

# Globalisation and Income Gap between Rich and Poor Nations

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## ABSTRACT

*Set against the background of initial relatively low cross-country income and considerable poverty and deprivation in Sub-Saharan Africa (SSA), the question of whether globalisation is associated with a 'catching up' in terms of real income growth, in absolute and relative terms, is both relevant and important. This paper contributes to the empirical literature by investigating globalisation as a channel of income gap reduction between SSA and developed countries. We employ Globalisation Indexes from the Konjunkturforschungsstelle (KOF) and the Centre for the Study of Globalisation and Regionalisation (CSGR) in an Arellano-Bond dynamic panel GMM specification to test the hypothesis that globalisation has reduced the income gap between SSA and developed countries. We find no evidence that globalisation is associated with a reduction between SSA and developed countries over the period 1980-2009. This result is consistent with previous studies on country's absorptive capacity. An implication of this result for policy theorists is that structural features of SSA output require a more heterodox approach to all dimensions of human development.*

## 1. INTRODUCTION

The relationship between globalisation and economic growth in Sub-Saharan Africa has continued to attract considerable attention in the literature (e.g. Schneider, 2003; Akinbobola and Isike, 2009; Barry, 2010; Anyanwu, 2012). Underpinning the unflagging research and policy interests in this relationship are, in part, the results of continuing tensions and contestations from attempts to figure out the reasons for 'Africa's growth tragedy' (Easterly and Levine, 1997; see also Collier, 2006). More curiously, despite far-reaching macroeconomic reform programmes implemented by many countries in SSA over the past three decades, economic gains in terms of catching up with fast-growing East Asia and effective participation in the global economy remains less than impressive (Schneider, 1999; Nwankwo and Richards, 2004).

SSA Purchasing Power Parity (PPP) income per capita for 2008, of \$1,949, was significantly less than that of the world (\$10,415), East Asia and Pacific (\$5,421) or the euro area (\$33,193). This low absolute level of income is accompanied by low growth. Average annual growth over 1900-2000 in SSA was 2.5 per cent compared with world growth of 2.9 per cent, East Asia and Pacific of 8.5 per cent and Latin America and the Caribbean of 3.2 per cent. An important aspect of low SSA output is its structure. The level and composition of output affords SSA the lowest reported regional Gross Saving ratio, of 16.5 per cent of Gross National Income (GNI), as compared to the world ratio of 20.9 per cent and East Asia and Pacific of 47.3 per cent (World Bank, 2010, p. 214).

Globalisation is seen by some as a force that can impel countries onto a higher growth path (Wade, 2004; Brauninger and Vopel, 2009). For some countries, however, it offers little if any real opportunity for growth (Boafo-Arthur, 2000; Barry, 2010). We are interested in the position of SSA income relative to income in the rest of the world. Income per capita is highly correlated with many development indicators, such as life expectancy at birth, secondary school enrolment, access to water and sanitation, the prevalence of malnutrition and infant mortality. The importance of this is the generally strong support for the notion that the key to future poverty reduction, as was for poverty reduction over the last hundred years, lies in strong economic growth (Sala-i-Martin 2002; Hillebrand 2009).

Automatic welfare gains from economic phenomena are not generally accepted as a *sine qua non* and the impact of globalisation remains the subject of considerable debate (see, for example, Stiglitz, 2002, 2006; Görg and Greenaway, 2004; Dollar, 2005; Goldberg and Pavcnik, 2007; Elmawazini et al, 2013a). Recent decades have seen some countries substantially transform themselves from economic backwardness to engines of economic growth and prosperity. The technological boom of the late 20th century and the rise of globalisation have seen a tremendous rise in world output, as well as a shift in the geographical areas in which production takes place (IMF, 2000, 2010). The recent recession has served to accelerate the shift of world production from the Advanced Industrial Countries (AICs, principally the US, Canada, EU, Japan and the UK) to the emerging and developing countries. World output increased by 7.1 per cent from 2007 to 2010 but over the same period the output of the AICs fell to 99.6 per cent of its 2007 level while the output of Emerging Market Economies rose by 10.5 per cent, with China and India increasing their output by 32.1 per cent and 23.4 per cent, respectively. The AICs share of world output has declined since the 1970s as the share of emerging and developing economies has increased (World Bank, 2010; Caribbean Centre for Money and Finance, CCMF, 2011).

There are considerable *lacunae* in the literature, especially those that show mixed support for the hypothesis that globalisation widens the income gap between rich and poor countries (see for example, Durham, 2000; Lee,

2002; World Bank, 2002). Accordingly, in order to extend the literature base, this study differs from previous studies in three important respects. First, to the best of our knowledge, this is the first study that investigates empirically globalisation as a channel of income inequality between SSA and rich countries. Previous studies focus on the impact of globalisation simply on growth (see, for example, Dreher, 2006). Second, the study differentiates SSA countries from other regions. Previous studies on globalisation and growth did not compare the effect of globalisation in SSA with other regions (see for example, IMF, 2007). Third, the study estimates the overall impact of globalisation using the *Konjunkturforschungsstelle* (KOF) and Centre for the Study of Globalisation and Regionalisation (CSGR) indexes of globalisation.<sup>2</sup> Many previous studies focus on individual sub-dimensions of globalisation (e.g. Borensztein et al. 1998; Dollar and Kraay, 2001; Elmawazini *et al.*, 2008; Elmawazini and Nawnkwo, 2012). Specifically, we contribute to the empirical literature by employing the KOF and CSGR globalisation indexes to test the hypothesis that globalisation has widened the income gap between the USA and Sub-Saharan African countries.

The remainder of the paper is organised as follows. Section 2 reviews the theoretical approaches and the results of previous empirical studies. Section 3 covers the empirical specification of the model. Section 4 explains the construction of the data. Section 5 presents the empirical findings. Section 6 draws together the conclusions.

## 2. THEORETICAL APPROACHES AND EMPIRICAL EVIDENCE

Wade (2001) indicates that there are three theoretical approaches to modelling the impact of globalisation on inequality between developed and developing countries. The first is neoclassical growth theory, which predicts that productivity and technology gaps between developed and developing countries will converge over time. The innovation (by developed countries) and the imitation (by developing countries) may lead to a convergence in the growth rates of developed and developing countries (Sala-i-Martin, 2006).<sup>3</sup> The Solow-Swan growth model suggests that a country's growth rate is positively correlated with the distance from its steady state income per capita. This implies that countries with initial low per capita income will tend to grow relatively fast, so that over time, per capita incomes tend to converge, a phenomenon called  $\beta$  convergence (Barro and Sala-i-Martin 1992). There is a considerable literature on this (see for example, Baumol, 1986; DeLong, 1988; Mankiw, Romer and Weil, 1992; Lee, Pesaran and Smith, 1997; Quah, 1996, 1997; Atkins and Boyd, 1998). In contrast, the second approach, new (endogenous) growth theory (Lucas, 1988; Romer, 1994), shows that innovation activities will widen the technology and income gaps between developed and developing countries. The third approach, 'dependency theory' and 'world systems theory', supports the second approach. Based on the third approach, the growing gap between

developing and developed countries is mainly due to globalisation. In other words, the third approach shows that developing countries benefit from globalisation less than developed countries.

The underlying issue is that there is the perception that some countries or regions have not kept pace with global production of goods and services and, as such, the social and economic experience has largely been unaffected by the globalisation phenomenon (Easterly and Levine, 1997; Sender 1999; Lumumba-Kasong 2002). In their recent review, Goldberg and Pavcnik (2007, pp. 76-77) concluded, 'The substantial amount of evidence we reviewed in this article suggests a contemporaneous increase in globalization and inequality in most developing countries. Despite the ambiguities involved in identifying the relationship between openness and distributional changes, it seems fair to say that the evidence has provided little support for the conventional wisdom that trade openness in developing countries would favour the less fortunate (at least in relative terms).'

The empirical literature shows mixed results on the impact of globalisation on growth and income equality (Lipsey 2002; Görg and Greenaway 2004; Goldberg and Pavcnik 2007). Sala-i-Martin (2006, pp. 352) estimated that the world distribution of income (WDI) has shown reductions in global inequality and poverty over the 1980s and 1990s. Focusing on the WDI across individuals where the unit of analysis is the individual, he emphatically asserts that, 'the incomes of poor citizens have grown faster ( $\beta$ -convergence), and measures of income inequality have declined ( $\sigma$ -convergence)' He estimated the world distribution of income for each citizen and concluded that there were up to 500 million fewer people in poverty in 2000 compared to 1970. Dollar (2005) indicates that the new wave of globalisation, starting around 1980, has had a positive impact on the people in developing countries. This result comes from two indicators. The first is that growth rate of per capita income in developing countries is higher than growth rate of per capita income in developed countries in 1990s. The second is that the share of people living on less than \$1 per day has been reduced by fifty percent over 1981-2003. Similar results can be found in Dollar and Kraay (2001), World Bank (2002), Bhagwati (2004) and Panagariya (2004).

However, Stiglitz (2002) argues that globalisation has led to a growing gap between rich and poor countries. The UNDP (1999) provides evidence of the growing income disparity and indicates that the income of the richest 20 percent was 45 times the income of the poorest 20 per cent in 1980, but increased to 74 times in 1997. Similar results that argue for a growing gap can be found in Maddison (2001). The identification of the causal factors is not straightforward. For instance, Rodrik (2000) argues that trade globalisation does not seem to have had a significant impact on growth in China and India. He justifies his argument by the fact that they are classified as 'countries with the highest tariffs' in the 1980s and 1990s.

The search for statistical evidence always relies heavily on the specifics of the statistical procedure employed. This is true from the way that statisti-

cal data are collected through to the specification of the sometimes complex methods that are employed in the estimation of relationships and testing of hypotheses (Dreher *et al* 2009). In an interesting development, Dreher (2006) shows that globalisation has a significant and positive impact on economic growth. He constructs a globalisation index to examine the impact of globalisation on economic growth in developed and developing countries. It is on this initiative that we examine the globalisation impact on SSA. Specifically, in the following sections we investigate empirically the hypothesis that globalisation has led to a closing of the income gap between SSA and the advanced industrial nations, a phenomenon known as  $\sigma$ -convergence (Barro and Sala-i-Martin 1992).

### 3. EMPIRICAL SPECIFICATION

To test whether globalisation has reduced the income gap between SSA and developed countries over the period 1980-2009, we specify the following dynamic panel data regression:

$$\text{Inc\_Gap}_{it} = \beta_1 \text{Inc\_Gap}_{i,t-1} + \beta_2 \text{Glob\_Index}_{it} + \beta_3 X_{it} + \varepsilon_{it} \quad (1)$$

Equation (1) can be justified by existing models in the literature as follows. GAP is the relative income gap between the USA and African countries, calculated based on Li and Liu (2005) and measured by purchasing power parity GDP per capita in constant 2005 international \$. Glob\_index is the KOF globalisation index at time  $t$ . The construction of this variable will be discussed in the next section.<sup>4</sup>  $X_{it}$  is a matrix of variables which could affect the speed of convergence and growth, that are frequently included in previous studies (see for example, Barro, 1991; Sachs and Warner, 1997; Dreher, 2006). Because of limited data availability for SSA countries (see World Bank, 2012),  $X_{it}$  includes only two variables: life expectancy at birth, in total years; and gross capital formation, as a percentage of GDP.<sup>5</sup>  $\varepsilon_{it}$  is the error term.

$$\varepsilon_{it} = v_i + e_{it} \quad (2)$$

Equation (2) tells us that the unobserved country-specific effect  $v_i$  and the observation specific errors  $e_{it}$  are the two components of the error term in equation (1). The use of dynamic panel data model and Arellano-Bond dynamic panel GMM estimators will be justified in the empirical findings section.

### 4. DATA

GAP, life expectancy at birth and gross capital formation data are collected from the World Development Indicators (World Bank, 2012). The definition and the source for each variable are discussed in appendix B (data appendix). The GAP is calculated using the following formula from Li and Liu (2005):

$$GAP_{i,t} = \frac{US'sGDPperCapita - SSAcountry'sGDPperCapita}{SSAcountry'sGDPperCapita} \quad (3)$$

Equation (3) tells us that the GAP at time ( $t$ ) is the relative income gap between the USA and a SSA country ( $i$ ), measured by PPP GDP per capita (in constant 2005 international \$). There is no agreement between researchers on the definition of globalisation (Al-Rodhan and Stoudmann, 2006).<sup>6</sup> One explanation is that globalisation has many dimensions. For this reason, some authors have introduced divergent constructs or indexes to measure globalisation. The globalisation indexes are surveyed and evaluated in previous studies.<sup>7</sup> For example, Samimi *et al* (2012) evaluate the relative overall precision of globalisation indexes. They conclude that the KOF index of globalisation is relatively the most comprehensive measure all dimensions of globalisation for three reasons. Firstly, it is the only index that considers trade restrictions as a main factor that effect economic globalisation.<sup>8</sup> Secondly, it measures the impact culture on globalisation. Thirdly, it covers the largest number of countries and years compared to other indexes (see table A.4 in appendix A).

For these reasons, we use the KOF index of globalisation variable, which also captures three dimensions of globalisation: the economic, the social and the political. Each dimension is measured through a number of variables; see table (A.5) in appendix (A) for a brief description. The weights that are indicated in the table (A.5) are determined using principal components analysis. The transformation of the original variables is based on two formulae (Dreher, 2006). The first formula is:

$$\text{Index} = (\text{Actual Value} - \text{Minimum value}) / (\text{Maximum value} - \text{Minimum value}) \quad (4)$$

This formula is used when there is a positive relationship between a specific variable and globalisation.

The second formula is:

$$\text{Index} = (\text{Maximum value} - \text{Actual Value}) / (\text{Maximum value} - \text{Minimum Value}) \quad (5)$$

This formula is used when there is a negative relation between a specific variable and globalisation.

The start year of the panel dataset is 1980 because relevant PPP GDP per capita data are not available before that year (World Bank, 2012). The end year of the panel dataset is 2009 because the KOF globalisation index is not yet available for more recent years (KOF, 2012). PPP GDP per capita data are not available for 11 SSA countries. For this reason, thirty seven (37) SSA countries are used in this study, covering the period 1980-2009 (see table (A.1) in appendix A).

## 5. EMPIRICAL FINDINGS

Equation (1) has several econometric problems. The first problem is endogeneity, where the bilateral or feedback causality between the income gap and globalisation is indicated in previous studies (e.g. Dreher, 2006). The second problem is correlation between time-invariant country characteristics (fixed effects) and explanatory variables. The third problem is autocorrelation, that may arise from the presence of the lagged dependent variable. These three problems can be solved by using the Arellano - Bond (1991) two-step General Method of Moments (GMM) estimator.<sup>9</sup> Both one-step and two-step estimators are consistent. The two-step GMM is more asymptotic-efficient than the one-step GMM (Bond et al, 2001). However, the main limitation of two-step GMM is that its standard errors are downward biased (Windmeijer, 2005). To overcome this limitation, we employ Windmeijer's (2005) correction procedure.

Before discussing the empirical findings, it is necessary to check if regression results are spurious. This can be done by panel unit root tests. This study uses the  $\bar{t}$  test of Im, Pesaran, and Shin (2003), the 'IPS test'. Table (A.7) in appendix (A) presents this test. The results in table (A.7) confirm that all variables are stationary and the regression results are not spurious. Tables (1) and (2) present the empirical results of equation (5.1) before and after adding the control variables that are included in the matrix (see section 3).

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Table 1: Results of dynamic panel data regression for the  $\Delta \text{Inc\_Gap}_{it}$  variable, GMM Model;

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<i>Regression Number</i>	<i>Regression (5.1)</i>
$\Delta \text{Inc\_Gap}_{it}$	.8067405 (18.20)
$\Delta \text{KOF\_Index}_{it}$	-.0000891 (-1.05)
Arellano-Bond test for AR(1) in first differences	Prob > z = 0.001
Arellano-Bond test for AR(2) in first differences	Prob > z = 0.137
Hansen (1982) test of overid. Restrictions	Prob > chi <sup>2</sup> = 0.987
Number of observations	1036

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Values in parentheses are *t*-statistics.

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The two Arellano - Bond tests for autocorrelation have a null hypothesis of no autocorrelation. It is expected that the test for an AR (1) process in first differences rejects the null hypothesis, as in the above table (Baum, 2006, p. 235). The first-order autocorrelation problem in levels is examined by the Arellano-Bond test for AR (2) in first differences (Roodman, 2009). For this reason, we should pay attention to the Arellano-Bond test for AR (2) in first differences, which is more valuable than the Arellano-Bond test for AR(1) in the first differences.

Based on the results in table (2), the Arellano-Bond test for AR (2) in first differences show no autocorrelation at the 5% significance level. The Hansen (1982) test shows that the instruments as a group are exogenous. This implies that the instrumental variables are uncorrelated with residuals. The main result of regression (5.1) shows that globalisation has no significant impact on the income gap between the USA and SSA countries over 1980-2009. However, the control variables are not included in regression (5.1). Specifically, we should check whether this insignificance will be affected by including other variables to the regression. because of the unavailability of data we add only two variables to the regression, life expectancy at birth and gross capital formation,<sup>10</sup> see table 2.

Table 2: Results of the dynamic panel data regression for the  $\Delta\text{Inc\_Gap}_{it}$  variable, GMM Model

<i>Regression Number</i>	<i>Regression 5.2</i>	<i>Regression 5.3</i>	<i>Regression 5.4</i>
$\Delta\text{Inc\_Gap}_{it}$	.8824881 (14.12)	.840376 (13.57)	.7414493 (6.62)
$\Delta\text{KOF\_Index}_{it}$	-.0001186 (-0.84)	-.0002599 (-1.07)	-.0001083 (-0.35)
$\Delta\text{health}_{it}$	-.000576 (-1.04)	Not included	-.0008431 (-0.96)
$\Delta\text{capital}_{it}$	Not included	-.0008247 (-3.07)	-.0009711 (-3.91)
Arellano-Bond test for AR(1) in first differences	Prob > z = 0.003	Prob > z = 0.026	Prob > z = 0.034
Arellano-Bond test for AR(2) in first differences	Prob > z = 0.167	Prob > z = 0.838	Prob > z = 0.866
Hansen (1982) test of overid. restrictions	Prob > chi <sup>2</sup> = 0.113	Prob > chi <sup>2</sup> = 0.625	Prob > chi <sup>2</sup> = 0.773
Number of observations	1036	672	672

Values in parentheses are t-statistics.

The results of table 3 confirm the main results of table 2: globalisation has no significant impact on the income gap between the USA and SSA countries over 1980-2009. For robustness checks, the impact of globalisation on the income gap between countries is measured using the CSGR index instead of KOF index. This will allow us to check if the empirical findings can be affected by using different definitions and measures of globalisation. There are three main differences between the CSGR index and the KOF index. The first difference is the number of years and countries (both are fewer in the CSGR Index — see table A.4 in appendix A).<sup>11</sup> The second difference is the number of variables

(there are fewer variables used to construct the CSGR index; see tables A.5 and A.6 in appendix A). For example, the CSGR index does not consider trade restrictions and culture variables.

The third difference is geographic characteristics. For example, the KOF index does not adjust for the variation in country size, while the CSGR index controls for geographical characteristics. Lockwood and Redoano (2005) show that controlling for geographical characteristics (e.g. geographical location and country size) improves the precision of country rankings derived from globalisation indexes. The following table shows the empirical results of equation 5.1 after replacing the KOF index with the CSGR index for 13 SSA countries, for the period 1996-2004.

Table 3: Results of the dynamic panel data regression for the  $\Delta\text{Inc\_Gap}_{it}$  variable, GMM Model

Regression Number	Regression 5.5	Regression 5.6	Regression 5.7	Regression 5.8
$\Delta\text{Inc\_Gap}_{it}$	1.073447 (21.16)	1.047544 (22.51)	1.020172 (32.76)	1.060205 (61.50)
$\Delta\text{CSGR\_Index}_{it}$	-.0017029 (-1.51)	-.0003373 (-0.67)	-.0001021 (-0.24)	-.0008536 (-1.76)
$\Delta\text{health}_{it}$	Not included	-.0006144 (-0.57)	-.0002574 (-0.31)	Not included
$\Delta\text{capital}_{it}$	Not included	Not included	-.0001665 (-0.38)	-.0008306 (-1.66)
Arellano-Bond test for AR(1) in first differences	Prob > z = 0.148	Prob > z = 0.201	Prob > z = 0.315	Prob > z = 0.196
Arellano-Bond test for AR(2) in first differences	Prob > z = 0.864	Prob > z = 0.332	Prob > z = 0.347	Prob > z = 0.579
Hansen (1982) test of overid. restrictions	Prob > chi2 = 0.488	Prob > chi2 = 0.996	Prob > chi2 = 0.683	Prob > chi2 = 0.419
Number of observations	104	104	88	88

Values in parentheses are t-statistics.

The results of tables (2) and (3) show that globalisation, based on both the KOF and CSGR indexes, has no significant impact on the income gap between the USA and SSA countries.<sup>13</sup> In general, our empirical results stand in contrast to certain World Bank and IMF studies (e.g. World Bank 2002, Dollar 2005). An important factor in explaining the results obtained by IMF and World Bank studies is that those studies use a sample of developing countries which includes China. China's growth is considered as a major reason why IMF and World Bank studies conclude that globalisation reduces the income

inequality between rich and poor countries (Sala-i-Martin, 2002). A second explanation is provided by some recent studies (see for example, UNECA 2005; Elmawazini, 2012, Elmawazini *et al.* 2013b), where globalisation, especially foreign direct investment, has no positive impact in countries that have weak human and technological capabilities. These shortcomings are particularly relevant to the African countries in our study.

## 6. CONCLUSION AND POLICY IMPLICATIONS

The present study of the impact of globalisation on the income gap between the USA and SSA countries differs from previous studies in three aspects. The first, it investigates empirically globalisation as channel of income inequality between SSA and developed countries. Second, it differentiates SSA countries from other regions in order to achieve a robust contextual analysis. Third, it estimates the overall impact of globalisation using two different indexes of globalisation; the KOF and CSGR indexes.

The main result of this study supports the hypothesis that globalisation has widened the income gap between SSA and developed countries over the period. These results stand in contrast to previous studies, notably those of the IMF and World Bank, which have tended to support the notion that globalisation, trade liberalisation and free capital flows generally lead to increased growth and a fall in income inequality. The results of this study would tend to support a less deterministic relationship, but one that is conditional on the social and economic response of national policy makers to international trade opportunities (Rodrik, 2000). Stiglitz (2002, 2006) argues that globalisation may well lead to a growing gap between rich and poor countries. Moreover, mismanagement of globalisation, the removal of barriers to free trade and closer integration of national economies may make poor countries poorer.

The results of this study are consistent with the view developed in other parts of the literature, that is, whether inequalities between rich and poor countries improve or worsen may depend on the structural composition of the countries under consideration (Elmawazini, 2010; UNECA, 2005; Maddison, 2001).

We note, too, that whether the recently-increasing investments especially by China and to a lesser extent India in SSA will reduce the inequality we address here remains to be seen. Most of their investments are in the resource extraction sectors which, in the past, did not lead to dynamic transformation and long-term growth in Africa. By implication, a more pragmatic approach to leveraging the economic opportunities that arise over time should be a necessary policy pre-occupation. Essentially, poor investments in human capital and lack of improvements in economic and corporate governance are fundamental obstacles to income growth in SSA countries.

The findings are consistent with Thorbecke (2009, p.7), who notes that a main lesson of the literature is that 'the dominant view today is that inequal-

ity is not a final outcome of growth but plays a central role in determining the rate and pattern of growth (Bourguignon 2004, p.14)'. The development of an African heterodoxy that adequately addresses the continental paradigm may well depend on recognition of the crucial role of strong institutions (World Development Report 2008). The limited aim of this paper is to examine the cross country income inequality experience in Sub-Saharan Africa with respect to globalisation. In other words, this study focuses only on the first dimension (i.e. income dimension) of human development. Future research should investigate the impact of globalisation on the second and third dimensions (education and health) of human development in SSA.

*Accepted for publication: 23rd June 2013*

APPENDICES

APPENDIX A

Table A.1 SSA Countries in the KOF Index			
1	Benin	20	Madagascar
2	Botswana	21	Malawi
3	Burkina Faso	22	Mali
4	Burundi	23	Mauritania
5	Cameroon	24	Mauritius
6	Cape Verde	25	Mozambique
7	Central African Republic	26	Namibia
8	Chad	27	Niger
9	Comoros	28	Nigeria
10	Congo, Dem. Rep.	29	Rwanda
11	Congo, Rep.	30	Senegal
12	Cote d'Ivoire	31	Seychelles
13	Gabon	32	Sierra Leone
14	Gambia, The	33	South Africa
15	Ghana	34	Sudan
16	Guinea-Bissau	35	Swaziland
17	Kenya	36	Togo
18	Lesotho	37	Zambia
19	Liberia		

Table A.2: SSA Countries used in regressions (5.3) and (5.4)

1	Benin	19	Seychelles
2	Botswana	20	South Africa
3	Burkina Faso	21	Sudan
4	Burundi	22	Swaziland
5	Cameroon	23	Togo
6	Central African Republic	24	Zambia
7	Congo, Dem. Rep.	13	Madagascar
8	Congo, Rep.	14	Malawi
9	Cote d'Ivoire	15	Mauritania
10	Guinea-Bissau	16	Nigeria
11	Kenya	17	Rwanda
12	Lesotho	18	Senegal
13	Madagascar	19	Seychelles
14	Malawi	20	South Africa
15	Mauritania	21	Sudan
16	Nigeria	22	Swaziland
17	Rwanda	23	Togo
18	Senegal	24	Zambia

Table A.3: Countries in the CSGR Index

1	Cameroon
2	Congo, Rep.
3	Cote d'Ivoire
4	Gabon
5	Kenya
6	Malawi
7	Nigeria
8	Senegal
9	Seychelles
10	South Africa
11	Togo
12	Zambia
13	Zimbabwe

Table A.4: Globalisation Indexes

<i>Globalisation Index</i>	<i>Years</i>	<i>No. of Countries</i>	<i>Sources</i>
KOF	1970-2009	187	Dreher (2006) and KOF (2012)
CSGR	1982-2004	62	Lockwood and Redoano (2005)
NGI	1995-2005	70	Vujakovic (2010)
MGI	2000-2008	117	Martens and Zywiets (2006)
A.T. Kearney/Foreign Policy	2000-2007	72	A. T. Kearney (2007)
G-index	2001	185	Randolph (2001)

Table A.5: KOF Index of Globalisation  
(numbers in parentheses are the weights for each variable)

<i>Economic dimension (36%</i>	<i>Social dimension (37%</i>	<i>Political dimension (26%</i>
i) Actual Flows (50%ade (percent of GDP) (21%)	i) Data on Personal Contact (34% per cent)	
(2) Foreign Direct Investment, stocks (per- cent of GDP) (28%)	(1) Telephone Traffic (25%) (2) Transfers (percent of GDP) (4%)	Embassies in Country (25%)
(3) Portfolio Investment (percent of GDP) (24%)	(3) International Tourism (26%)	Membership in I n t e r n a t i o n a l Organisations (28%)
(5) Income Payments to Foreign Nationals (percent of GDP) (27%)	(4) Foreign Population (per- cent of total population) (21%)	Participation in U.N. Security Council Missions (22%)
ii) Restrictions (50%)	(5) International letters (per capita) (25%)	
(1) Hidden Import Barriers (24%)	ii) Data on Information Flows (35%)	International Treaties (25%)
(2) Mean Tariff Rate (27%)	1) Internet Users (per 1000 people) (33%)	
(3) Taxes on International Trade (percent of current revenue) (26%)	(2) Cable Television (per 1000 people) (36%)	
(4) Capital Account Restrictions (23%)	(3) Trade in Newspapers (percent of GDP) (32%)	
	iii) Data on Cultural Proximity (31%)	
	(1) Number of McDonald's Restaurants (per capita) (44%)	
	(2) Number of Ikea (per capita) (45%)	
	(3) Trade in books (per cent of GDP) (11%)	

Source: Dreher (2006), Dreher et al. (2008) and KOF (2012)

Table A.6: CSGR Index of Globalisation  
 ((Numbers in parentheses are averages calculated over all countries/years)

<i>Economic dimension</i>	<i>Social dimension</i>	<i>Political dimension</i>
Trade: Exports plus imports of goods and services as a proportion of GDP (83.29%)	People: Foreign Stock: Stock of foreign population as proportion of total population (6.65%)	Embassies: Number of foreign embassies in country (34.16)
Foreign Direct Investment (FDI): Inflows plus outflows as a proportion of GDP (2.35%)	Foreign Flow: Inflows of foreign population as proportion of total population (0.5%)	UN Missions: Number of UN peacekeeping operations in which country participates (1.16)
Portfolio Investment: Inflows plus outflows of portfolio investments as a proportion of GDP (3.22%)	Worker remittances (receipts) as a proportion of GDP (3.11%)	Organisations: Number of memberships of International organisations (40.7)
Income: Employee compensation paid to non-resident workers and investment income from foreign assets owned by domestic residents plus employee compensation paid to resident workers working abroad and investment income from domestic assets owned by foreign residents, as a proportion of GDP. (9.12%)	Ideas: Phone calls: International outgoing telephone traffic (minutes) per capita (0.059)	
	Internet users as a percentage of population (3.97%)	
	Films Number of films imported and exported (310.92)	
	Books and newspapers: Sum of value of books and newspapers imported and exported per capita (\$10.08)	
	Mail: Number of international letters delivered and sent per capita (15.76)	

Source: Lockwood and Redoano (2005).

Table A.7: t-bar test of IPS (2003), Unit root test of panel data\*

<i>Variable</i>	<i>t-bar</i>
Inc_Gap	-3.386
Glob_Index	-2.826
Life_Exp	-13.028
Capital_Form	-2.614

\*The critical value of the 5% per cent confidence level is

## APPENDIX B (DATA APPENDIX)

<i>Variables</i>	<i>Definition</i>	<i>Source</i>
PPP GDP per capita (constant 2005 international \$)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes, minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 international dollars.	The World Bank <a href="http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD">http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD</a>
life expectancy at birth, total (years)	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	The World Bank <a href="http://data.worldbank.org/indicator/SP.DY.N.LE00.IN">http://data.worldbank.org/indicator/SP.DY.N.LE00.IN</a>
Gross capital formation (% of GDP)	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy, plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and 'work in progress'. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.	The World Bank <a href="http://data.worldbank.org/indicator/NE.GDI.TOTL.ZS">http://data.worldbank.org/indicator/NE.GDI.TOTL.ZS</a>

ENDNOTES

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2. The KOF index was developed by Dreher (2006) and updated in Dreher et al (2008). The CSGR globalisation index was developed by Lockwood and Redoano (2005). The reasons for selecting these two indexes are discussed in Sections 4 and 5.
3. See Barro and Sala-i-Martin (2003) for a survey.
4. For robustness checks, the CSGR globalisation index will also be used in section 5. The main differences between the KOF and CSGR indexes will be discussed in section 5.
5. Other control variables (see Barro, 1991), namely, school enrolment, health expenditure (% of GDP), fertility rate, market capitalisation (% of GDP), military expenditure (% of GDP), and research and development expenditure (% of GDP), are not available in most SSA countries during the period 1980-2009 (World Bank, 2012).
6. Al-Rodhan and Stoudmann (2006) reviewed 114 different definitions of globalisation. They concluded that globalisation should be defined thus: 'Globalisation is a process that encompasses the causes, course, and consequences of transnational and trans-cultural integration of human and non-human activities.'
7. See for example, Dreher et al (2010) and Samimi et al (2012).
8. In addition, the KOF index and NGI index are the only two globalisation indexes that consider culture as a main factor that can affect globalisation.
9. Estimating vector autoregressions with panel data is first suggested by Holtz-Eakin et al (1988).
10. Gross capital formation (% of GDP) is not available for 24 SSA countries (World Bank, 2012), see table A.2 in appendix A. For this reason, the number of SSA countries in regressions (5.3) and (5.4) is 24.
11. Table (A.4) in appendix (A) shows also that both KOF and CSGR indexes cover a larger number of years than other globalisation indexes.
12. Because of the unavailability of data, the CSGR index is available only for 13 SSA countries during the period 1996-2004; see table (A.3) in appendix A. In addition, gross capital formation (% GDP) is not available for Cameroon and Nigeria. With this in mind, the number of SSA countries in regressions (5.7) and (5.8) is 11.
13. The results of table (3) show that life expectancy at birth ( ), as a proxy for health conditions, and gross capital formation (% of GDP), have no significant impact on the

income gap between the USA and SSA. One explanation is that these variables do not capture all dimensions of human development and technological capabilities. Because of the unavailability of data (see Dreher, 2006, and World Bank, 2012), we are not able to include other variables in the regression equation. Similar results can be found in previous studies. For example, Dreher (2006, p 1103) shows that life expectancy at birth has no significant impact on economic growth.

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