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Globalization, Growth, Inequality and Poverty in Africa

A Macroeconomic Perspective

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Abstract

The last two decades has witnessed an increase in globalizing influences affecting most countries, Africa included. These influences have arisen partly as a result of domestic and international policies, such as trade policies, and partly as a result of general globalizing impulses, such as technological developments and enhanced communications. The single overarching objective of this paper is to outline the macro evidence on the extent to which globalization is taking place and poverty is reducing in Africa, and to consider this to both characteristics of the region (i.e., within the region) and relative to other global regions. It draws on some of the most recent evidence about the globalizing processes in various forms so as to try to determine the speed and extent of globalization in Africa. This helps to put into proper perspective the impact of globalization on poverty and inequality. It is essentially a partial and descriptive approach, at best indicative of associations, and stops short of attempting to identify, empirically, channels of influence and causal relationships.

Keywords: globalization, inequality, poverty, Sub-Saharan Africa

JEL classification: O11, O55, I30

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Acronyms

CSGR	Centre for the Study of Globalization and Regionalization
EGI	economic globalization index
FDI	foreign direct investment
PGI	political globalization index
PG	poverty gap
SGI	social globalization index
SSA	Sub-Saharan Africa
WENAO	Western Europe, North America, Oceania

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1 Introduction

The last decade or so has witnessed the process of globalization; a process characterized by an increasing degree of market openness and more integration—between countries and within the global economy more generally (Nissanke and Thorbecke 2005). Market openness is reflected in increasing cross-border movement in goods, people, capital, and the transfer of technology and information. While the globalizing forces in respect of commodities and, to some extent, of factors, stem from the increasingly liberalized international policy regime of the 1980s and 1990s (Dollar 2005), evidence on the degree or the extent of globalization in its various manifestations is not easy to assemble at the individual country level, and still less so at a regional or world level. In particular, while there are some assertions, there is much less by way of hard evidence on the extent of globalization in Sub-Saharan Africa (SSA) relative to other regions, and on what impact increasing global interdependence is having on poverty in countries in Africa.¹ There is also relatively little knowledge about the channels of impact of globalization on poverty in African countries.

This paper has one single overarching objective. It is to outline the macro evidence on the extent to which globalization is taking place and poverty is reducing in Africa, and to consider this in relation to both characteristics of the Africa region (i.e., within the region) and relative to other global regions. This draws on some of the most recent evidence about the globalizing processes in various forms in order to try to determine the speed and extent of globalization in Africa. This is potentially important in helping to put into proper perspective the likely impact of globalization on poverty and inequality. It is therefore essentially a partial and descriptive approach, at best indicative of associations, and is therefore not analytically rigorous enough to identify the channels of influence and possible causal relationships discussed by Nissanke and Thorbecke (2005) and by Bourguignon (2004).

Some important previous studies take a similarly broad perspective and examine the evidence on globalization, inequality and the poverty nexus in Africa. In particular, in a broad-ranging paper, Geda and Shimeless (2005) examine many patterns of association between social and economic variables, including poverty, inequality and openness, in an attempt to establish whether there is a causal link between greater global interdependence and poverty. Likewise, Kayizzi-Mugerwa (2001) addresses the same issue, but with reliance on evidence from selected African countries, though with less reference to poverty and inequality indicators. Various reports, in particular by UNECA (1999, 2004, 2005) and UNCTAD (2002, 2003, 2004a and 2005) provide very useful and extensive statistical and economic analyses around these broad issues. Several other papers empirically examine aspects of globalization, growth, and/or poverty and inequality more formally in an African context. These include Christiaensen, Demery and Paternostro (2003), who examine some macro and micro perspectives on growth and poverty; Collier and Gunning (1999) who review the empirical evidence on Africa's relatively poor growth performance; and many country-specific studies (econometric and simulation studies). The present paper does not attempt to replicate any of this previous work, but instead the attempt is to look afresh at some of the most recent empirical evidence.

¹ Throughout this paper 'Africa' is used synonymously with 'Sub-Saharan Africa' (SSA) unless otherwise stated.

2 The Sub-Saharan Africa region in a global context

2.1 Identifying trends in globalization, growth, poverty and inequality

To make any significant headway in identifying the channels of impact of globalization on poverty in Africa, it is helpful to find ways of tracking the broad globalizing features of African countries, both over time and relative to other countries and regions. For analytical purposes there are clear advantages in seeking quantifiable evidence, as there are obvious difficulties in relying on qualitative evidence, even though some facets of globalization are extremely hard to quantify.

Globalization via trade

Many writers suggest that globalization is a process that has several interpretations (Bigsten and Durevall 2003), though it is universally recognized to reflect increasing global integration, not just from the liberalization of commodity and factor markets, but also of cross-border movements of labour and capital, transfers of incomes and technology, and an increase in communication and the flow of information between countries. It is probably true that most research has focused on economic globalization, and most often on trade liberalization. There are two good reasons for this. Obviously, one is to do with tractability and, in particular, measurability. Estimates of exports of goods and non-factor services are routinely assembled as part of countries' national accounts and balance-of-payments statistics, and, moreover, they are internationally comparable. International movements of capital, human migration, and international

Table 1
Global comparisons of trade openness and growth

	1980-84	1985-89	1990-94	1995-99	2000-04
Trade openness ¹ : (X+M)/GDP					
Sub-Saharan Africa	55.4	53.0	54.8	60.1	65.3
Latin America and Caribbean	27.3	29.2	32.0	39.3	43.4
South Asia	19.2	17.8	22.4	27.5	32.6
East Asia	29.2	36.6	50.7	59.8	73.9
E Europe and Central Asia	na	na	59.1	67.3	73.9
Middle East and North Africa	57.6	41.5	59.7	54.0	56.9
World total	37.9	36.6	38.8	43.9	48.5
Sub-Saharan Africa (with country weights) ²	69.3	65.3	68.6	70.4	75.7
Growth of GDP per capita (average annual) ³					
Sub-Saharan Africa	-1.2	-0.2	-2.0	0.8	1.5
Latin America and Caribbean	-0.8	0.3	1.7	0.9	0.8
South Asia	3.2	3.6	2.8	4.0	3.7
East Asia	5.7	6.2	7.7	5.4	6.5
E Europe and Central Asia	na	na	-5.4	1.6	5.3
Middle East and North Africa	0.7	-1.2	1.8	1.7	2.5
World total	0.5	2.0	0.8	1.7	1.6

Note: na = not available

Sources: ¹⁾ World Bank (2005) (calculated from current US\$ estimates);

²⁾ Own calculates based on World Bank (2005);

³⁾ Average annual % (World Bank 2005).

transfers of technology are more difficult to track. But besides the data issue there is a second good reason. Trade liberalization is a policy-determined influence and it is relatively more tractable to analysis than might be the case with many other kinds of globalizing influences, especially those involving social and political variables. Empirically, trade liberalization is usually measured via outcome variables such as trade openness (Sachs and Warner 1995) or via policy input measures such as average tariff rates or quota restrictions.

In order to examine some features of globalization trends in Africa relative to other global regions, in Table 1 we show some summary data on performance in SSA in respect of trade openness, alongside evidence on economic growth, over the period 1980 to 2004. Estimates are shown for 5-year periods for each of regions (low- and middle-income countries) where comparable data are available. Clearly, such selectivity over periods of time can be problematic because we may miss events and macro features of individual years. However, this span covers the period when many African countries embarked on economic reform programmes, and it includes the decade or so of their aftermath.

Turning first to the evidence on trade openness, following Sachs and Warner (1995) we use a measure of trade intensity, that is, imports plus exports relative to GDP (measured in current US\$). Three important issues about measuring trade intensity should be noted. First, *ceteris paribus*, one would expect the ratio to decline with income, so if a ratio for a region is based on country ratios weighted by GDP, then this is likely to be lower than an equivalent ratio using (equal) country weights. Second, if trade and GDP are valued at PPP units, then the ratios are also likely to be lower (as GDP in PPP prices for low-income countries are higher than in current dollars, while trade values would remain the same). Table 1 is therefore based on average trade intensity measured in current US dollars. Third, the ratio is likely to be affected by country- or region-specific effects, which has led some researchers to control for these factors before making comparisons across regions.

The first panel of Table 1 shows the expected general trend towards greater openness over the two decades across all global regions between 1980 and 2004, based on GDP weights. The trend is not uniform, either across regions or over time, and this is an important feature. At first sight, openness in SSA is higher than other regions in almost all years shown, but this is potentially misleading because of region-specific factors (IMF 2005). Low levels of per capita income, geographical location, and the composition of trade (predominantly exports of primary goods and imports of manufactured and capital goods) make African countries relatively more dependent on trade (relative to their income) (UNCTAD 2004b). Average trade intensity has increased in Africa in line with the overall global increase, but not as rapidly as almost all other low- and middle-income regions. East Asia increased from 29 per cent in 1980-84 to 74 per cent in 2000-4; and Latin America and South Asia also increased by more than Africa. Table 1 also shows the trade intensity ratios for Africa calculated with equal country weights. They confirm expectations that the ratios are considerably higher than those with GDP weights although the trend between each 5-year period is broadly comparable.²

² Averages are based on those countries for which trade intensity ratios have been recorded. So the estimates are subject to errors due to composition.

In spite of the increase in trade intensity, Africa's share of total world trade has fallen over these two decades.³ UNCTAD (2003) attributes the reasons for this downturn to the region's primary commodity dependence and the structure of international trade, and to market access and the agricultural policies of industrialized countries. Similarly, Bigsten and Durevall (2003) suggest two conflicting inferences; either that Africa has not globalized, at least to the same extent as other regions, or, that it has done as well as it could, given its underlying geography and characteristics. But the reduction in the share of total world trade and the increase in the trade intensity ratio are consistent with the relatively poor performance of Africa in terms of economic growth. There are also endemic obstacles to intra-African trade through high transaction costs (non-tariff barriers, and poor infrastructure) (UNCTAD 2004b).

Relying solely on trade intensity as an indicator of trade liberalization is problematic, and still more so as a measure of globalization, because there are many factors that may influence the ratio besides liberalization policies. Some researchers prefer to use a policy-input measure, such as average tariff rates (weighted or unweighted) but this does not necessarily take into account the full consequential effect of tariffs and non-tariff restrictions. And finding the tariff equivalents of non-tariff restrictions is difficult. Pritchett (1996) and others consider a 'structure-adjusted trade intensity' measure along with other alternative measures of outward orientation. He corrects trade intensity for structural characteristics (size, GDP per capita and resource endowment characteristics) similar to the Chenery-Syrquin adjustments in measuring country typologies. This is also similar to controlling for region fixed-effects. Table 1 therefore needs to be interpreted with some caution.

Growth

Relative growth performance of Africa compared with other regions is shown in the lower panel of Table 1. The table confirms the now well-established fact that Africa's growth performance (GDP per capita) has been worse, period by period, than any other region since 1980, with the possible exception of Eastern Europe prior to economic reform. In fact, more detailed estimates show this to be so throughout the decade of the 1990s, with growth rates also being predominantly negative. However, a reversal occurred in 2000 and 2001, and the most recent estimates suggest that per capita growth is continuing to rise sharply, with rates of 2.1 and 2.8 per cent being recorded in 2003 and 2004 (ADB 2005). Many authors offer explanations for the relatively poor performance, such as economic policy failures, low levels of education and skills of the labourforce, poor infrastructure, conflict and political instability, rent-seeking behaviour (Bigsten and Durevall 2003), poor institutions (Acemoglou, Johnson and Robinson 2001). What the table does not adequately show is the relatively strong growth performance in the Africa region since 2002, relative, that is, to performance before 2002, although growth is still low compared with other regions.

The link between trade and growth has been examined by many authors, most prominently recently by Frankel and Romer (1999), Dollar and Kraay (2002) and Rodriguez and Rodrik (1999), Greenaway, Morgan and Wright (1998), and with the literature usefully reviewed in an Africa context by Hammouda (2004). Whether there is

³ UNCTAD (2003: Table 1) reports Africa's share of world exports falling from about 6 per cent to 1.5 per cent, and imports from 5 per cent to 1.5 per cent (merchandise trade) over the period from 1980 to 2002.

a causal link, or a correlation that is controlled by other factors, is still a matter of some controversy. However, the estimates in Table 1 suggest that global regions which showed the greatest increase in openness also experienced the fastest growth, and that Africa recorded relatively little increase in openness and slow growth in this period.

Globalization via foreign direct investment

Since the early 1990s many developing countries have enhanced their efforts to attract foreign direct investment (FDI), and the most successful have been those engaged in exporting fuels and mining products and fast-growing exporters of manufactures (UNCTAD 2005). Within Africa, as in any of the global regions, there is considerable variance across countries in this regard. However, the relative increase in growth of FDI has sometimes been used as another indicator of globalization (Geda and Shimeless 2005), partly to indicate the degree of integration into world capital markets. Table 2 shows estimates of FDI flows (inflows and outflows combined) expressed relative to GDP and (net inflows) as shares of the total net FDI received by developing countries, in both cases shown at the regional level.⁴ Because FDI is a relatively volatile measure

Table 2
Global comparisons of FDI

	1980-84	1985-89	1990-94	1995-99	2000-04
	Foreign direct investment: FDI(I+O)/GDP (%) ^{1,a}				
Sub-Saharan Africa	0.30	0.50	0.72	2.04	2.74
Latin America and Caribbean	0.83	0.75	1.17	3.26	3.16
South Asia	0.07	0.10	0.23	0.68	0.67
East Asia	0.57	0.90	2.99	3.98	3.13
Eastern Europe and Central Asia	0.06	0.07	0.47	2.22	2.81
Middle East and North Africa	0.46	0.47	0.91	0.76	1.08
World total	0.54	0.77	0.84	2.00	2.64
Sub-Saharan Africa (with country weights) ²	0.84	0.94	1.31	4.53	4.56
	Foreign direct investment: FDI ^{1, 2, b} (regional shares of total) ^c				
Sub-Saharan Africa	0.06	0.09	0.04	0.04	0.06
Latin America and Caribbean	0.47	0.42	0.31	0.40	0.34
South Asia	0.01	0.02	0.02	0.02	0.03
East Asia	0.31	0.35	0.51	0.37	0.33
Eastern Europe and Central Asia	0.01	0.02	0.10	0.15	0.21
Middle East and North Africa	0.13	0.10	0.04	0.02	0.03
Developing countries as a share of world total	0.21	0.12	0.26	0.26	0.18

Notes: a) I (inflows) and O (outflows);

b) Net inflows only: net inflows dominate net outflows in these regions;

c) Regional shares of total net inflows across the six regions. (These may include flows between regions.)

Sources: 1) World Bank (2005) (average annual ratios);

2) Own calculations based on World Bank (2005).

⁴ Clearly, shares of the total can only be calculated for net figures. Inflows of FDI greatly exceed outflows for Africa. But the opposite may be true in the case of private capital flows other than FDI.

Table 2 again shows estimates smoothed as 5-year averages. The top panel does confirm the marked increase in FDI relative to GDP over the 25-year period, and especially in the last decade. Africa does better than most other regions, increasing from 0.30 per cent in the first period to 2.74 per cent in the final 5-year period. The same ratio based on (equal) country weights suggests an even greater increase, reflecting the high ratios in some very low-income countries (e.g., Chad). In terms of the regional shares of FDI, the estimates are far less favourable to Africa. The second panel shows that around 6 per cent of total net FDI inflows to developing countries have accrued to Africa throughout this period. The increase in the share of world FDI that was received by developing countries in the 1990s (a globalizing feature?) did not significantly impact on Africa: Africa's share fell to 4 per cent of the total during this period.

Poverty

There are also significant and well-known conceptual problems in making poverty comparisons. There is a choice to be made between income and non-monetary based measures, and in the case of the former, a selection of poverty lines and appropriate aggregate poverty measures to account for the chronic and hard-core poor. Table 3 simply shows estimates of income poverty (based on the \$1 a day international poverty line) taken from the latest published estimates by Chen and Ravallion (2004). For Africa the estimates are significant. They show little or no progress over the two decades, in fact, quite the reverse. Based on this measure, the number of poor increased in this region, almost doubling from about 164 million to 313 million. Over the same period, the world total fell, largely due to a dramatic reduction in the number of poor in China and a modest reduction in India.⁵ Table 3 shows that the proportion of the world's poor in Africa rose from about 11 per cent in 1981 to approximately 29 per cent in 2001. In terms of headcount indices, which normalize these poverty estimates to levels of population, the results look somewhat different. For Africa the incidence of poverty is approximately constant, between 44 and 46 percent, for much of the two decades although a slight rise is perceptible on a year-on-year basis (Chen and Ravallion 2004: Table 3). Using the world headcount ratio as a benchmark, we see that the outcome for the Africa region is far worse; the relative size of the poverty incidence increased sharply, the ratios rising from just over 1.0 in 1981, to 1.65 in 1987 and well over 2.0 in 2001.

Inequality

There are very few comparative estimates of levels and changes in inequality on a global or regional basis. As in the case of poverty, we focus only on income (or expenditure) inequality. Milanovic (2005) and Ravallion (2004) identify several significant issues in measuring inequality. These issues are due not only to the scarcity of data but also to alternative conceptual bases for measurement. In particular, Milanovic⁶ distinguishes between inter-country inequality (concept 1, country weights), international inequality (concept 2, population weights) and global inequality (concept 3, this includes intra-country inequality). Thus, with access to individual-level data from

⁵ Note that these results are sensitive to the choice of the poverty line. With a \$2 a day measure, while the number in poverty in SSA still rises dramatically, and very nearly doubles, the world total now rises, but less sharply. This is due to quite different outcomes for China and India: over this period the fall is less dramatic for China while there is now an increase for India.

⁶ Milanovic (2005) refers to these as 'concept 1', 'concept 2' and 'concept 3' inequality, respectively.

household surveys, the true spread of incomes (concept 3) is a combination of inequality within countries and between countries.⁷ Milanovic (2002) estimates regional inequality (using Gini coefficients) for broad regional groups, corresponding close to the years 1988 and 1993. His global (concept 3) estimates are reproduced in Table 4a.

The results show a general world increase in inequality during this period, together with a corresponding increase in Africa. Inequality changes in other regions vary considerably, with slight reductions in Western Europe, North America, Oceania (WENAO) and in Latin America, a sharp increase in Eastern Europe, and a comparable increase in Asia to that of Africa.

Detailed analysis and decomposition for Africa suggest that this overall increase for Africa arises from a slight decline in intra-country inequality, a sharp increase in between-country inequality and (in consequence) a reduction in the ‘overlapping’ component. Nevertheless, the between-country inequality in Africa is a good deal lower than the between-country inequality in Asia.

From the point of view of assessing the impacts of globalization at the country level (within the Africa region, or within other regions), estimates of inter-country inequality (based on country Ginis, using country weights) might be more appropriate. Table 4b shows estimates taken from Milanovic (2003) for countries in Africa compared with the rest of the world, for the decades of the 1970s, 1980s and 1990s. The evidence is

Table 3
Global comparisons of poverty trends

	1981	1987	1993	1996	2001
Income poverty ¹ (headcount ratios)					
Sub-Saharan Africa	41.6	46.8	44.1	45.6	46.4
Latin America and Caribbean	9.7	10.9	11.3	10.7	9.5
South Asia	51.5	45.0	40.1	36.6	31.3
East Asia	57.7	28.0	24.9	16.6	14.9
Eastern Europe and Central Asia	0.7	0.4	3.7	4.3	3.6
Middle East and North Africa	5.1	3.2	1.6	2.0	3.4
World total	40.4	28.4	26.3	22.8	21.1
Ratio: SSA/World	1.03	1.65	1.68	2.00	2.20
Income poverty ² (numbers million)					
Sub-Saharan Africa	163.6	218.6	242.3	271.4	312.7
Latin America and Caribbean	35.6	45.1	52.0	52.2	49.8
South Asia	474.8	473.3	476.2	461.3	431.1
East Asia	795.6	425.6	415.4	286.7	271.3
Easter Europe and Central Asia	3.1	1.7	17.5	20.1	17.0
Middle East and North Africa	9.1	6.7	4.1	5.5	7.1
World total	1481.8	1171.2	1207.5	1097.2	1089.0
Ratio: SSA/World	0.11	0.19	0.20	0.25	0.29

Sources: ¹ Chen and Ravallion (2004: Table 3); based on international poverty line (\$1.08 1993 PPP);

² Chen and Ravallion (2004: Table 4); based on international poverty line (\$1.08 1993 PPP).

⁷ Of course not all inequality measures are exactly decomposable. For the Gini coefficient, which is not decomposable, Milanovic (2002, 2005) includes an ‘overlapping’ component.

fragmentary, with few African countries having comparable individual-based household survey data in these decades. Nevertheless, the results do confirm that intra-country inequality in Africa does appear to be higher than in the rest of the world (Milanovic 2003). This is further confirmed by a finer rest of the world regional breakdown reported by Geda and Shimeless (2005) based on UNECA (1999).⁸ What is even more noteworthy from Tables 4a and 4b is that the degree of income inequality in Africa has increased sharply between the 1980s and the 1990s.

Table 4a
Regional Gini coefficients in 1988 and 1993

	1988	1993
Africa	42.7	48.7
Asia	55.9	61.8
Latin America & Caribbean	57.1	55.6
Eastern Europe	25.6	46.4
Western Europe, North America, Oceania (WENAO)	37.1	36.6
World	62.8	66.0

Note: 'Africa' includes north Africa: only 8 of the 12 countries included in the dataset (common sample) were from SSA. The results are based on household survey data.

Source: Milanovic (2002: Tables 10 and 16).

Table 4b
Regional Gini Coefficients over time

	Africa	Rest of world
1970s	47.0	34.2
1980s	41.0	36.9
1990s	45.9	37.8

Source: Milanovic (2003: Table 2) (calculated from the WIID dataset, and based on the relatively few countries for which Gini coefficients have been estimated for all periods).

2.2 Measuring globalization: a composite index

The issue of whether outcome measures or input measures are most appropriate cuts across whether globalization is, or should be, viewed as a phenomenon under the control of domestic policymakers (e.g., domestic trade policy), or whether it is a global phenomenon which is outside a country's control (communications, technology, trade policy of other countries) and is therefore exogenously determined. Studies have generally considered facets of globalization such as trade, FDI, and capital flows, and the changing role of institutions and democratic processes as separate phenomena. There have been a few attempts to construct globalization indices which embrace more than just measures of trade and take into account some additional non-economic as well as economic factors.

Responding to an initial attempt by Kearney (2001), Lockwood (2004) and subsequently Lockwood and Redoano (2005) have recently constructed an all-

⁸ Survey comparability might be an issue here. Milanovic (2003) includes only individual-based household surveys, whereas the latter include household-based household survey evidence.

embracing CSGR⁹ index applied at country, region and world levels annually for the period 1982-2004. The overall index is a composite (an unweighted average) of three indices: an economic globalization index (EGI), a social globalization index (SGI) and a political globalization index (PGI). The EGI is based on four variables, all measuring international flows, standardized with respect to GDP; these include trade (the standard openness measure), foreign direct investment, portfolio investment, and factor income remittances. The SGI is constructed from nine variables, four are included in a 'people' sub-index and five are in an 'ideas' sub-index. The 'people' sub-index includes stocks and flows of foreign population, and tourists, expressed as proportions of total population, and worker remittances as a proportion of GDP. The 'ideas' sub-index includes phone calls, internet users, the sum of books and newspapers imported and exported and mail, all expressed per capita. The PGI is derived from three variables; the numbers of embassies in country, and UN missions and international organizations in which the country participates. Each variable is normalized (actually, 'panel-normalized', so as to enable comparisons to be made across countries and over time), weighted and aggregated to form EGI, SGI and PGI indices for each country. The unweighted average of these indices yields an overall globalization index for each country. The regional indices are a weighted average of country indices, where the weights are equal to individual country GDP (at PPP values). The regional indices are, therefore, susceptible to composition effects as more countries enter the sample over time.

Clearly, whatever virtues the index may have in indicating changes in globalization processes over time or in making comparisons of globalizing influences across countries or regions, there are many problems and deficiencies of the CSGR index too. The choice of variables is obviously crucial. A major influence in the choice is the availability of data, and the 16 variables listed above represent a first attempt based on a reasonable coverage of data. However, Lockwood and Redoano have attempted to choose variables that measure outcomes, rather than policy inputs directly. Also, for the trade openness measure especially, geographic and economic characteristics (such as population size, land area, and isolation) will influence the outcome measure. So what they do is to control for country characteristics in the measures of all their economic variables.

Table 5 shows the CSGR index results at a regional level, concentrating only on the economic globalization index (EGI) and the overall index. The movement of the EGI for SSA shows an increase from a value of 0.034 in 1983 to a value of 0.123 in 2004. By way of comparison the 2004 figure does not reach the value achieved in western Europe at the beginning of the period in 1983 of 0.139; although the index for this region only rose to 0.160 in 2001. Better comparators might be the South Asia region or the Latin American and Caribbean region. The former started at an even lower value of 0.009 in 1983 and rose to 0.146 in 2004: evidence of a much stronger globalizing outcome. The latter started higher at 0.094 and rose less strongly to 0.123 in 2001. In SSA a big shift occurred in the early 1990s; the index rose from 0.080 in 1993 to 0.126 in 1997, with little change since then. The SGI and PGI indices (not shown) reflect similar sluggish movement, both over time and in comparison with other regions. For SSA the overall index of globalization shows a slightly stronger gradient in outcomes than we observe from the EGI alone, as in all regions and hence at the world level. But in 2004 it still falls well behind South Asia, although it seems to be on a par with Latin America and the Caribbean.

⁹ Centre for the Study of Globalization and Regionalization, University of Warwick: www.csgr.org

Table 5
CSGR globalization index

Region	1983	1987	1990	1993	1997	2000	2004
(a) Economic Globalization Index							
Sub-Saharan Africa	0.034	0.058	0.064	0.080	0.126	0.128	0.123
Latin America and Caribbean	0.094	0.096	0.102	0.103	0.112	0.120	0.123
South Asia	0.009	0.021	0.023	0.133	0.139	0.144	0.146
East Asia and Pacific	0.113	0.107	0.114	0.112	0.122	0.135	0.138
Eastern Europe and Central Asia	0.025	0.013	0.002	0.010	0.122	0.133	0.130
Middle East and North Africa	0.046	0.049	0.057	0.076	0.079	0.097	0.105
North America	0.115	0.118	0.121	0.123	0.132	0.136	0.133
Western Europe	0.139	0.134	0.140	0.142	0.152	0.174	0.160
World	0.111	0.113	0.115	0.119	0.132	0.143	0.140
(b) Overall Globalization Index							
Sub-Saharan Africa	0.020	0.054	0.075	0.126	0.206	0.237	0.270
Latin America and Caribbean	0.080	0.135	0.179	0.251	0.268	0.238	0.286
South Asia	0.008	0.023	0.030	0.353	0.408	0.359	0.394
East Asia and Pacific	0.171	0.198	0.235	0.281	0.316	0.413	0.524
Eastern Europe and Central Asia	0.024	0.014	0.002	0.021	0.332	0.323	0.376
Middle East and North Africa	0.055	0.069	0.097	0.169	0.182	0.228	0.313
North America	0.363	0.371	0.489	0.664	0.764	0.786	0.872
Western Europe	0.254	0.277	0.343	0.537	0.555	0.670	0.754
World	0.242	0.264	0.320	0.455	0.513	0.583	0.675

Notes: Sources of data are set out at www2.warwick.ac.uk/fac/soc/csgr/index/guide/sources/

Source: Lockwood and Redoano (2005).

Other empirical evidence on relative levels and changes in globalization between regions and over time does exist but is similarly fragmentary. Heshmati (2005) computes several composite indices of globalization, for example, one is based on the *Kearney Foreign Policy* index which combines a similar vector of components (but with equal weights) and a second which extracts the principal components of this vector (and hence has unequal weights). Amongst several methodological differences to the CSGR index, Heshmati relies on a balanced panel of data and hence the total number of countries included is only 62 worldwide. Of this total, only five countries from SSA are included in his dataset.¹⁰ Nevertheless, SSA emerges near the bottom of the rank order of world regions on the basis of all indices of globalization.

The evidence is flimsy and we have to be cautious by not putting too much weight on the precise numerical scores, but the evidence is nevertheless quite compelling. Sub-Saharan Africa has not ‘globalized’ at the same pace, or to the same extent, as that of any other world region. It lags way behind what have been the outcomes in other regions where poor countries are also predominantly found. It may also be the case that the ways in which African countries are linked to the rest of the world are different, so that a scaling up of linkages might not be sufficient to reduce inequality and poverty in the region. This evidence on the slow rate of integration might also help to put into context some measures of other outcomes, including performance in terms of growth, poverty and inequality discussed earlier.

¹⁰ The countries are Nigeria, Botswana, South Africa, Senegal, Kenya and Uganda.

3 Assessing the evidence across countries in Africa

Against this background of the average broad trends and performance of Africa (SSA) relative to other global regions, there is much variation across and within the countries of the region. This variation and, in particular, the relatively poor performance of particular countries obviously explain the aggregate performance. There has been a recent and quite dramatic upturn in the growth performance in Africa (SSA) as a whole. But there is, as yet, only very limited evidence in terms of how this translates into poverty reduction. However, it is useful to examine some features of this macroeconomic performance more deeply and to set this against particular country characteristics.

3.1 A typology approach to the analysis of globalization and growth performance

Table 6 shows some comparisons of globalization and growth performance in subgroups of countries, chosen according to different criteria. Note that the analysis is based on averages across countries with country weights. Clearly this has the disadvantage that small countries are given the same weight as large countries, but is consistent with the use of country weights in standard regression analysis. Also, there has been no attempt to exclude outliers, although all the subgroups are sufficiently large that outliers do not affect the average values unduly. The analysis is restricted to two periods within the past decade, roughly the second half of the 1990s and the first half of the 2000s, primarily to identify any broad changes over time but in the most recent period. Comparisons are made in terms of real GDP growth, real GDP growth (in non-oil sectors), real GDP per capita growth, trade intensity (trade to GDP ratios), FDI to GDP ratios, and the terms of trade. All of the reported measures are annualized averages, in real terms, and hence are smoothed and broadly comparable.¹¹ The distinction between GDP and non-oil GDP is based on a treatment suggested by IMF (2005). We assume for the latter that they simply exclude the oil (extraction and refining) sectors but it is, of course, difficult to account for the indirect effects on other sectors.

One long-standing basic hypothesis suggests that countries' growth performance may be inextricably linked with their natural resource endowments, especially minerals and oil. Some evidence on recent growth performance across oil and non-oil-producing countries is reproduced as the first typology in Table 5. A comparison of growth performance in terms of real GDP and real GDP per capita¹² confirms that oil-producing countries have experienced higher growth rates on average than non-oil-producing countries in both periods. Even when the oil sectors are excluded, the disparity remains. Interestingly, the trade intensity ratio is much higher (in both periods) in oil-producing countries, although the ratio increased slightly, on average, in non-oil-producing countries between the first and second periods. Confirming expectations, the

¹¹ The analysis may also be subject to exclusion bias, as small numbers of countries are excluded from parts of the analysis, due to absence of data. Missing observations have simply been treated as 'missing'.

¹² Note that, as these averages are based on country weights, and exclude some countries for which data are not available, the estimates are not consistent with the aggregate SSA estimates shown in Table 1.

FDI/GDP ratios are considerably higher on average in oil-producing countries: oil attracts FDI inflows. The estimates show a slight increase, on average, in oil countries between the two periods and a slight fall in non-oil countries. Also the terms of trade index indicates a rising trend for oil countries, and a falling trend for non-oil countries. A cursory analysis of these results suggests that oil-producing countries may have had a tendency towards experiencing faster growth (and not necessarily confined to the oil sectors) and to have become more globalized than has been the case in the non-oil producing countries.

A second analysis is shown in Table 6 with respect to resource intensity levels and geographical aspects, as suggested by Sachs and Warner (1997) and Collier and Gunning (1999).¹³ Again, the results reveal expected outcomes. Resource-intensive countries¹⁴ have consistently grown faster on average than resource-poor countries, and have generally had higher trade intensity ratios, higher FDI/GDP ratios (high prices of key commodities attracting new exploration projects from overseas), and rising terms-of-trade indices (although lower on average than the benchmark year 2000). The average difference in performance between the coastal and landlocked categories of resource-poor countries is also discernable in both periods, though the differences are not dramatic. Coastal countries on average grew slightly faster (in terms of real GDP growth, real non-oil GDP growth, real GDP per capita growth), and the average trade intensity was higher. However the FDI/GDP ratios were lower, though not by a margin that would suggest an appreciable difference. The terms of trade indices for the coastal resource-poor countries are approximately the same in both periods and are falling for landlocked resource-poor countries, suggesting a pattern (a divergence) consistent with the other indicators.

The third typology tackles a division between relatively fast- and relatively slow-growing countries. In the 5-year period, 1990-94, many African countries recorded low, even negative average annual rates of growth; the overall average growth rate (country weights) was -0.2 per cent. Faced with the choice of subdividing countries into those above and below this average and those with positive and negative average growth rates, it was decided to go along with the latter. On this basis 25 countries were deemed to be relatively fast-growing and 17 relatively slow-growing. Either way, there are some anomalies: Zimbabwe is categorized as fast-growing and, on the chosen split, South Africa is deemed to be slow-growing. Nevertheless, in spite of the arbitrariness of the division the results are noteworthy. The fast-growing countries (in 1990-94) continue to have an average growth rate (of real GDP or GDP per capita) that exceeds that of previously slow-growing countries, but oil appears to explain most of this, because the comparison of average real non-oil GDP growth in the two subsequent periods shows very little difference and even a suggestion of a reversal in the second period. The globalization indicators, trade intensity and FDI/GDP ratios confirm expectations: with relatively high average ratios for the previous fast-growers.

¹³ The classifications are based on Collier and O'Connell (2004).

¹⁴ These include all the oil-producing countries, with the exception of Chad and the Cote d'Ivoire (which were not included because their oil reserves were discovered only relatively recently), plus Botswana, Guinea, Namibia, Sierra Leone and Zambia.

Table 6
A typology of growth and globalization trends in SSA countries, 1995-2005

Subgroups	Real GDP growth		Real GDP growth (non-oil)		Real GDP per capita growth		Trade intensity		FDI/GDP		Terms of trade (Index: 2000=100)	
	1997-01	2002-05	1997-01	2002-05	1995-99	2000-04	1995-99	2000-03	1995-99	2000-03	1997-01	2002-05
	Oil-producing countries ²	4.3	6.2	5.0	5.8	4.3	2.6	97.3	94.3	10.7	11.0	85.3
Non-oil-producing countries	2.8	3.8	2.8	3.8	2.2	1.3	63.7	71.6	3.2	2.8	104.3	99.2
Resource-intensive ³	7.3	7.0	4.5	6.1	2.9	3.1	85.4	81.1	6.8	8.9	89.1	95.7
Coastal resource-poor	4.0	3.4	4.0	3.2	1.8	1.1	69.6	80.9	2.7	3.1	104.2	105.0
Landlocked resource-poor	2.9	3.7	2.9	2.7	1.5	1.0	58.6	64.7	3.2	4.2	105.7	95.5
Fast growers in 1990-94 ¹	7.1	3.9	4.7	3.6	1.5	4.1	85.6	87.9	8.1	5.0	98.0	93.1
Slow growers in 1990-94	2.9	5.0	3.2	4.0	-3.2	0.6	60.1	67.5	2.3	4.1	102.0	103.3

Notes: 1) 'Fast growers' are those countries whose average annual rate of growth of GDP per capita in the period 1990-94 was positive, the average for SSA in this period was -0.2 (see Appendix).

Sources: 2) The categories are based on classifications in IMF (2005);

3) The categories are based on classifications in IMF (2005) which are in turn based on Collier and O'Connell (2004).

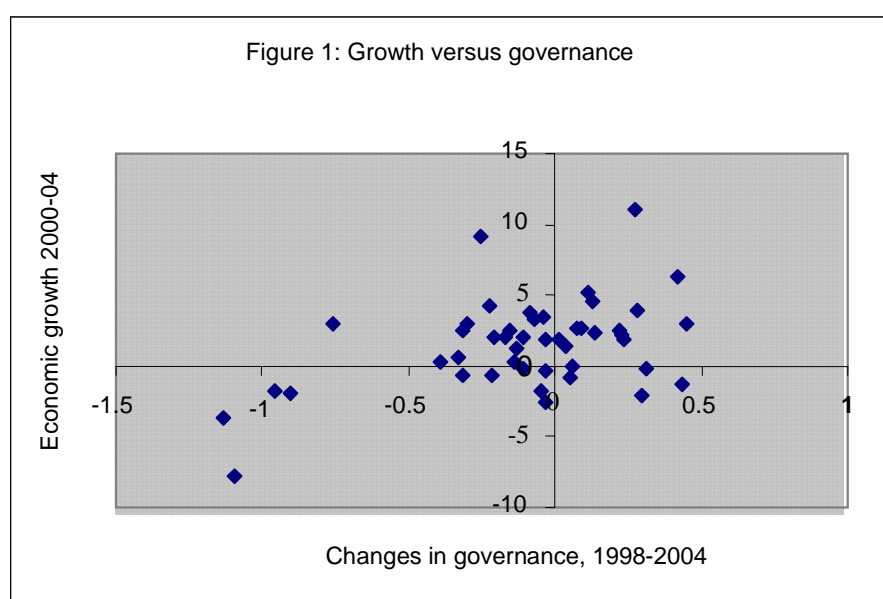
The typologies considered here can be extended further. The work of Dollar and Kraay (2004) has been key to distinguishing the performance (in growth and poverty reduction) between 'globalizers' and 'non-globalizers' (defined according to trade intensity ratios) while Birdsall and Hamoudi (2002) suggest that these categories are closely aligned to 'least-' and 'most-' commodity dependent countries (UNCTAD 2003 and 2004). These are not pursued here but there is a point to be made that the alternative classifications are not necessarily orthogonal, and may indeed be highly correlated, as is already apparent in the three typologies selected above.

The overall picture of globalization and growth performance in Africa in the last decade gained from this typology analysis is quite pronounced. There seems to be a considerable variation across countries, and some clear differences between subgroups defined according to their natural resource endowments (especially oil), to geographical features (landlocked versus coastal), and according to growth experience in the immediate previous 5-year period. The analysis is cursory, relying on averages, and with averaging over two periods of approximately five years so that some important variations may have been smoothed out. Nevertheless the differences between all subgroups are large and systematic, indicating that the following conclusions may be robust. There seems to be some association between growth and globalizing features (as measured by trade intensity and FDI/GDP ratios), and between natural resource endowments (including oil) and globalization. Clearly this is simply a cursory analysis based only on averages. It does not take into account within-subgroup variation, nor

does it control for other factors that might affect the association, so causality cannot be inferred.

3.2 Globalization, growth and governance

Many authors now attribute at least part of Africa's poor growth performance to poor governance, weak or inappropriate institutions, and continuing conflict (Sachs and Warner 1997; and Bigsten and Durevall 2003),¹⁵ the combination of which creates impediments to the accumulation of capital and the necessary structural change. Continuing the theme of exploring patterns and associations between key variables measured at the country level, the first relationship considered is between the change in a country's governance and growth in GDP per capita. Governance is measured using the Kaufmann governance indicator (Kaufmann, Kraay and Mastruzzi 2005) which is a composite indicator based on six indicators of governance.¹⁶ Figure 1 shows the plot between the change in the aggregate governance indicator (1998-2004) and the average annual growth in real GDP per capita (2000-04), the underlying assumption being that if there is a relationship, it should be observed between growth and a change in governance over a longer horizon. From the plot there is a discernible positive association between these variables, confirmed by a sample correlation coefficient of 0.459 (p-value: 0.0014), which suggests the linear association is highly significant.

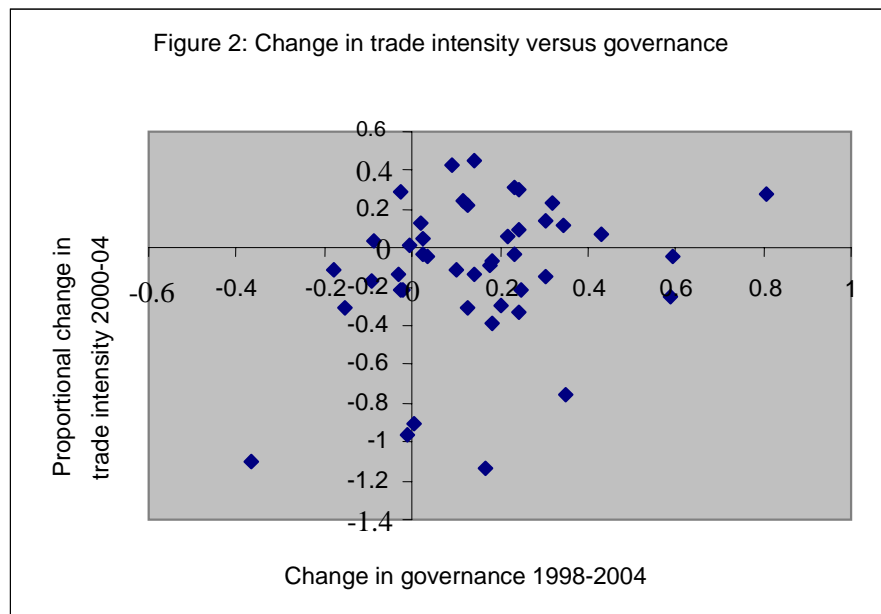


Note: Own calculations based on observations for 46 African countries.

Source: World Bank (2005); Kaufmann, Kraay and Mastruzzi (2003/2005).

¹⁵ Plus several classic papers on institutions and growth referred to and providing the background to the report by the Commission for Africa (2005), which places a heavy emphasis on the improvement of governance as a key to growth and poverty reduction in Africa.

¹⁶ The six components are (i) voice and accountability, (ii) political stability, (iii) government effectiveness, (iv) regulatory quality, (v) rule of law, and (vi) control of corruption. Each component in each country is assessed on a scale from -2.5 to 2.5. Our calculations are based on an unweighted average of these six component indicators.



Note: Own calculations based on observations for 46 African countries.

Source: World Bank (2005); Kaufmann, Kraay and Mastruzzi (2003/2005).

In Figure 2 a second association is explored between governance (as defined above) and the change in the trade intensity. Again, to smooth out as much volatility in the annual openness ratios as possible, the change in trade intensity is measured as the proportional change in the averages of the trade openness ratios in the periods 1995-99 and 2000-04. Again, the plot is indicative of some positive association (an improvement in governance being associated with more openness), confirmed by a correlation coefficient of 0.277 although this is not statistically significant (p-value: 0.069).

The Kaufmann governance indicators are based on a wide range of responses about the quality of governance at the country level, derived from expert groups, institutes, NGOs and international organizations. They are predominantly subjective but are widely regarded as reputable indicators. The plots in both Figures 1 and 2 are only intended to be indicative of relationships and, at best, do just that. Formal (often panel data-based econometric) analyses of governance and economic performance in Africa are already underway (e.g., Amin, Bussari and Ntilivamunda 2005). There is also a view that governance may be endogenous. Hence it might be important to heed caution in putting too much reliance on bivariate associations and to recognize there may be a multiplicity of causal factors in the governance, growth, globalization nexus. Sachs (2003) is prominent in cautioning not to place all the weight on a single-factor explanation of growth and development and, while Acemoglu, Johnson and Robinson (2001) and others show that institutions and governance are important contributory factors, but so are geography, health and human capital, etc. (Sachs 2003). The focus in the present paper is on the growth, globalization (and poverty) nexus, hence it is sufficient to indicate that governance may be a related factor, alongside resource endowments and geography, and more credence ought not to be inferred from it than this.

3.3 Evidence on globalization at the country level in Africa

For completeness, Table 7 shows some results from calculations of the EGI for countries in Africa (Lockwood and Redoano 2005). The table includes only those countries for which sufficient data were available to compute the index between 1983 and 2004. Some countries enter the series during this period. This is a problem and is due entirely to the lack of data. There are also significant country omissions, such as Ghana, Tanzania, Uganda, Madagascar, Burundi and Ethiopia, some of which figure

Table 7
Economic globalization index for countries in Africa (SSA)

	1983	1987	1990	1993	1997	2000	2004
Angola							0.219
Benin			0.079	0.100	0.101	0.097	0.084
Burkina Faso	0.094	0.098	0.094	0.102	0.099	0.099	0.089
Botswana	0.183	0.201	0.159	0.136	0.163	0.154	0.135
Côte d'Ivoire	0.134	0.128	0.128	0.124	0.146	0.145	0.154
Cameroon		0.081	0.085	0.083	0.102	0.115	0.114
Congo, Rep.					0.202	0.194	0.195
Comoros	0.047	0.039	0.029	0.038	0.048	0.030	0.033
Cape Verde						0.085	0.097
Gabon					0.129	0.136	0.134
Guinea						0.093	0.102
Guinea-Bissau							0.096
Kenya	0.116	0.115	0.129	0.168	0.137	0.136	0.127
Liberia	0.146	0.126	0.128	0.132	0.137	0.107	0.091
Mali							0.131
Mozambique							0.151
Mauritania				0.138	0.113	0.110	0.119
Mauritius			0.168	0.131	0.128	0.132	0.127
Malawi	0.105	0.109	0.109	0.100	0.137	0.150	0.128
Namibia							0.144
Niger	0.089	0.098	0.097	0.099	0.088	0.093	0.180
Nigeria		0.157	0.181	0.210	0.193	0.202	0.101
Rwanda	0.060	0.058	0.050	0.058	0.067	0.064	0.069
Sudan							0.097
Senegal	0.135	0.095	0.100	0.093	0.111	0.120	0.124
Sierra Leone	0.054	0.082	0.104	0.084	0.055	0.084	0.090
Sao Tome and Principe	0.017	0.002	0.000	0.025	0.057	0.082	0.125
Swaziland	0.195	0.213	0.210	0.219	0.204	0.201	0.223
Seychelles			0.090	0.078	0.100	0.129	0.129
Togo	0.137	0.129	0.131	0.102	0.121	0.127	0.131
South Africa					0.119	0.126	0.135
Zambia					0.135	0.136	0.121
Zimbabwe	0.091	0.104	0.106	0.127	0.151	0.123	0.072

Note: Some countries are excluded owing to the lack of data necessary to compile the index to date. These include Burundi, Central African Republic, Eritrea, Ethiopia, Ghana, The Gambia, Equatorial Guinea, Lesotho, Madagascar, Mayotte, Somalia, Chad, Tanzania, Uganda, Congo Democratic Republic.

Source: Lockwood and Redoano (2005).

prominently in empirical and analytical work on globalization and poverty in Africa.¹⁷ Viewing and comparing the outcomes for 2004, the results suggest that Swaziland is the most globalized African country, closely followed by Angola, and that Comoros is the least globalized. According to Lockwood and Redoano's calculations, a half of the 25 countries for which estimates exist are less globalized in 2004 than they were in 2000. Overall, the mixed picture across countries is a significant feature of the table. Some countries appear to show signs of steady globalization (South Africa, Cameroon), some show a downward trend (Liberia), some show U-shaped tendencies (Côte d'Ivoire) and others are inverse U-shaped (Zimbabwe, Nigeria). So the average trends for Africa reported earlier (Table 5) subsumes considerable variation across countries. Clearly, these results are questionable, and may say as much about the inadequacies of the data and methodology than about the level or trends in globalization. On the other hand, the fact that there is so much variation, with few countries showing striking changes, may confirm the view that Africa is not showing significant signs of globalization.

3.4 Evidence on change in poverty levels at the country level in Africa

Evidence on the level and change in (income) poverty in Africa (SSA), either at the all-Africa level or country level across Africa, is relatively scarce (Ali and Thorbecke 2000). There has been a sequence of important studies by Ravallion, Chen and associates (most recently, for example, Chen and Ravallion 2004) in attempting to make international poverty comparisons at the global and regional levels. This project has helped significantly in assembling a database of household surveys, although there are well-known issues of data quality and comparability, both between surveys for individual countries (i.e., over time) and across countries, that make comparisons difficult. In their study making international poverty comparisons Chen et al. rely on a small number of countries, and benchmark their poverty comparisons to international poverty lines, including the \$1 per day (\$30.42 per month) line.

Ali and Thorbecke (2000) assess the level and change in poverty in Africa based on secondary information for 16 SSA countries (representing about 47 per cent of the total population of SSA). As in the present paper, their objective is mainly descriptive and uses countries as the units of observation. However, instead of using absolute poverty lines (e.g., international poverty lines) they estimate relative poverty lines, but build in a non-proportional variation of the poverty lines with income, thereby avoiding the usual assumption that 'poverty changes over time are not affected by the growth in mean income' (Ali and Thorbecke 2000: 13). Their study focuses on an analysis of rural versus urban poverty, the relationship between the change in poverty and the change in mean income and the change in distribution (inequality). Their results show that change in inequality matters, especially as regards the results for urban poverty. Importantly, the research is based on secondary data generated by Povcal, a programme for calculating poverty measures from grouped data developed by Chen, Ravallion and associates (Chen and Ravallion 2004).

In this section we also use Povcal, but advance one stage further into the realm of secondary data, by generating some observations on poverty (headcount ratios) and

¹⁷ The introduction of countries (or complete omission) into the EGI for SSA is also problematic for interpreting the regional index. Countries are weighted by GDP (PPP) to form the aggregate index, so the EGI index is affected as and when countries are included, and the weights are adjusted.

inequality (Gini coefficients) for selected African countries from PovcalNet. PovcalNet generates these summary statistics based on grouped data drawn from a databank of household surveys for selected countries, and chosen poverty lines. The default poverty line is the PPP-based \$1 a day international line, although this can be varied. In view of the availability of this database and software, PovcalNet was applied to all the datasets available for African countries, selecting those countries for which there are at least two household surveys. This gave rise to results for 19 countries, spanning the period 1985 to 2000. Chen and Ravallion (2004) and earlier papers discuss in detail the problems of the comparability and consistency of household surveys, and there are many.¹⁸ So in those cases where more than two household surveys are available, two surveys were selected to achieve what seemed to be the best degree of comparability. The surveys chosen were not always the earliest and latest surveys available for each country, and the intervals between surveys are quite variable, ranging from 2 years (Zambia) to 10 years (Uganda), with an average gap of 5.6 years. PovcalNet generates estimates of the headcount, poverty-gap (PG) and squared PG ratios, and the Gini coefficient. However, for our purposes, we confine our attention to the headcount ratio and Gini coefficient, and simply observe the directions of change that are indicated by these respective estimates in each country and disregard the magnitude of change.¹⁹ Table 8 sets out the results.

Overall, the results in Table 8 show a preponderance of countries where it appears poverty (headcount ratio) has been falling between survey years. In twelve countries the headcount ratio fell, in six countries it rose and in one country (South Africa) it was virtually unchanged. This pattern is broadly consistent with the overall estimates produced by Chen and Ravallion (2004) and reproduced earlier in Table 1. As regards inequality (Gini coefficient) PovcalNet generated results showing six countries where inequality fell, eleven in which it increased, and two countries (Kenya²⁰ and Uganda) in which it was virtually unchanged. It suggests a tendency for inequality to have increased overall. Of potentially greater interest is the outcome in terms of both poverty and inequality in each country. In those countries where poverty increased, the predominant outcome was that inequality also increased, whereas in those countries where poverty decreased, there was no clear direction of change in inequality. Obviously, it is difficult to draw firm conclusions without introducing information on growth rates and other controlling variables at the country level, so as ascertain whether it is the growth in incomes (or the lack of it) and/or changes in inequality that best describe the outcome on the change in poverty. Nevertheless, the pattern of results at the country level does

¹⁸ Detailed notes accompanying PovcalNet indicate that surveys for individual countries may not be comparable: Priority Surveys alongside LSMS surveys, Integrated Household Surveys, income and expenditure surveys, welfare monitoring surveys, etc.

¹⁹ For those countries in which there are more than two surveys, the direction of change is not always uniform, and this is a further complication of this cursory analysis. It might, of course, be possible to use other information (maybe country poverty assessments) to ascertain whether poverty has been generally falling, rising or changing direction during the past 15 to 20 years.

²⁰ The results for Kenya are perhaps surprising and questionable on the grounds that this change was based on a short time interval (1994-97) and that it excludes results from the 1998/9 Integrated Household Survey, which indicated a marked increase in inequality.

Table 8
Poverty and inequality change at the country level in Africa:
Some evidence based on PovcalNet

Country	Survey years	Headcount (%)	Change (+/-)	Gini coefficients	Change (+/-)
Botswana	1985-93	33.3 – 32.1	–	54.2 – 66.7	+
Burkina Faso	1994-98	51.4 – 44.9	–	50.7 – 46.9	–
Burundi	1992-98	45.2 – 54.6	+	33.3 v 42.3	+
Cameroon	1996-2001	32.5 – 17.1	–	46.8 – 44.6	–
Cote d'Ivoire	1993-98	9.9 – 15.5	+	36.9 – 43.8	+
Ethiopia	1995-2000	31.3 – 23.0	–	40.0 – 30.0	–
The Gambia	1992-98	53.7 – 27.1	–	47.8 – 50.2	+
Ghana	1988-98	45.5 – 40.5	–	36.0 – 40.8	+
Kenya	1994-97	26.5 – 20.1	–	44.5 – 42.5	–
Lesotho	1986-95	30.3 – 36.4	+	56.0 – 63.1	+
Madagascar	1993-99	46.3 – 66.0	+	46.1 – 39.1	–
Malawi	1997-2004	41.7 – 21.3	–	50.3 – 39.0	–
Mali	1994-2001	72.3 – 36.4	–	50.5 – 40.0	–
Mauritania	1995-2000	28.6 – 25.9	–	37.3 – 39.0	+
Niger	1992-94	41.7 – 54.8	+	36.1 – 41.5	+
Nigeria	1992-96	59.2 – 77.9	+	45.0 – 52.0	+
Rwanda	1984-99	35.7 – 51.8	+	28.9 – 45.4	+
Senegal	1994-2001	24.0 – 17.0	–	41.4 – 41.3	=
South Africa	1993-2000	10.0 – 10.7	=	59.3 – 57.8	–
Uganda	1989-99	39.2 – 26.4	–	44.4 – 43.1	–
Zambia	1996-98	72.6 – 65.7	–	49.8 – 52.4	+
Zimbabwe	1990-95	54.4 – 56.1	+	56.2 – 50.1	–

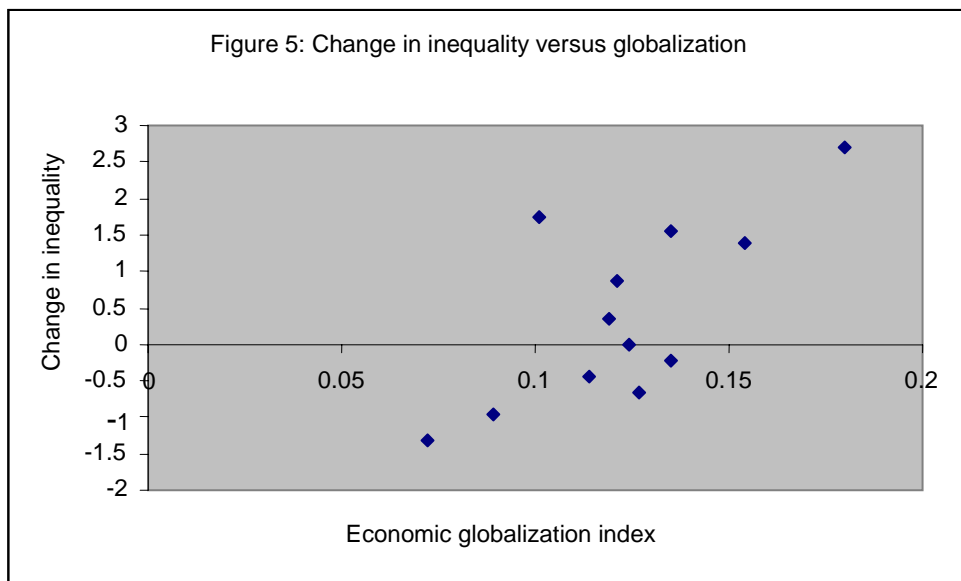
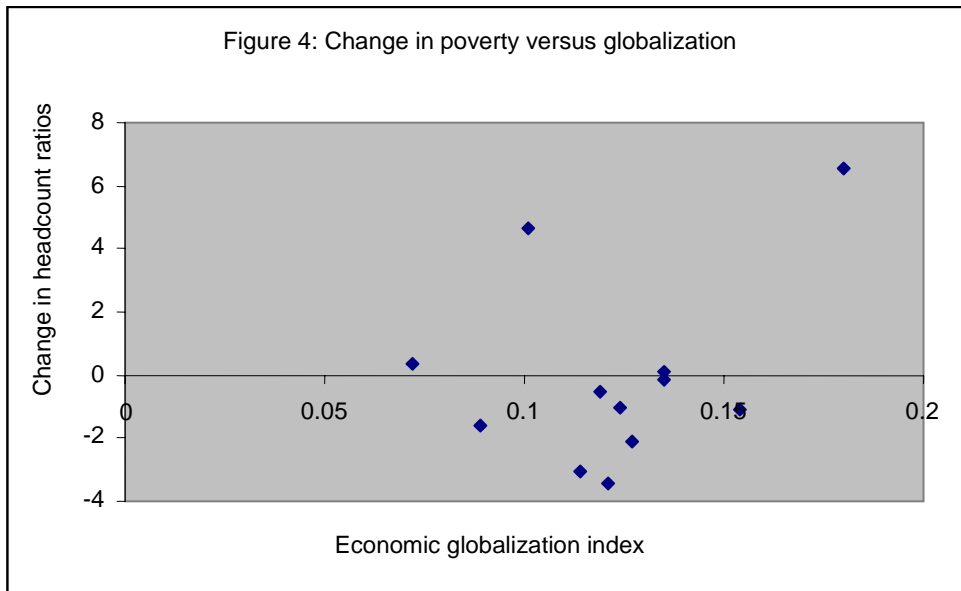
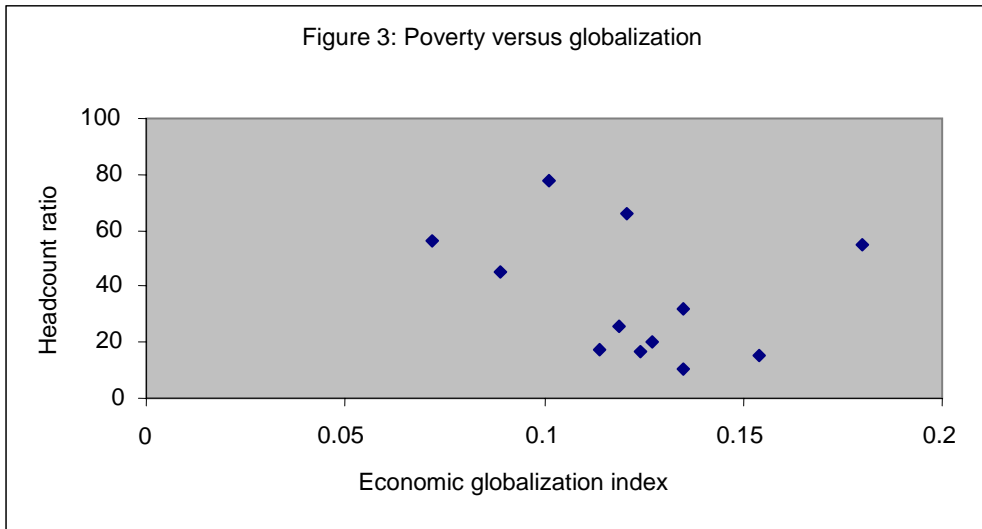
Notes: PovcalNet is software (due to Chen and Ravallion) which computes Headcount (and Poverty Gap and Squared P-G) indices based on a chosen poverty line and household survey data, usually in grouped data format. In this table the poverty line is the \$1 a day international poverty line, converted into local currency (within PovcalNet) using PPP estimates.

Source: PovcalNet <http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp> and Chen and Ravallion (2004).

not appear to be clear-cut. Also, as noted earlier, we need to be cautious about the comparability of surveys and of placing too much reliance on just two data points for each country.

The above evidence on the level and change in poverty and inequality on the one hand and the relative indices of economic globalization on the other permit us to carry out some tentative associations between variables. Tables 7 and 8 show there are twelve countries²¹ for which estimates exist on the levels and change in poverty and inequality, between various years, and globalization indices for 2004. As the poverty and inequality estimates for countries span varying time periods, to standardize the changes the estimates shown in Table 7 are divided by the span of years. Figures 3, 4 and 5 show simple plots of the 2004 economic globalization index versus the level of poverty, and versus the change in poverty, and versus the change in inequality.

²¹ The countries included are Botswana, Burkina Faso, Cameroon, Cote d'Ivoire, Kenya, Mauritania, Niger, Nigeria, Senegal, South Africa, Zambia, and Zimbabwe.



Source: For Figures 3, 4, and 5, the plots are based on Tables 7 and 8.

The simple linear correlation coefficients between the globalization index and (i) the level of poverty is -0.30; (ii) the change in poverty is 0.32; and (iii) the change in inequality is 0.71. Only in (iii) is the coefficient significantly different from zero. These results suggest that globalization may be associated with an increase in inequality, with an increase in poverty, though with a lower *level* of poverty. Thus, countries which are more ‘globalized’ tend to have a lower level of poverty although poverty is increasing in these countries and so is inequality. This suggests that globalization may be associated with increasing inequality and (hence) with an increase in poverty. However, the evidence is not strong and is at best indicative.

3.5 Other country-level dimensions of change in poverty in Africa

This paper has focussed exclusively on income poverty. Other socioeconomic dimensions of wellbeing have not been considered and it is a moot point whether, and to what extent, health, education, environmental sustainability, gender imbalance, etc., have been affected by (and in turn may influence) globalization and growth. But this would broaden the scope of the paper beyond feasible limits. Useful sources of evidence for Africa are summarized in Geda and Shimeless (2005), UNECA (2005) and Commission for Africa (2005).

What perhaps is more useful as a prelude to analytical work is the evidence on structural profiles in African countries. Structural features are now considered to be central to understanding the channels through which globalization impacts on growth, poverty and inequality (Nissanke and Thorbecke 2005; Culpeper 2005) and also underpin the possible policy initiatives underlying ‘pro-poor growth’. Structural features are wide-ranging, going beyond product or sectoral disaggregations, and include rural-urban dimensions, gender, labour markets (by skill, formal-informal employment), and the ownership of enterprises (private-public, foreign and domestic ownership). Many of these profiles are discussed, and some evidence presented, in the reports for the Economic Commission for Africa (UNECA 2005) and in a study by Fielding (2001).

According to the standard (HOS) trade model, trade liberalization in Africa should lead (or have led) to an expansion of use of its most abundant factor resource, low-skilled labour. Because of the anti-agricultural bias of trade protection (UNECA 2005) this should be expected to boost, *ceteris paribus*, an expansion of small-scale agriculture, and a relative reduction of rural poverty. In their summary of the extent of poverty in Africa, Ali and Thorbecke (2000) note that at the beginning of the 1990s, rural poverty was very widespread and substantially higher than urban poverty.²² So what we have produced in Table 9 is the available evidence on rural and poverty headcount ratios at the country level in Africa, based on published household survey data post-1990 in the *World Development Indicators 2005* (World Bank 2005). We assume that the survey results for urban and rural households are more likely to be comparable than between countries or over time. Out of 32 surveys reported in Table 9, in 30 cases there was a positive differential between rural and urban poverty, and in many cases this is recorded

²² Note that the urban and rural poverty lines were not the same, because their estimates were based on relative (and country-specific) poverty lines. But still the rural and urban poverty ratios (headcount, poverty gap and squared P-G) were substantially different.

as a double-digit difference.²³ So rural poverty in Africa remains persistent and is substantially higher than in urban areas (Wood 1998). In only ten countries is there reported evidence from more than one survey, and (as mentioned earlier) it is questionable whether the surveys for each country are directly comparable. Nevertheless, in half of the countries, the rural-urban differential in headcount ratios fell and in half they rose: at best, this is an inconclusive result.

Table 9
Rural-urban differentials of poverty ratios (headcount ratios)

Country	Survey year	Rural-urban poverty differential (% headcount ratio)
Benin	1995	- 3.3
	1999	9.7
Burkina Faso	1994	40.6
	1998	34.6
Burundi	1990	- 7.0
Cameroon	1996	18.2
	2001	27.8
Chad	1996	4.0
Ethiopia	1996	13.7
	2000	8.0
The Gambia	1998	13.0
Ghana	1999	31.9
Kenya	1994	18.0
	1997	4.0
Madagascar	1997	12.8
	1999	24.6
Malawi	1998	11.6
Mali	1998	45.8
Namibia	1996	35.4
	2000	35.8
Mozambique	1997	9.3
Nigeria	1993	6.0
Niger	1993	14.0
Rwanda	2000	51.4
Senegal	1992	16.8
Sierra Leone	2004	22.4
Tanzania	1991	9.6
	2001	9.2
Zambia	1996	36.8
	1998	27.1
Zimbabwe	1992	32.4
	1996	40.1

Source: Based on UNECA (2005: Figure 3.3);
Own calculations from data derived from World Bank (2005).

²³ These results are based on national (not international) poverty lines and we must assume that in most cases (if not all) there are no separate rural and urban poverty lines. This may exaggerate the rural-urban differential, but they are still considered large.

4 Analytical approaches and empirical evidence for Africa

4.1 Deeper analytical approaches

A more rigorous empirical investigation of the channels of influence and possible causal relationships within the globalization-growth-inequality-poverty nexus, set out and discussed by Nissanke and Thorbecke (2005), invite several alternative approaches of analysis.²⁴ Each analytical approach has both advantages and disadvantages: there is no universally acceptable way in which one can assess the impacts of a globalization shock, or indeed of any impulse, conclusively. Theory alone is not sufficient and it is necessary to pursue an evidence-based (empirical) approach to assess the linkages and impacts further. At the risk of some oversimplification, existing studies may be dichotomized into econometric and simulation approaches. We first briefly set out some of the pros and cons of these approaches because this is relevant to a review of the studies we consider subsequently.

4.2 Econometric analysis

Apart from their reliance on consistent data, whether cross-section, timeseries or even panel data, econometric models are usually estimated as reduced-form relationships, and therefore the approach is quite problematic in ascertaining channels of effect linking policy variables with outcomes (Devarajan and Robinson 2005). These links ideally need to be identified via structural relationships (Fielding 2001). The econometric approach has therefore most often been used in the context of estimating channel ‘segments’, such as trade-growth, growth-inequality, trade-wages, export performance-productivity relationships. Tied up with the difficulty of estimating structural relationships, there is the problem of choosing the relevant control variables so as to identify the channels of effect. For example, the magnitude of many responses (say, the income effects of price shocks) will depend crucially on sociopolitical factors as well as economic factors, of a country-specific or time-specific nature such as the institutional capability, local conflicts, geography, etc. (Bigsten and Fosu 2004). These are not easy to quantify and therefore not easy to account for in regressions. Nevertheless, the econometric approach has proved popular and useful in statistical (as opposed to structural) analyses of growth and inequality, determining regularities over time and across countries.

4.3 Simulation modelling

Simulation models (such as computable general equilibrium, CGE, or linked microsimulation-CGE models) are an alternative empirical approach to ascertaining magnitude and directions of effect explicitly via channels of impact, and are more suited to counterfactual rather than predictive analysis (Devarajan and Robinson 2005). There are several examples of their application in an African context, some of which are reviewed in the next section. Amongst the main advantages of CGE models is their ability to trace the effects of an exogenous ‘shock’ (in this case, for example, a globalizing shock such as the removal of tariffs, or inflows of capital) through the

²⁴ Hertel and Reimer (2005) have recently surveyed alternative models of the effects of trade policy on the poor.

system as it impacts on markets and on real incomes of households. They are representative of the classic counterfactual experimentation, and the literature is vast. Many scholars would caution about the drawbacks and even dangers of CGE modelling. For example, econometricians are sceptical of the use of single datapoint ‘estimates’ or even ‘guesstimates’ of parameters. Macroeconomists are wary of the primitive or even *ad hoc* macroeconomic features that many models employ along with large-dimensional equilibrium representations of product and factor markets (Robinson and Lofgren 2005). For sure, it has been shown many times over that the macro ‘closure’ rules drive the results to a very significant degree. Most of the applications of CGE models are large-scale comparative static models showing impacts on representative household groups. To analyse poverty effects with these models a further link has to be included, either within the model or bolted on to the model outcomes (Decaluwé et al. 1999). Recently, more technical advances have generated CGE models with dynamic features and incorporating ‘real’ (as opposed to ‘representative’) households (referred to as RHG models) and microsimulation methods. It is not yet possible to provide an assessment, let alone a blanket assurance, that these more complex models are better able to capture poverty impacts than their first generation RHG counterparts.

4.4 Evidence for Africa

The specific links identified by Nissanke and Thorbecke (2005) are: globalization and growth, globalization and inequality, growth and inequality (bi-directional), and growth-inequality on poverty. Within these broad links there may be several channels of effect. At first sight, there appear to be few studies that have specifically tackled the globalization-poverty relationship in African context. But it is not difficult to uncover many studies that qualify on the grounds that either they deal with specific links (e.g., openness-growth) or they consider policy shocks (e.g., structural adjustment programmes and economic reform) that have related liberalizing features.

Link 1: Globalization and growth

There is a good deal of mainly cross-section econometric evidence on the linkage between trade openness and growth. The most highly regarded studies are those that include a SSA dummy (possibly including interaction effects with other explanatory variables) in a more globally-based dataset. This is more likely to increase the explanatory power with more degrees of freedom. Interestingly, after controlling for geography and income, Frankel and Romer (1999) find no additional distinguishing factors for SSA. Greenaway, Morgan and Wright (1998) provide a panel analysis of trade reforms and growth, based on data for 73 countries, worldwide. Again, they find strong evidence of trade reform-induced effect on growth. They point out that this is not necessarily a strong, or even a positive effect for every country. But importantly, they do not include separate regional effects, so one cannot generalize about Africa from their study. Harrison (1996) has also performed an earlier panel analysis of openness and growth, and she too finds a positive relationship. Alongside this positive evidence there is no counter-evidence as such; that is, to demonstrate that openness is ‘bad’ for growth. The closest the dissenting voices (e.g., Ocampo and Taylor 1998) get to it, are challenges to the assumptions made about the underlying microeconomic conditions and the potential regressive effects of globalization.

The specific evidence for Africa obtained from the global growth regressions is discussed by Collier and Gunning (1999). They report on four well-known studies that

include Africa dummies; the studies are by Barro and Lee (1994), Easterly and Levine (1997), Sachs and Warner (1997) and Collier and Gunning (1999). The periods covered are closely comparable, predominantly covering the 1960s to the 1980s. All studies include an openness variable along with many other similar explanatory variables, with different interaction terms, but all have an African (shift) dummy. In two of the studies (Barro-Lee and Easterly-Levine) the Africa dummy is significant while in the others (Sachs-Warner and Collier-Gunning) the inclusion of an openness variable renders the dummy insignificant. While these studies are searching for broader explanations for relatively poor growth performance in Africa, they do provide us with evidence that openness does have a growth-enhancing effect in the region. It is the strength of this effect that is more questionable.

While the cross-country growth regressions dominate, other studies provide significant and specific insights into the globalization-growth relationship, either at an individual country or sectoral level. A relatively early econometric study by van Frausum and Sahn (1993) examines the possible macroeconomic effects of four exogenous shocks, including currency devaluation, in Malawi. There are many examples of similar models for other African economies. What they have in common is an attempt to track the consequences on other variables besides output. And this highlights channels of effect on households other than growth. There are also early examples of fairly aggregative country-specific simulation (CGE) models, which make no attempt at tracing through to individual household groups, but nevertheless examine the short-run consequences of trade liberalization. Classic examples are by Rattsø and Torvik (1998) in both an SSA and Zimbabwe context (they examine import rationing and trade liberalization but recognize the sensitivity of the results to alternative macro closure rules) and Davies, Rattsø and Torvik (1998) who consider the macroeconomic effects of trade liberalization in Zimbabwe. Bigsten and Fosu (2004) use an econometric approach using data for Cameroon, Ghana, Kenya and Zimbabwe to demonstrate that under trade liberalization, increases in exports of manufacturing firms lead to efficiency gains.

Link 2: Globalization and Inequality

The second primary macro-meso channel links globalization with inequality. There are many possible channels of effect, and the extent to which globalization impacts on factor markets, goods markets, government income and expenditure, etc., is largely an empirical question. Kanbur (1999) sets out the attendant problems of four facets of globalization on income distribution (principally the factoral distribution) in an African context. He provides no empirical evidence as such, but he urges caution against using theory to assume that the opportunities of globalization are a 'win-win' situation. Kanbur argues that inequality may well worsen, and is more concerned that this will induce policymakers into a retreat from globalization rather than managing the risk that inequality may worsen.

In their econometric study of the long-term changes in the ratio of manufacturing wages and agricultural wages (a proxy for skilled-unskilled wage inequality) in Kenya, Bigsten and Durevall (2006) find that greater openness was linked directly to a reduction in wage inequality. On the other hand there is evidence in several African economies that there has been an increased urban-rural inequality, and that this is a source of the overall increase in inequality. Nicita and Razzaz (2003) look at the impact of an increase in textile exports on labour income in Madagascar and find significant differences by gender. Textiles are a highly labour-intensive good, and tracing the effects through

labour markets is an excellent way to see how the benefits impact on households: who benefits and how?

Fagerås (2004) constructs a CGE model for Zimbabwe (based on the well-known, standard IFPRI model) to simulate the effects of adjustment and stabilization policies (devaluation and expenditure reduction). She considers the distributional implications for household groups (defined according to socioeconomic group) and finds that while agricultural households gain, many other households lose under combinations of policies. It is of interest to note that she tries to compare her results with those of Davies, Rattsø and Torvik (1998). Although the scenarios are different, her enquiry leads her to question the plausibility of her own results and to question the plausibility/validity of the macroeconomic closure rules of both models. This is a virtue of good-practice simulation work. Finally, Devarajan and van Mensbrugge (2000) have also conducted a standard (RHG) CGE model analysis of the impact of trade reform on the income inequality between households defined according to their ethnic background and by income level. They show that trade reform could benefit black South Africans at the expense of white South Africans, although inequality would worsen within the black population and improve within the white population.

Link 3: Growth and inequality

Evidence on the (bi-directional) growth-inequality relationship in an African context is sparse. The global evidence on the correlates of income inequality, including economic growth and the level of development, has not been replicated, mainly due to the paucity of data. But some evidence is now emerging. Two studies in particular arise. First, Odedokun and Round (2004) study the bi-directional relationship between income inequality and growth in Africa using essentially cross-section evidence. The results suggest two things; first that based on African data, the postulated causality from economic growth to inequality does not seem to apply. Structural and geographical features were stronger explanations of inequality than growth *per se*. Second, the results suggest that inequality did appear to hinder growth in the countries sampled and, moreover that inequality is associated with channels that adversely affect growth such as socio-political instability, high fertility, and low school enrolment rates. In related work Fielding and Torres (2006) attempt to investigate further the reasons for the negative African dummy in growth regressions. They conclude that the reasons can be partly attributed to 'ethno-linguistic fractionalization', geography and socio-political factors, underlining the earlier suggestion that channels of effect from inequality to growth may be multifarious and complex.

Link 4: Growth and inequality on poverty

The question of the links from growth and inequality to determining the impacts on household groups and individuals has been addressed mainly (though not exclusively) via simulation models. Sahn, Dorosh and Younger (1996) carry out a study of ten African countries to examine the effects of adjustment policies and agricultural reforms on the poor, but they use an eclectic mix of analytical tools to do so, ranging from econometric models, through partial equilibrium models and CGE models. Apart from the significance of their main conclusions—that the adjustment programmes were marginally beneficial to the poor, in that they precipitated a redistribution of benefits though without positive growth effects—the study was instrumental in provoking a useful debate about the appropriateness of the methodology used. There are many other good examples of the use of CGE models in this context for African countries,

including Chitiga (2000), Chitiga, Kandeiro and Mabugu (2005), for Zimbabwe, and, most recently, Emini, Cockburn and Decaluwé (2006) for Cameroon and Abdelkhalek (2006) for Morocco. Some of the most recent examples are highly innovative in having fully linked microsimulation and recursive dynamic features, thereby potentially embracing a fuller range of macro- and meso-level effects on households. The results from these models are not at all clear-cut and easy to summarize. There is a good deal of country-specificity; some evidence of inequalizing effects of trade policy shocks, and of poverty consequences that do not show dramatic improvement. There are some other studies that do not fit comfortably within this framework of analysis, but nevertheless provide valuable insights into what the data tell us. For example, Bigsten and Durevall (2003) use panel data from household surveys in Ethiopia, between 1994 to 1997 (the post-economic reform era), to examine the extent to which changes in poverty can be attributed to growth and distribution effects. The study is insightful. The authors conclude that increasing inequality offsets the potential poverty reduction from growth.

Case study approach

The studies reviewed above suggest that whatever methodological approach is pursued, a country case study may offer the best prospect of identifying the links, the channels of effect and their importance within the globalization-poverty nexus. There is clearly considerable country specificity, and whether this generalizes across countries, or across groupings of countries according to typology, is a more open question.

A good example is South Africa, which is notable for its high degree of income inequality that has persisted in the post-apartheid era and throughout the recent era of globalization and liberalization. The indications are that there has been a decline in the dispersion of racial incomes and an increase in within-group income inequality. Several studies (Jenkins and Thomas 2004) indicate that there are several reasons for this, including, for example, (i) labour market imperfections and segmentation (wage differentials and unequal access to unemployment); and (ii) marked inequalities in asset distribution, education, social spending and land. Naudé and Coetzee (2004) and others suggest that globalization may have induced higher inequality through technological change, higher unemployment and less wage income towards poorer/unskilled households.

5 Conclusions

The results in this paper confirm that globalization has generally been a gradual and, indeed, a slow process in Africa relative to other global regions, whether globalization is perceived fairly narrowly as a process of greater trade openness or as a combination of several kinds of globalizing processes. The mechanisms through which globalization in its various manifestations impact on growth, inequality and poverty is still a matter of intense debate. Some authors claim that globalization is good for poverty reduction by promoting growth, although the outcome may be affected (even mitigated or offset) by the effects on inequality. The net effects for Africa suggest that poverty incidence has remained persistently high alongside a relatively slow globalizing process and generally sluggish growth performance.

What this paper has shown is that there is considerable variation within these broad regional outcomes. For a start, income inequality within Africa (notwithstanding the

difficulty as to how best measure this) seems high relative to other regions and is persistently so. *A priori* expectations of the impact of globalization on distribution are not clear-cut (Kanbur 1999; Nissanke and Thorbecke 2005) and this is borne out by the evidence. Indeed, there are good reasons to expect that trade liberalization will not necessarily be inequality-reducing, as would be the naïve expectation under the standard Heckscher-Ohlin model. Segmented factor markets (including rural and urban dichotomies), entrenched social and culturally-based gender and ethnic dimensions mean there is considerable country specificity, and no easy ‘all-Africa’ prediction. But as regards globalization and growth outcomes since the early 1980s, the typology analysis has revealed marked variation across subgroups. In particular, and predictably, oil-producing and resource-intensive countries have grown faster, and are significantly more open to trade, and attract a higher proportion of FDI relative to GDP, than resource-poor countries. Geography also seems to matter in that amongst the resource-poor countries, there appears to be some difference in the average performance of landlocked and coastal countries, although the differences are less clear-cut and maybe less significant.

The evidence on changes in poverty and inequality across African countries is more fragmentary, and therefore difficult to assess. There are several issues and difficulties here. First, there are relatively few African countries that are able to report household survey evidence on changes in income (or expenditure) on a comparable basis during the past 25 years. The partial evidence that does exist has been assessed for the Africa region as a whole by Chen and Ravallion (2004) and this underpins the outcome that suggests poverty incidence remains high. But it is quite difficult to investigate changes in poverty incidence at a country level, for example in line with typologies. Second, many authors (for example, Ali and Thorbecke 2000) argue strongly for the use of country-specific (and locally-based) poverty lines for country-level poverty monitoring and analysis. However, cross-country analysis can only be satisfactorily undertaken with international poverty lines. In this case, and based on Chen and Ravallion’s PovcalNet software, we observe the broadly comparable changes in poverty incidence and income inequality across 19 countries, and note that slightly more of the countries show a decline in poverty incidence while roughly the same number of countries show an increase in inequality as show a decrease. There is still insufficient evidence to pursue cross-country empirical analysis suggested by Sahn and Younger (2004) or undertaken for selected countries by Christiaensen, Demery and Paternostro (2003). In any case, there is so much country-specificity and so many problems with cross-country analysis, that it is likely that the only way to trace the various channels and mechanisms of globalization is through country studies.

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Appendix Table
Subgroups of Sub-Saharan African countries used in Table 6

Oil-producing countries	Resource-intensive	Coastal, resource-poor	Landlocked, resource-poor	Fast-growers (g > 0: 1990-94)	Slow-growers (g < 0: 1990-94)
Angola	Angola	Benin	Burkina Faso	Equatorial Guinea	Angola
Cameroon	Botswana	Cape Verde	Burundi	Nigeria	Cameroon
Congo, Rep. of	Cameroon	Comoros	Central African Republic	Botswana	Congo, Rep. of
Equatorial Guinea	Congo, Rep. of	Côte d'Ivoire	Chad	Namibia	Sierra Leone
Sao Tome & Principe	Equatorial Guinea	Gambia, The	Congo, Dem. Rep.	Benin	Zambia
Côte d'Ivoire	Gabon	Ghana	Ethiopia	Cape Verde	Côte d'Ivoire
Chad	Guinea	Guinea-Bissau	Lesotho	Ghana	Madagascar
Gabon	Namibia	Kenya	Malawi	Guinea-Bissau	Togo
Nigeria	Sao Tome & Principe	Madagascar	Mali	Mauritius	Burundi
	Sierra Leone	Mauritius	Niger	Mozambique	Central African Republic
	Zambia	Mozambique	Rwanda	Seychelles	Congo, Dem. Rep.
		Senegal	Swaziland	Burkina Faso	Niger
		Seychelles	Uganda	Lesotho	Rwanda
		South Africa	Zimbabwe	Swaziland	Guinea
		Tanzania		Uganda	Sao Tome & Principe
		Togo		Mali	Comoros
				Chad	Zimbabwe
				Gambia, The	Kenya
				Gabon	Senegal
					South Africa
					Tanzania
					Ethiopia
					Malawi

Source: IMF (2005: Tables A2, A3).