8.57	COR	243.18	MLW	474.83	UGN	29.03	GAB	-0.5
RWD	-11.5	MLW	231.78	TZN	455.3	ETH	21.82	BOT	-0.98

Source: World Bank (2001).

Table 3.b
Trade openness, FDI and economic growth (1995-99)

Country (1)	GDP growth (2)	Country (3)	Income in 1975 (4)	Country (5)	Income in 1995 (6)	Country (7)	Openness (8)	Country (9)	FDI (10)
Relatively high GDP growth rates									
RWD	15.72	SAF	4,593.20	SAF	8,631.20	SWZ	184.92	ANG	12.61
MOZ	8.33	NAM	4,217.00	MRS	7,592.50	MRS	130.33	ZAM	4.59
UGN	7.67	GAB	3,615.00	GAB	6,258.50	COR	124.97	MOZ	4.26
MLW	6.77	ALG	1,952.60	BOT	5,843.30	NAM	118.75	NGA	3.75
ANG	6.48	SWZ	1,499.00	NAM	5,232.30	GAM	112.04	SWZ	3.50
CDI	5.58	TUN	1,451.80	TUN	4,943.40	ANG	105.24	GAB	2.99
EGY	5.36	MRS	1,422.20	ALG	4,698.30	MRT	96.24	CDI	2.97
ETH	5.36	GUI	1,273.50	SWZ	4,085.10	GAB	91.06	GAM	2.87
BKF	5.33	ZIM	1,117.30	MAR	3,126.10	TUN	88.81	UGN	2.69
SEN	5.23	ANG	1,091.00	EGY	2,941.90	ZIM	82.21	MLW	2.35
TUN	5.17	MAR	1,009.70	ZIM	2,547.60	CDI	81.82	ZIM	2.35
BEN	5.07	CDR	980.72	ANG	2,105.10	NGA	78.99	TZN	2.15
MAL	5.02	CDI	900.07	GUI	1,746.90	BOT	76.86	MAL	2.14
MRS	4.98	GNA	801.30	GNA	1,709.80	GNA	75.61	TUN	1.88
BOT	4.80	BOT	773.62	CDI	1,533.50	SEN	73.13	TOG	1.77
Very low or negative growth rates									
KNY	2.71	KNY	401.37	ZAM	754.37	GUI	44.95	SRL	0.33
NGA	2.46	SRL	395.42	NGE	736.41	EGY	44.34	MRT	0.32
SAF	2.33	RWD	377.79	RWD	736.35	CAF	42.71	COR	0.25
MAR	1.91	BEN	334.95	MAL	678.39	BKF	41.05	RWD	0.18
ZAM	1.59	GBS	327.88	MOZ	657.75	ETH	41.00	KNY	0.18
COR	-0.04	MAL	311.66	BUR	644.41	NGE	40.95	MAR	0.11
GBS	-1.18	BKF	294.99	SRL	613.62	SRL	38.50	BUR	0.07
BUR	-2.29	BUR	282.47	ETH	563.01	UGN	33.31	CDR	0.02
CDR	-2.78	COR	243.18	MLW	545.83	RWD	30.23	ALG	0.01
SRL	-6.30	MLW	231.78	TZN	472.31	BUR	28.05	NAM	0.00

Source: World Bank (2001).

Table 4
Selected economic and social development indicators (10-year averages)

	1970-79			1980-89			1990-99		
	Mean	Median	Std deviation	Mean	Median	Std deviation	Mean	Median	Std deviation
GDP per capita, PPP (international $)	1,003.35	722.29	987.96	1,520.51	955.10	1,458.08	2,049.75	1,041.30	2,025.96
Industry, value added (of GDP)	25.304	23.729	13.269	26.258	22.736	13.512	25.831	22.398	11.995
Gross fixed capital formation (% of GDP)	19.048	20.603	9.979	17.853	16.035	7.392	18.091	17.644	5.860
Genuine domestic savings (% of GDP)	4.787	2.992	10.054	0.607	-0.241	9.963	0.820	0.596	10.597
Government expenditure (% of GDP)	16.315	15.016	6.322	16.804	16.355	6.711	15.959	13.954	7.952
M2 (% of GDP)	21.066	17.866	11.533	27.734	22.499	16.688	26.279	20.624	17.052
Domestic credit	19.992	17.581	18.720	33.652	31.031	24.905	26.841	20.513	28.069
Imports (% of GDP)	33.425	33.231	13.424	34.553	30.721	16.388	37.380	35.421	16.202
Exports (% of GDP)	27.768	25.740	16.149	28.475	23.000	17.111	28.052	24.118	18.318
Manufactures exports (% exports)	9.778	7.025	11.588	13.367	8.711	13.957	20.626	12.475	21.167
FDI, net inflows (% of GDP)	0.779	0.492	1.137	0.678	0.219	1.082	1.125	0.711	1.502
Aid (% of GNI)	5.571	3.704	5.482	10.378	7.378	11.346	13.896	12.453	12.755
Education expenditure (% of GDP)	3.436	3.527	1.114	3.675	3.477	1.419	3.485	3.189	1.839
Labour force activity rate, female	37.845	40.040	12.159	37.038	38.680	11.032	36.885	37.960	9.947
Labour force activity rate, male	53.166	53.560	4.067	51.882	52.330	3.573	51.251	51.290	3.203
Illiteracy rate, adult female	77.983	82.425	17.224	67.616	71.105	19.289	56.076	58.818	20.584
Illiteracy rate, adult male	56.146	54.585	17.603	45.898	43.050	17.684	36.286	32.752	16.948
Illiteracy rate, youth female	64.497	68.455	21.662	50.373	53.817	23.428	37.261	35.987	22.940
Illiteracy rate, youth male	40.419	38.510	19.390	30.752	26.635	17.989	22.702	19.281	15.922
Fertility rate	6.572	6.600	0.866	6.342	6.550	1.007	5.497	5.772	1.189
Urban population growth	5.912	5.704	2.189	5.232	5.261	1.945	4.405	4.465	1.101
Rural population growth	1.950	2.007	0.987	1.907	2.084	1.023	1.459	1.699	1.128
Age dependency ratio	0.880	0.922	0.194	0.892	0.933	0.175	0.896	0.921	0.119
Health expenditure per capita				88.465 [a]	38.75 [a]	111.848 [a]	98.936 [b]	49.875 [b]	125.020 [b]

Note: [a] 1990-94; [b] 1995-99.

Source: World Bank (2001) and author's calculations.

Table 5
Fixed-effect model

Dependent variable: Growth in real GDP

	(1)	(2)	(3)	(4)
Initial income (ln)	-7.461***	-5.803***	-8.033***	
	(0.738)	(1.638)	(1.689)	
Income$_{1975}$ (ln)				-5.761**
				(2.468)
Openness	-0.169***	-0.312*	-0.292**	-1.063***
	(0.051)	(0.184)	(0.113)	(0.356)
FDI	1.072***	1.213**	2.053***	2.468***
	(0.099)	(0.349)	(0.434)	(0.364)
Education expenditure		-0.690*	0.102	
		(0.367)	(0.363)	
Adult illiteracy	-0.174***			
	(0.033)			
Openness x income$_{1975}$		0.414*	0.039**	0.152***
		(0.022)	(0.014)	(0.0522)
Economic freedom		1.306***		
		(0.434)		
Property rights			0.618***	0.335***
			(0.214)	(0.196)
Female illiteracy				0.374**
				(0.163)
Male illiteracy				-0.280
				(0.193)
Manufacturing			0.323*	0.399*
			(0.189)	(0.201)
M2/GDP			0.099**	
			(0.041)	
Credit by the banking sector			-0.114***	
			(0.028)	
Number of observations	112	97	87	84
Adjusted R^2	0.14	0.16	0.46	0.36
F-test	1.460*	1. 479*	2.911***	2.276***

Note: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01.
Standard errors are in parentheses.

Table 6
Adjusted fixed-effect model (Caselli and Coleman 2001)

Dependent variable: Growth in real GDP

	(1)	(2)	(3)
Initial income (ln)	0.005	-1.235***	-2.265***
	(0.105)	(0.432)	(0.374)
Openness	-0.016***	-0.197***	-0.184***
	(0.010)	(0.046)	(0.034)
FDI	1.738***	1.605***	0.588**
	(0.133)	(0.172)	(0.277)
Education		0.155	
		(0.117)	
Openness x income$_{1975}$		0.020***	0.020***
		(0.006)	(0.005)
Property rights	0.495***	0.213***	0.446***
	(0.127)	(0.077)	(0.100)
Female illiteracy	0.128***		
	(0.038)		
Male illiteracy	-0.091**		
	(0.042)		
Manufacturing		0.139***	0.151***
		(0.380)	(0.032)
M2/GDP		0.077***	0.053***
		(0.014)	(0.010)
Credit by the banking sector		-0.41***	-0.032***
		(0.006)	(0.005)
FDI times Illiteracy			0.023***
			(0.004)
Number of observations	86	87	82
Adjusted R^2	0.73	0.88	0.85
F-test	26.65***	50.60***	35.66***

Note: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01.
White heteroscedasticity-consistent standard errors are in parentheses.