Openness and growth in Sub-Saharan Africa: Time series and cross-country analysis

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Abstract

This paper presents empirical evidence from a cross-section sample of thirty six Sub-Saharan African countries and time-series sample of selected seven. The evidence suggests that countries in the region that open generally tend to grow faster than those that are closed. However, the country-case study suggests that whether a particular country experiences higher output growth as it "opens up" is contingent upon its own peculiarities

1. Background

Since the Ricardo's critique of the *Corn Laws*, the idea that openness to international trade leads to higher economic growth has occupied a central position in international economic policy discourse. The increased trade and exchange liberalisation, especially among African countries since the early 1980s, and the lack of clear unambiguous empirical evidence, has triggered a lively debate as to whether openness to trade do cause better economic performance. On one side of this debate, the argument is that countries that are open to trade tend to perform better than those that are not. In fact a proponents of this view argue that there was no single example of a country that has achieved "sustained rapid growth" without experiencing a simultaneous rapid growth in trade and have low or declining barriers to trade (see for instance, Panagariya, 2004). On the other side of the debate, however, are the sceptics, who believe that it is the quality of institutions that is most important, and that openness to trade has no independent effect on growth. Rodriguez and Rodrik (2000) doubt the existence of a general and unambiguous relationship between trade openness and growth. They argue that most of the large empirical evidence linking openness to trade and higher economic growth suffer methodological problems that render such evidence subject to diverse interpretations. At theoretical level, however, a more common view appears to be that whether openness leads to higher growth is contingent on both domestic and external factors. For instance, the need for complementary policies and good quality institutions are often emphasised (see for instance, Balasubramanyam, 2003). The implication of this argument is

that openness is unlikely to lead to faster growth in those Sub-Saharan African (SSA) countries that have poor quality institutions, macroeconomic instability and lack of policy credibility. Although there are large number of empirical studies on openness and growth, a great majority of them relate to either developed countries or developing countries as a whole, mixing those of Asia, Latin America and SSA, often using what is now known as "*African dummy*" to account for the heterogeneity of the sample. The few studies that are based on African sample such as the World Bank's (1994) study are based on a group reforming countries, thereby overlooking the non-reforming ones. The objective of this paper is to empirically examine the proposition that countries that are more open to international trade tend to grow faster in SSA. This is done using both time-series and cross-section data from 36 SSA countries[1].

The rest of the paper is organised as follows: the next section reviews the theoretical and empirical literature linking openness and economic growth. Section 3 presents describes the methodology while section 4 discusses the results and section 5 concludes.

2. Literature Review

2.1. Theoretical Literature

The theoretical linkage between openness to international trade and economic growth can be found in the various strands of both trade and growth theories, each of which emphasises different mechanisms of transmission. These differences in emphasis of channels of transmission have led to a variety of empirical approaches and, hence, conclusions about the effects of openness and growth[2].

2.1.1. Trade-Based Theories

Both the static and dynamic versions of the traditional trade theories suggest that openness to international trade lead to higher national income. According to (static) traditional theories (i.e., the Ricardian and Hecksher-Ohlin theories), liberalisation of trade in the form of lower barriers generate welfare improvements as the *specialisation gains* and *exchange gains* manifest themselves into higher output than would have been possible under a restrictive

1 Unlike some of the studies motioned above, we allow data availability to determine the countries that entre our sample.

2 Excellent surveys of this literature can be found in Edwards (1993) and Rodriguez and Rodrik (2000). In this paper, we attempt to present a schematic outline of the various theoretical arguments on the link between growth and openness, emphasising the potential sources of empirical ambiguity in relation to the case of the SSA.

trade regime[3]. The dynamic versions of these traditional models, in fact, suggest that the overtime, the productivity gains are even higher due to acceleration in the accumulation of additional resources. This may be because of the higher savings made possible by higher output levels, or because of enhanced technology, forward and backward linkages in the export sector as well as x-efficiencies. The implication of these traditional models is that since openness can raise the rate of accumulation of additional resources, countries that are more open should experience higher output growth.

The new trade theories, which are attributable to the works of Krugman (1986), Brander and Spencer (1983), Dixit (1886, 1987), and Grossman (1992), however recognise that trade restrictions may be welfare-enhancing under certain conditions. The argument is that if domestic firms use such restrictions to acquire international market power, which is then used to prevent entry (e.g. especially through price wars) and increase their market shares, then lower prices and higher output may result due to economies of scale. Dynamic gains are therefore possible because there is high entry cost, high learning cost, and externalities in the protected industries. These externalities refer to those linked to accumulation of physical and human capital (education, on-the-job training, learning-by-doing), and in the production of new ideas (learn how to imitate as well as use blueprints to adapt technology, innovations, etc.). The new trade theories, therefore, justify government interventions (such as subsidies, for instance) that will enhance *spill-overs* in the economy. It is the existence of *spill-overs* in production lead to the increase in the long-run growth rate of the economy. This is so because positive spill-overs make possible constant or even increasing returns of the accumulated physical and human capital.

2.1.2. Growth-Based Theories

Whether openness has a temporary one-off effect on growth or permanent and long-term depends on which strand of the growth theory one considers. *The neoclassical growth theory* (of Solow (1952) attributes growth to exogenous technological progress, because increases in savings, on which capital accumulations depends, cannot be sustained in the long-run. According to its open-economy extension (see, for instance, Barro and Sala-I-Martin, 1995, Ben-David and Loewy, 2001), trade liberalisation may only have impact on income *level*. A

[3] Specialisation gains occur because all factors are allocated to their best uses. Exchange gains occur since production is done under least-cost conditions, free trade leads to consumption gains through both *increased choice* of goods and services and the *lower prices* for consumers than would have prevailed under autarky.

rise in savings due to trade liberalisation[4] will translate into domestic investment, almost like in the closed economy due to capital market imperfections, home country bias of investors, fear of expropriation, etc. (Schmidt-Hebbel *et al.*, 1996). This raises the level of per capita income and its growth rate up to a point when the available saving is only sufficient to cover depreciation and growth in labour force. With constant technology (exogenous), growth of output stops. The implication of the neoclassical theory is that trade policy has only a *short-term positive* impact on income level. However, Ben-David and Loewy's (2001) extension shows that if trade liberalisation allows technological improvements (say, by enhancing the extent of knowledge spill-overs), then it will be growth-inducing[5].

Within the new (endogenous) growth theories, openness can lead to higher economic growth via a number of channels[6]: first, within the so-called *AK* approach, openness can increase growth if it increases the rate of growth *reproducible* capital over and above the rate of depreciation of output[7]. Unlike in the neoclassical models, openness has an unambiguously permanent effect on growth because the externalities associated with capital accumulation, especially human capital and knowledge, allows constant or increasing returns to scale. It is worth noting here that the *AK* approach heavily relies on the assumption of constant returns to physical and human capital, which is found to have little empirical support, especially in African countries (see, for instance, Mankiw, Romer and Weil, 1992).

The Schumpeterian approach to the endogenous growth theory provides two additional channels through which openness leads to growth: one emphasises the role of international flows of ideas, goods, services, and capital (such as in Grossman and Helpman, 1991). Here, openness raises growth by reducing the impediments to the free movements of goods and these factors of production[8]. The second channel emphasises the possibility that openness facilitate the adoption and imitation of technologies already discovered in other

[4] Notice the implicit assumption here that liberalisation increases trade volumes, which in turn increases the level of income and thus increased level of saving, a link that is so indirect.

[5] Notice, however, that the liberalisation does not by itself lead to growth according to the neoclassical growth theory.

[6] The new growth theories are attributable to the works of Romer (1986, 1990), Lucas (1988), Grossman and Helpman (1992), Aghion and Howitt (1992) and Grossman (1992).

[7] The model states that $Y=AK$, where Y is the output, A is constant and K is *reproducible* capital (such as human capital or new ideas). Suppose $\partial K/\partial t=sY-\delta K$, where δ is the rate of depreciation of reproducible capital, s is the rate of saving; then $\partial K/\partial t=s(AK)-\delta K$, or $(\partial K/\partial t)/K=sA-\delta$. Since A is constant, the rate of growth of income (the same as 's' since the savings is a constant proportion of income) is equal to the rate of growth of the reproducible capital (for instance, the human capital).

[8] The theory here presupposes that these growth-enhancing factors of production will flow *into* countries that are more "open". Knowledge, ideas, etc. generated in the "less open" countries will fly out towards countries that are more open. This theory therefore acknowledges the possibility of capital flight and growth-retarding to the country of origin but growth-enhancing to the recipient.

countries (Parente and Prescott, 1994). The Schumpeterian approach therefore implies that the growth-impact of openness depends on the effectiveness of the channels and arrangements through which technology is transferred, i.e., international trade, foreign direct investment (FDI), and direct knowledge transfer via technology licensing (Hoekman, *et al.* 2004). However, because of market failure (information asymmetry and externalities) in the market transactions in technology transfer, receiving countries need deliberate policies for technology-acquisition and adoption.

2.2. Empirical Literature

The empirical evidence on the relationship between openness and economic growth is overwhelmingly positive and can be broadly divided, into two groups, based on their methodological approach. The first category follows a *two-stage* methodology, where in the first stage a positive link between exports and openness is assumed. In the second stage, they proceed to estimate the impact of exports on economic growth[9]. These studies include Balassa (1978), Greenaway and Sapsford (1994), Krueger (1990), Edwards (1993) and Frankel and Romer (1999). For this category of studies, the evidence is generally that openness (defined here as higher exports) leads to growth. The major issue of contention here is whether evidence on exports-growth link can be construed as evidence on the openness-growth link. This is because the evidence on the link between openness and exports is itself weak, especially in the context of SSA[10]. In addition, by assuming that openness leads to growth of exports, these studies have assumed away the possibility that a country with all the "right" policies to be classified as "open" could experience no rise in exports: a realistic possibility in the SSA due to, say, high commodity export specialisation.

The second category, in contrast, includes those studies that attempt to directly estimate the link between openness and growth. This methodology usually involves the use of certain measures of openness or trade policy indicators in some form of growth regressions. Such studies include Dollar (1992), Ben-David (1993), Sachs and Warner (1995), Edwards (1998), Wacziarg (1998), Greenaway *et al*. (2002), Wacziarg and Welch (2003), Wang, *et al*. (2004), Romalis (2007)[11]**.** For these studies, the major methodological issue relates to the empirical measure for the concept of "openness". This has formed the basis for most of the

[9] This is the so-called Export-Led Growth Hypothesis (ELGH)
[10] This issue is clearly both definitional and methodological, and is further addressed below.
[11] For comprehensive review of the recent empirical studies, see Rodriguez and Rodrik (1999) and Francisco **(2006)**

critical reviews of this literature (see, for example, Pritchett, 1996; Edwards, 1992, 1993, 1998; Rodriguez and Rodrik, 2000, referred to RR henceforth, and Baldwin, 2003). The various empirical measures of openness that have been devised in the literature are shown to either have low correlation with one another (such as in Pritchett, 1996) or suffer conceptual problems. Therefore they are often difficult to interpret as measuring "openness", especially because they often fail to cover all the various aspects of openness/trade policy stance (as argued by Rodriguez and Rodrik, 2000 for instance).

The difficulty in measuring "openness" stems, partly, from the lack of clear distinction between the concepts "openness" and "liberalisation". Equating these concepts as is often done in the literature, as Balasubramanyam (2003) argues, leads to confusion and erroneous policy conclusions about the role of trade policy in development. Openness is a much broader concept than trade liberalisation. In addition to liberal trade policy, it includes a variety of factors such as "economic stability (signified by low budget deficit and low rates of inflation) absence of barriers to new investments, absence of distortions in product and factor markets (which drive a wedge between private and social opportunity costs), improvements in transportation and communications and receptive to technological change". Trade liberalisation, on the other hand, has several interpretations. One of such interpretations is that it is "*a policy which eliminates tariffs on importable goods and equalises the domestic price ratio between importables and exportables with the free trade price ratio"*. A second interpretation of liberalisation is that it is *"a trade policy which is neutral in the provision of incentives between the production of importables and exportables.* A third interpretation, which is referred to as the second-best liberalisation is *"a policy which replaces non-tariff barriers such as import quotas with tariffs."* (Balasubramanyam, *op. cit.* p.11). This conceptual distinction between the concepts of trade liberalization and openness is often ignored in most empirical works partly because of the difficulty in capturing the broader aspects of openness. For instance, Dollar's (1992) two indices of openness are essentially indices of real exchange rate distortion, and of real exchange rate variability. Therefore, they are better interpreted as measuring the effects of real exchange rate distortion and variability, or at best of economic instability, than of openness. Another problem with the Dollar's indices is that Rodriguez and Rodrik (1999) found them to be sensitive to data changes and specifications[12].

[12] Dollar used the Mark 4.0 of the Summers-Heston database (1988), while Rodriguez and Rodrik used newer version Mark 5.6.

Similarly, although Edwards' (1998) cross-country regressions of nine alternative measures of openness[13] on total factor productivity (TFP) produced a robust positive relationship, Rodriguez and Rodrik (1999) show that these results are highly dependent on some questionable weighs assigned in constructing such indices and the identification assumptions.

Wacziarg (1998) estimated the effects of *trade policy* on several determinants of growth, and identifies five channels (equations) through which trade policy affects growth[14]. His strategy was to include the openness measure in estimating equations for the marginal distributions of all the determinants of growth. These include estimating equations for openness, quality of macroeconomic policy, government size, distortions channel, investment channel, technological transmission and FDI. The measure of trade policy openness is entered in all the equations except the growth equation. Although the index entered with the correct sign and is statistically significant, some important methodological issues could be raised. For instance, while some of the channels are easily measured and data readily available, others such as the quality of macroeconomic policy, extent of technological transmission and distortion (or the efficiency of the price system) are not.

Another important issue in Wacziarg (1998) is the heterogeneity of the countries in the sample. Although regional dummies were used to account for this, where they appear insignificant would suggest that the estimated parameters are the same for SSA, OECD, ASIA, and Latin America. For instance, in the FDI channel equation, all the regional dummies appear insignificant. This implies that the responsiveness of FDI to the factors included in the regression is the same for all the countries including those in SSA. This however, is not too convincing as multinational investors generally place a premium on SSA countries in their investment decision.

The most influential studies that attempt resolving these conceptual and measurement problems are Sachs and Warner (1995) and Wacziarg and Welch (2003). Both have constructed indices that appear to address most of the issues we have raised above. Sachs and Warner (1995) constructed an index of openness that combines information about several

[13] Edwards' (1998) nine measures of openness are: The Sachs-Warner (1995) openness index; the World Bank's subjective classification of trade strategies in World Development Report 1987; Edward-Leamer's (1988) openness index, built on the basis of the average residuals from regressions of trade flows; the average Black Market Premium; the average import tariffs from UNCTAD via Barro and Lee (1994); the average coverage of non-tariff barriers, also from UNCTAD via Barro and Lee (1994); the subjective Heritage Foundation index of Distortions in International Trade; the ratio of total revenues on trade taxes to total trade; and Holger Wolf's regression-based index of import distortions for 1985. He used initial income and some measures of schooling as control variables

[14] His measure of openness is based on three indicators: the average import duty rate; the NTB coverage ratio; and the Sachs-Warner's (1995) openness indicator.

aspects of trade policy. They devised five criteria upon which a dummy is assigned to a country as zero when closed and one if open. A country is deemed closed if it fails to meet at least one of the following conditions:

- it had average tariff rates higher than 40% (TAR);
- its non-tariff barriers covered on average more than 40% of imports (NTB);
- it had a socialist economic system (SOC);
- it had a state monopoly of major exports (MON);
- its black market premium exceeded 20% during either the decade of the 1970s or the decade of the 1980s (BMP).

These five criteria were chosen in order to cover various types of trade restrictions. Noting the obvious role of tariff and non-tariff barriers in restricting trade, Sachs and Werner (1995), referred to SW henceforth, argue that the existence of black market premium on exchange rate serves to restrict trade. For example, if exporters have to purchase foreign inputs using foreign currencies acquired in the black market, but remit their foreign currency earnings to government at an official rate, the black market premium acts as a restriction to trade. On the basis of Lerner's symmetry between import tariff and export taxes, they argue that Government's monopoly of major export (such as marketing boards) also acts as trade restriction. A Socialist dummy is included to account for the trade limiting aspects of centrally planned economy.

The SW openness index appears with high and robust coefficient in growth regressions. However, Rodriguez and Rodrik (2000) show that the robustness of the SW openness variable was predominantly as a result of the black market premium and state monopoly variables. They argue, therefore that the SW openness variable is not a good measure of openness for two reasons. First, the MON variable is indistinguishable from the SSA dummy. Secondly, the BMP actually captures the effects of several factors such as corruption[15], red-tepism, low capacity to enforce the rule of law, conflicts, external shocks, inflationary pressure, growing level of external debt and sheer mismanagement[16]. They

[15] Since black market premium favours corrupt government officials who trade exchange rate allocation for bribes, or round-tripping, the black market premium tends to be higher in corrupt countries.

[16] RR found high correlation of black market premium with the level of inflation, the debt/exports ratio, wars and institutional quality. In fact they found that of the 48 economies ranked as closed according to the BMP criteria, 40 had one or more of the following characteristics: average inflation over 1975-1990 higher than [10] percent, debt to GNP ratio in 1985 greater than 125 percent, a terms-of-trade decline of more than 20 percent, an institutional quality index less than 5 (on a scale of 1 to 10), or involvement in a war. (See pp. 33)

conclude that it is therefore risky to draw inferences about the effect of openness on growth based on the coefficients of SW openness variable.

Wacziarg and Welch (2003), henceforth referred to as WW, attempted to overcome these apparent shortcomings. They updated the SW dataset of openness indicators and trade liberalization dates for a wide cross section of countries in the 1990s and perform a within country study of the effects of liberalization effect on per capita income growth, investment rate and the ratio of trade to GDP.

In the within-country regressions, the WW openness variable appears to have a positive and significant effect on growth in both the 1980s and 1990s. WW also examine a sub sample of developing countries and found that the impact of trade reforms on growth differs among countries. While some countries experience large positive increases in growth after reform, others (roughly half) had zero or even negative changes in growth rates. It should be noted that the pre-existing institutional environment, the extent of political turmoil, the scope and depth of economic reforms, and the characteristics of current macroeconomic policies all play a significant role in determining the extent to which economic growth responds to trade policy reforms[17].

In summary, the literature survey highlights several dominant issues in empirical research on the impact of openness on growth. First, although the theoretical effect of openness on growth is positive in both traditional growth and trade models, some versions of the new growth theory, such as that of Grossman and Helpman, suggest that this needs not be. Such positive effect is conditional upon the presence of international knowledge spill-over, without which openness could have a negative effect on growth. In such models as Parente and Prescott's (1994) models of technology adoption, countries that do not possess the requisite infrastructure for the imitation and adoption of new technology (including the requisite human capital stock) may not experience higher growth following trade liberalisation. At empirical level, the literature seems to generally support the idea that trade openness has a positive effect on economic growth. However, the general problem lies in the definitional and methodological difficulties in capturing the concept of openness.

[17] This is in line with the critique of Rodriguez and Rodrik (2000). WW also noted that generalisation about factors that are responsible for the differences in the extent of growth response to trade reform among these countries is difficult to draw; thus confirming Rodriguez and Rodrik's (2000) conclusions about the contingency of the openness-growth relation across countries.

3. Methodology

3.1. Model Specification

Following the conventional methodology, the model specification starts with a general production function (equation 1) in which GDP (*Y*) is modelled as a function of labour (*L*), capital stock (*K*) and technological change (*A*). The subscripts *i* and *t* denote country and time respectively.

$$Y_{it} = f\left(A, K_{it}, L_{it}\right) \qquad \textbf{(1)}$$

Technological change, *A,* is assumed to be endogenously determined, consistent with the new growth theories. In less developed countries, new technologies are primarily acquired though FDI. Hence, countries that receive higher FDI flows are more likely to have experience faster technological change, ceteris paribus. In addition, countries that are more open to international trade are more likely attract more FDI according to Balasubramanyam, *et al.* (1996), and to experience faster technological change. The term *A* can be represented as[18]

$$A = g\left(FDI, Open\right) \qquad \textbf{(2)}$$

where "*Open"* is an indicator of (a dummy for) trade policy regime, with 1 for countries open to trade and 0 otherwise. Substituting equation 2 into equation 1 yields:

$$Y_{it} = f\left[K_{it}, L_{it}, g\left(FDI, Open\right)\right] \qquad \textbf{(1a)}$$

Following Balasubramanyam, *et al.* (1996) and Hoekman *et al*. (2004), we can introduce exports as an additional factor input into the production function (equation 1a) for three reasons. Firstly the neutrality of export orientation (i.e. trade openness) is likely to lead to higher factor productivity because of the exploitation of economies of scale, better utilisation of capacity and lower capital-output ratios. Secondly, exports are likely to alleviate the foreign exchange constraints and thereby provide greater access to international markets. Thirdly, exports are likely to increase the rate of technological innovation and dynamic learning from abroad. Thus adding exports (*X*) to equation 1a yields:

[18] It is assumed that FDI is associated with externalities, learning by watching and spill-overs, as well as direct transfer and diffusion of new technologies.

$$Y_{it} = f\left(K_{it}, L_{it}, FDI_{it}, Open, X_{it}\right) \quad \textbf{(3)}$$

Taking the logs of equation 3 and differencing yields:

$$y_{it} = \alpha_0 + \alpha_1 k_{it} + \alpha_2 l_{it} + \alpha_3 fdi_{it} + \alpha_4 open_{it} + \alpha_5 x_{it} + \varepsilon_t \quad \textbf{(4)}$$

Where the lower case letters denote the rate of growth of the individual variables and the parameters α_0, α_1, α_2, α_3, α_4 *and* α_5 are elasticities of output with respect to domestic capital, labour, FDI, openness, and exports respectively.

Since the effect of *FDI* on growth also depends on the countries trade regime (Balasubramanyam, *et al., 1996),* we can add the interaction of *FDI* and Openness as an additional explanatory variable. Thus, the final estimation model can be written as:

$$y_{it} = \alpha_0 + \overset{+}{\alpha}_1 k_{it} + \overset{+}{\alpha}_2 l_{it} + \overset{+}{\alpha}_3 fdi_{it} + \overset{+}{\alpha}_4 open_{it} + \overset{+}{\alpha}_5 x_{it} + \overset{+}{\alpha}_6 fdi * Open + \varepsilon_t \quad \textbf{(5)}$$

The theoretically expected signs are indicated above each coefficient.

3.2. Data and Source

Because of the lack of data on capital stock for most SSA countries, we use the rate of growth of gross domestic capital formation (GCFGR) to represent the growth rate of domestic capital. This proxy is widely used in the literature. The variable FDI is measured as the ratio of inward stock to GDP (FDI/GDP). Exports, *x,* is measured by the growth rate of exports (EXGR). The variable *l* is measured by the growth rate of the labour force. The dependant variable y is measured by the growth rate of GDP. The data for the all variables are obtained from the World Bank's *Word Development Indicators*.

The openness variable (*Open*) has no unique measure and, as noted above, has been a subject of continuing debate. Instead of using the widely used ratio of trade to GDP, which is subject to interpretational difficulties, we used broader alternatives constructed by Sachs and Warner (1995) and updated in Wacziarg and Welch (2003). These are OPEN99SW for our cross-country regressions and LIBR for the time series analysis. OPEN99SW is a dummy variable constructed based on five criteria listed above: a country that has met at least one of these criteria during the period under consideration is considered "open" and is assigned 1, and zero otherwise. The liberalisation dates variable, LIBR, is a dummy variable that takes the value of 1 for any years after when any of the five SW criteria are continuously met, and zero otherwise. As noted above, these indices combine information on several aspects of

trade policies and are therefore likely to be better measures of openness than the traditional trade to GDP ratios. The data is obtained from Wacziarg and Welch (2003: pp.7).

The data for the cross-section study is obtained from a sample of 36 countries, while that of the time-series study is obtained from seven countries. In both cases, countries are selected on the basis data availability.

4. Results and Discussions

The model shown in equation 5 above was estimated by Ordinary Least Squares (OLS) method using Microfit®. The estimated result would be used to provide answers to the following specific research questions: (*1) Do more open countries (defined in the sense of meeting the SW criteria) grow faster in the SSA? (2) Do exports and FDI positively affect growth in the SSA? (3) Are exports and FDI more efficient in open countries than in closed ones in influencing growth?*

We attempt to answer the first question by analysing the openness variable in the both cross-country and within-country growth regressions. The answer is affirmative if the coefficient of the openness variable is positive and statistically significant. The second question is answered by analysing the significance of exports growth rate and FDI variables in the cross-country regressions. Positive and significant coefficients would suggest an affirmative answer. For the third question, we assess the interaction terms[19] of (a) the openness variable and exports (OPENEXGR) and (b) the openness variable and FDI (OPENFDISW) in the growth regressions. Positive and significant coefficients would imply that FDI and exports are more efficient in inducing growth in open countries than in closed[20] or in liberalised regimes than in protected regimes[21].

Tables 4.1 to 4.3 show the estimated results from various specifications of the cross-country and time series regressions. For comparative purposes, the cross-country regression is estimated with a ten and five-year average data (1990-2000; and 1995-2000) as shown in Tables 4.1 and 4.2 respectively. In Table 4.3, we present the results of the time series regressions for the sample of seven SSA countries.

The last six rows of the tables display the diagnostics for the estimated equations. The Adjusted R-Squared ranges from 0.21 to 0.80. This suggests that the estimated model

[19] Openness times FDIGDP; and openness times export/GDP
[20] Cross country regressions.
[21] Within-country regressions

explains, fairly well, the growth performance of the SSA[22].. The diagnostic tests for the validity of the OLS assumptions suggest the absence of such econometric problems at 5% level for all the specifications.

Table 4.1: **Cross-country regression result for the period 1990-2000**

1990-2000	**Dependent Variable**				
Independent Variables	1 GDPGR	2 GDPGR	3 GDPGR	4 LGDP	5 GDPPCGR
INTERCEPT	1.3 [0.064]**	0.911 [0.145]	-1.97 [0.090]**	6.33 [0.00]*	-5.25 [0.003]*
FDIGDP	0.048 [0.255]	0.023 [0.948]		-0.140 [0.029]**	0.035 [0.903]
GREXP	0.075 [0.135]	0.074 [0.177]	0.073 [0.014]**		0.132 [0.071]***
LEXP				0.628 [0.029]**	
GRLABOR			108.02 [0.014]**		101.56 [0.094]***
LLABOR				0.839 [0.00]*	
GCFGR	0.170 [0.016]**		0.120 [0.061]***	0.043 [0.029]**	0.004 [0.961]
WAR	-1.25 [0.086]***			-0.279 [0.262]	
OPENFDISW	0.516 [0.280]	0.104 [0.813]			2.38 [0.012]**
OPEN99SW	1.49 [0.066]***	2.103 [0.016]**	1.825 [0.040]**	0.439 [0.038]**	
OPENEXGR			0.065 [0.527]		
PRI65				0.020 [0.000]*	
R-Squared Adjusted	0.36	0.23	0.41	0.80	0.21
SC (F-Version)	0.549	0.617	0.686	0.654	0.294
FF (F-version)	0.051†	0.124	0.05†	0.119	0.450
NORM	0.621	0.083	0.590	0.160	0.182
HETR (F-version)	0.120	0.146	0.213	0.052†	0.171

NOTES: *, **, *** Significant at 1, 5, and 10 % respectively figures in brackets are t-statistic
The variables defined as follows: FDIGDP is the ratio of net FDI inflow to GDP; GREXP is the growth rate of exports; LEXP log of exports of goods and services; GRLABOR growth rate of labour force; LLABOR is the log of labour force; GCFGR is the growth rate of gross capital formation; WAR is a dummy variable for war and major conflict; OPEN99SW is the SW openness variable, OPENFDISW the interaction of openness variable and FDI; OPENEXGR is the interaction of openness and exports; PRI65 id the rate of enrolment of primary school in 1965; GDPGR is the growth rate of GDP; GDPPCGR is the growth rate of Per Capita GDP; and LGDP is the log of GDP. SC is test statistic of Serial Correlation; FF is the Ramsey Reset Test for specification error; NORM is the normality test of the residual; and HETR is that test for Heteroscedasticity. † is significant at 10%; ‡ not significant.

[22] It is noteworthy that in a time series regression, the R-Squared should be high (tending towards unity) to warrant a good statistical fit. In cross-section regressions, however, the R-Squared need not be that high to warrant a satisfactory explanatory power of the model.

Table 4.2: Cross-country regression result for the period 1995-2000

1995-2000	**Dependent Variables**				
Independent	1	2	3	4	6
Variables	GDPGR	GDPGR	GDPGR	GDPPCGR	GDPGR
INTERCEPT	-5.67	1.76	-0.85	-3.03	-0.027
	[0.014]**	[0.158]	[0.638]	[0.118]	[0.986]
FDIGDP	-0.09	0.14	0.14	0.166	0.15
	[0.459]	[0.137]	[0.115]	0.085***	[0.09]***
EX/GDP		0.02	0.02	0.015	
		[0.407]	[0.387]	[0.510]	
GREXP	0.054				
	[0.253]				
GRLABOR	199.79		102.20	66.25	102.21
	[0.000]*		[0.063]***	[0.226]	[0.062]***
GCFGR	0.17	0.25	0.20	0.093	0.194
	[0.029]**	[0.000]*	[0.001]*	[0.089]**	[0.001]***
WAR	-0.61	-2.05	-1.86		-2.05
	[0.471]	[0.032]**	[0.043]**		[0.022]**
OPENFDISW		-0.33	-0.33		-0.30
		[0.333]	[0.312]		[0.347]
OPEN95SW	1.54			1.75	
	[0.085]***			[0.06]***	
OPENEXGR		0.20	0.22		0.19
		[0.031]**	[0.018]**		[0.024]**
R-Squared Adjusted	0.39	0.41	0.46	0.22	0.47
SC (F-Version)	0.805	0.832	0.659	0.240	0.543
FF (F version)	0.136	0.311	0.352	0.510	0.340
NORM	0.885	0.921	0.700	0.480	0.592
HETR (F)	0.958	0.559	0.730	0.467	0.478

All notations are as defined in Table 4.1

Table 4.3: Time series regression results for a selection of Sub-Saharan African Countries

	***Dependent Variable:* GDPGR**						
Independent Variables	*1* ***Botswana***	*2* *South Africa*	*3* *Uganda*	*4* *Ghana*	***5*** ***Zambia (LOG)***	***6*** ***Burkina Faso LOG***	***7*** ***Cameroon***
INTERCEPT	-50.06 [0.000]	6.45 [0.006]	-0.29 [0.958]	8.60 [0.047]	16.99 [0.000]	7.31 [0.000]	-16.76 [0.023]
FDIGDP	-0.38 [0.085]	-0.00 [0.708]	-0.173 [0.824]	-2.56 [0.019]	-0.003 [0.581]	-0.11 [0.094]	-0.42 [0.711]
EXGDP (LEX)	1.22 [0.000]				-0.06 [0.213]	0.72 [0.00]	0.30 [0.152]
GREXP		0.034 [0.521]	0.012 [0.779]	-0.05 [0.131]			
GRLABOR ***(LLABOR)***	43.13 [0.675]	-160.25 [0.073]	40.33 [0.883]	-0.000 002 [0.008]	0.34 [0.000]	6.22 [0.669]	-3.74 [0.048]
GCFGR	0.06 [0.004]	0.22 [0.000]	0.11 [0.038]			0.77 [0.923]	
GCF/GDP				0.53 [0.005]	0.002 [0.236]		1.03 [0.000]
LIBR	40.72 [0.001]	-1.78 [0.002]	4.91 [0.170]	8.2 [0.002]	-0.05 [0.072]	0.20 [0.114]	4.47 [0.057]
LIBFDI	0.67 [0.014]			1.42 [0.267]		0.39 [0.032]	
LIBEX	-0.95 [0.000]						
R-Squared Adjusted	0.81	0.90	0.52	0.53	0.77	0.97	0.46
SC (F)	0.396	0.117	0.922	0.598	0.846	0.900	0.780
FF (F)	0.381	0.535	0.350	0.352	1.00	0.506	0.250
NORM	0.052†	0.260	0.081†	0.000‡	0.769	0.170	0.543
HETR (LM)	0.317	0.331	0.112	0.214	0.377	0.964	0.759

NOTES: LIBEX is the interaction term of exports and liberalisation variable, LIBFDI is the interaction term of FDI and the liberalisation variable, they are analogous to the OPENEXGR and OPENFDISW respectively. For equations 5 and 6, all the variables are the logs of the levels except FDIGDP. All other notations are as defined in Table 4.1 above.

4.1.1 Do more open countries grow faster in the SSA?

Interestingly, the openness variable in the cross-section regression appears to be 'correctly' signed and is statistically significant for both datasets and in all specifications. From Table 4.1, OPEN99SW is positive and statistically significant at the 10% level in Equation1, and 5% in Equations 2, 3 and 4. This suggests that, *ceteris paribus*, "open" countries in the SSA have higher rates of growth of GDP than "closed" countries during the period 1990-2000. The magnitudes of the coefficients imply that on that average, open countries tend to grow at an annual rate of between 1.5 and 2.1 percentage points faster than those that are closed. The magnitude is similar for the period 1995-2000 (see Table 4.2). The coefficient of the

openness variable is positive and statistically significant at 10%. With the magnitude of 1.54, it suggests that during that period, open countries grew at an annual average of 1.54 percentage points faster than those that are closed. Similarly, Equation 4 of the Table 4.2 suggests that, on the average, the per capita GDP in the open countries grew at 1.75 percentage points faster than those that are closed.

The above result is consistent with the theoretical arguments in favour of openness. This is especially so according to the endogenous growth theory which postulates the possibility of openness (via trade and technology transfer) to have positive impact on not only the level but also the rates of growth of income. On the empirical angle, the result is in support of the findings of Krueger (1978)[23], Dollar (1992), Ben-David (1993), Sachs and Warner (1995), Rodrik (1997), Edwards (1998), Wacziarg (1998) and Wacziarg and Welch (2003) who all found robust positive relationship between openness and growth.

Although the above result suggests that open countries grow faster than closed countries, we need to ask the question "how reliable is this result in the context of time and country peculiarities?

The answer to this question requires case studies of these countries. The time-series regression allows us to observe in more detail the nature of these relationships without assuming away the peculiarities of the countries and their changes over time. This is undertaken by estimating the same model using a time series data for seven SSA countries for the period 1970-2001[24].

The results shown in Table 4.3 suggest that the relationship between openness and growth is indeed contingent on the countries' characteristics. While all the coefficients of the openness variable (LIBR) are positive and statistically significant in some countries (i.e., Botswana, Ghana, and Cameroon), it appears negative and significant for South Africa and Zambia.

What does this suggest? Do the negative signs contradict the theoretical expectation? No. It *may* indeed lend some support to the Schumpeterian approach to the endogenous growth theory, which emphasises the role to technology and knowledge spill-overs in the relationship between openness and growth. In such a model, trade openness may promote or retard growth depending on the nature of technological progress and the extent to which

[23] Although Krueger's dummy for different control regime phases did not appear significant when entered directly in the regression, her two-stage methodology suggests that trade policy positively affects GNP via higher exports.

[24] These countries are Botswana, Burkina Faso, Cameroon, Ghana, South Africa, Uganda and Zambia. However, the data for Botswana is only available from 1980

technology and new ideas can be adopted[25]. However, while we can conclude that openness negatively impacted on the growth of *some* countries in the SSA, we cannot confirm the channels in this study. A more detailed case study of these countries is required to determine why for instance in South Africa, a non socialist economy with no commodity marketing board, the GDP growth rate declined in the 1990s despite the massive reduction in its average tariff (to 9.05%), non tariff barriers and black market premium relative to the 1970s and 1980s level. Suffice it to say, we fail to find evidence for the universality of a positive link between openness and growth in the SSA. In fact, what we find is more of a support for Sachs and Werner who argue that the relationship between openness and growth is contingent on host of country and external characteristics.

4.1.2 Do FDI and exports positively affect growth in the SSA?

The impact of FDI on the growth process of the SSA countries appears to be inconclusive. Tables 4.1 and 4.2 shows the estimated coefficient of FDI is sensitive to changes in period and functional form of the model. It appears to be inconsistent in terms of statistical significance and sign. For instance, during the period 1990-999, the coefficient of FDI possesses the expected sign but statistically insignificant in equations 1, 2 and 5. In equation 4, however, it is statistically significant but incorrectly signed (Table 4.1). In contrast, for the period 1995-2000 the coefficient of FDI is correctly signed but statistically insignificant (Table 4.2). However, when we made the growth rate of *per capita* output the dependent variable, the coefficient of FDI is positive and significant (equation 4)[26]. The inconsistency of the estimated coefficient of FDI implies that the cross-country study does not provide sufficient evidence in support of a positive link between FDI and economic growth in the SSA.

Looking at the time series, however, the coefficient of FDI is negative in all the seven countries selected but it is significant only for Botswana, Ghana and Burkina Faso. This implies that for these three countries, FDI had impacted negatively on their output growth.

The negative sign of the FDI coefficient is not in conflict with the theory. The role of FDI could be growth enhancing or retarding depending on the existence of competition and some complementary factors. Balasubramanyam and Muhambare (2003) argue that the major

[25] In fact, Grossman and Helpman show that both the initial stock of knowledge and the ease with which technology can be adopted determine whether the negative competition effect on profit outweighs the positive integration and redundancy effects generated by openness to trade. Also trade without knowledge spill-overs may result in decline in the growth rate of output for economies with lower initial stock of knowledge. See section 2.1.2 above.

[26] This however, is not robust to period as can be seen in equation 5 of Table 4.1

channel through which FDI contributes to development of the host country is the spill-overs, and that volumes of FDI alone are unlikely to generate widespread spill-overs in the absence of competition and co-operant factors such as local R&D and human capital skills. FDI is more of a catalyst rather than the prime mover of growth. Balasubramanyam, *et al.* (1999) show that FDI is most effective as an agent of change in countries that possess a threshold level of human capital and skills. In those countries which have attained a threshold level of economic growth. Because of the low level of human capital and near complete absence of local R&D, It is therefore not surprising that FDI retards, instead of boosting, the growth process of some SSA countries.

The coefficient of exports is positive in all periods and specifications. However, it is statistically significant in equations 3, 4 and 5, but insignificant in equations 1 and 2 (Table 4.1). Interestingly, where the coefficient appears consistently significant, the dependant variable is the growth rate of per capita GDP and the log of the GDP. The coefficient of the log-linear specification can be interpreted as the elasticity of the GDP level with respect to export. In other words, it captures the extent to which output level increases as a result of a unit increase in the level of exports. The positive and significant coefficient therefore *suggests that there is evidence in support of a positive effect of exports growth on the level of output (equation 4).* This is consistent with the neoclassical growth theory, which suggests that exports may increase the *level* of output but not its growth rate. Also, in the context of the new growth theory (the Schumpeterian approach), exports in the absence of international knowledge spill-overs may not lead to increases in the growth rate of output. Given the low level of knowledge stock in the SSA relative to its trading partners, exports may not significantly affect their economic growth rates of output.

In the time series regressions, however, evidence for a positive growth effect of export on GDP growth is only found in Botswana and Burkina Faso. This suggests that exports may not be the engine of growth universally.

4.1.3 Are exports and FDI more efficient in influencing growth in open countries than in closed ones?

To answer this question, we analyse the interaction terms of FDI and the openness variable (OPENFDISW), and the interaction of exports and openness (OPENEXGR) in the cross-country regressions. However, OPENEXGR is not robust to period and functional form of the regression. In Table 4.1 the coefficient of OPENEXGR is positive but statistically not different from zero (equation 3). *This suggests that there is no evidence that, on the average,*

open countries' exports are more efficient in enhancing output growth in the region during the period 1990-2000. However, for the period 1995-2000, as shown in Table 4.2, the evidence *suggests that exports in open countries have stronger and positive influence on output growth*. The coefficient of OPENEXGR in all the equations appears positive and statistically significant at the 5% level (equations 2, 3 and 6). With a coefficient of about 0.2, it implies that exports of open countries contribute to output growth by 0.2 percentage points more than it does in the closed countries. This is plausible because exporters in open countries have greater incentive to increase production for exports because they have all the proceeds from the exports as they pay no export taxes and they face low or no black market premium whenever they need foreign exchange to import inputs.

Similarly, the coefficient of OPENFDISW for the period 1990-2000 (Table 4.1) is positive but statistically insignificant except in equation 5 where the growth rate of GDP *per capita* is the dependent variable. However, for the 1995-2000 period, the coefficient is negative in all the equations (equations 2, 3 and 6) but statistically insignificant. This suggests *no evidence in support of the argument that FDI tends to have higher efficiency in countries that are more open in the SSA sample*. This is plausible since most FDI in these countries tend to be in the extractive sectors or in sectors where production technology tends to be low. Another reason why FDI may not be more efficient in these SSA countries could be the absence of effective competition from the local firms due to a gap in technology or the absence of local R&D as argued by Balasubramanyam and Muhambare (2003).

5. CONCLUSIONS

This study attempts to contribute to the openness-growth debate by using the updated Sachs and Werner's openness indicator to empirically investigate the openness-growth link in the context of SSA. We estimated cross-country growth regressions with OLS using a sample of 36 SSA countries during two sub periods: (1990-2000) and (1995-2000). We also estimated a time-series regression for a sub-sample of seven countries in order to account for the effects of country characteristics that may not be possible to capture in the cross-country study. We attempted to answer three major questions relating to the openness-growth debate. These are: (1) Do more open countries grow faster in the SSA? (2) Do exports and FDI positively affect growth in the SSA? (3) Are exports and FDI more efficient in influencing growth in open countries than in closed ones?

From the cross-country study, we found that some evidence that open countries in the region tend to grow faster than those that are closed. However, within-country evidence

reveals that while in some countries (such as Botswana, Ghana, and Cameroon) open regimes are associated with faster growth rates, in others (such as South Africa) open regimes had slower (in fact, negative) growth rates of output. We conclude, therefore, that the relationship between openness and growth is a contingent one.

We also found positive effects of exports on output level and growth rate of per capita output, but not on growth rates of output in the cross country. In the time series study, exports have positive effects on output growth rates only in Botswana and Burkina Faso, We therefore conclude that while exports generally contribute to output and its growth, it needs not be the engine of growth in some countries within the region.

On the role of FDI on output growth, we fail to find a strong evidence of positive effect either on output growth, level or growth of per capita output in the cross-country study. In the time series regression, however, FDI appears to have negative effects on output growth in Botswana, Ghana and Burkina Faso.

Whether exports and FDI are more efficient in inducing growth in open than in closed economies is open to debate as we fail to find conclusive cross-country evidence for FDI. For exports, however, we find some evidence in recent period (1995-2000) but not in earlier period (1990-2000).

One policy implication of these findings is that SSA countries should direct their efforts in reducing tariff rates, non-tariff import barriers, reducing or eliminating the black market premium, abolish export commodity boards, reduce excessive government involvement in economic activities and encourage private sector growth.

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