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Patterns of Long Term Growth in Sub-Saharan Africa

Jorge Saba Arbache
John Page

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Abstract

Using the most recent purchasing power parity data for 44 sub-Saharan African countries, this paper examines the characteristics of long run growth in Africa between 1975 and 2005. The authors find that low and volatile growth is the outstanding defining characteristic of Africa's growth experience since 1975, but the authors find no evidence that growth volatility is associated with economic performance over the long run. The authors also find that the 1990s may mark a turning point in Africa's growth; income distribution is becoming more unequal across countries; formation of clubs; initial conditions matter a great deal for income distribution but not for growth; and that geography and natural resources do not seem to matter for growth.

This paper—a product of the Office of the Chief Economist for the Africa Region—is part of a larger effort in the department to investigate long term growth in Africa. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at jarbache@worldbank.org.

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Contacting author: Jorge Saba Arbache, World Bank, 1800 H St, NW, Washington, DC, 20433; email jarbache@worldbank.org.

1. Introduction

Recent popular and academic writing has suggested that Africa may be at a turning point in its long economic decline (Ndulu et al. 2006; Commission for Africa 2005). Beginning about the middle of the 1990s, growth accelerated in a number of countries, and the region's average growth rate began to approach that of other developing countries for the first time since the mid-1970s. To understand whether Africa is at a turning point, however, it is useful to understand the stylized facts of the region's post-independence long-run growth performance.

Using the most recent purchasing power parity (PPP) data for 44 sub-Saharan African countries, this paper examines the characteristics of long-run growth in Africa between 1975 and 2005. We were interested in examining the following issues: cross-country income structure, convergence, the country-level distribution of income, and growth persistence. Also, we examined the data for evidence of the formation of country groups or "clubs."

The time period includes the first oil shock and commodities prices plunge, when many African economies collapsed and several conflicts erupted; the introduction of structural reforms, which brought significant changes in many economies; and the growth recovery observed more recently. Given the rich and varied economic changes experienced by African countries, our time-series may well capture long-term economic trends.

The next section describes our data and methods and is followed by a section examining the characteristics of Africa's long-run growth experience. The fourth section of the paper looks at the structure of gross domestic product (GDP) per capita across Africa. We then identify four groups of countries according to their income levels and growth experiences, and we look for some common characteristics that are associated with the groups. Next, we probe more deeply into the consequences of growth volatility for economic performance and test for some correlates of volatility.

2. Data and methods

We analyzed patterns of GDP per capita growth at 2000 international PPP prices and their respective standard deviations (SDs) and coefficients of variation (CVs), which are our measures of volatility. Although there are differences between GDP per capita at

PPP and non-PPP, those differences mainly are confined to levels and do not affect growth trajectories.[1]

All data are from *World Development Indicators*, unless otherwise specified. The time-series spans the years 1975 to 2005. Our sample contains all sub-Saharan African countries for which PPP GDP data exist. For Liberia, San Tomé and Principe, and Somalia, there are no GDP per capita PPP data.[2] We have an unbalanced panel of data with 44 countries and 31 periods. The mean GDP per capita between 1975 and 2005, using unweighted data, was $2,306 for the 44 countries in our sample. The mean GDP using weighted data was $1,702. Unless stated otherwise, we used unweighted country data because we are interested in examining the representative country.[3]

Along with descriptive statistics and kernel distributions, we analyzed the GDP data using bivariate and multivariate cross-country and pooled ordinary least squares (OLS) regression models and multivariate logit models. Because we are interested in identifying the long-run association between growth and other variables, rather than in modeling the determinants of growth, we are not concerned about omitted variables and problems associated with direction of causality, reverse causality, endogeneities, nonlinearities, and other potential econometric issues that usually plague growth regressions. We interpret our econometric results descriptively only.

3. Characteristics of Africa's long run growth

Figure 1a shows that mean GDP per capita had a slow, positive long-term trend, consisting of about 20 years of virtual stagnation with a point of inflexion in the early 1990s.[4] Since the mid-1990s, the variance of mean income per capita also appears to have declined. Weighting by GDP (figure 1b) gives a U-shaped pattern of GDP per capita, reaching a minimum in the mid-1990s. By 2005, GDP per capita had not yet recovered to the levels observed in mid-1970s.

[1] Figure A1 and Table A1 in the Appendix show that PPP and non-PPP growth data share similar statistical properties.
[2] Our sample accounted for 98.4% of population and 99% of regional GDP as of 2005.
[3] Although Equatorial Guinea is in our sample, we removed the country from all charts, tables, econometrics, and aggregate descriptive statistics because its extremely high growth rates in recent years distort the results.
[4] We employ the Hodrick-Prescott filter in Figures 1 and 2 to smooth the estimate of the long term trend component of the GDP series.

The trajectories of the unweighted and weighted series show significant differences. Africa's larger economies stagnated or declined in the 1970s and 1980s, causing the U shape. South Africa, which represents, on average, 42 percent of the regions' GDP, grew by an average of only 0.12 percent a year; and Nigeria, the second-largest economy, representing 13.50 percent of the region's GDP, grew by 0.28 percent, while the regional unweighted average growth was 0.71 percent. Both the unweighted and weighted series show a strong positive trend from the mid-1990s on. In the period 1995–2005, the unweighted average GDP per capita growth was 1.81 percent, more than twice the long-term average.

Figure 1: GDP per capita

Figure 1a: Unweighted data

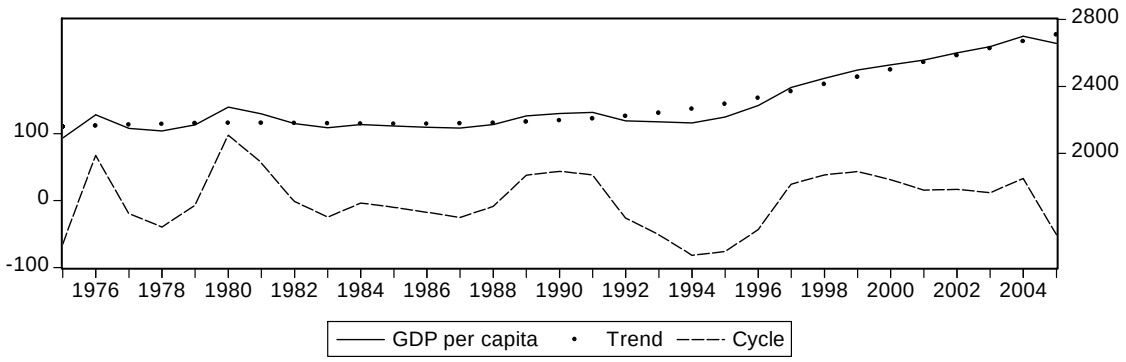
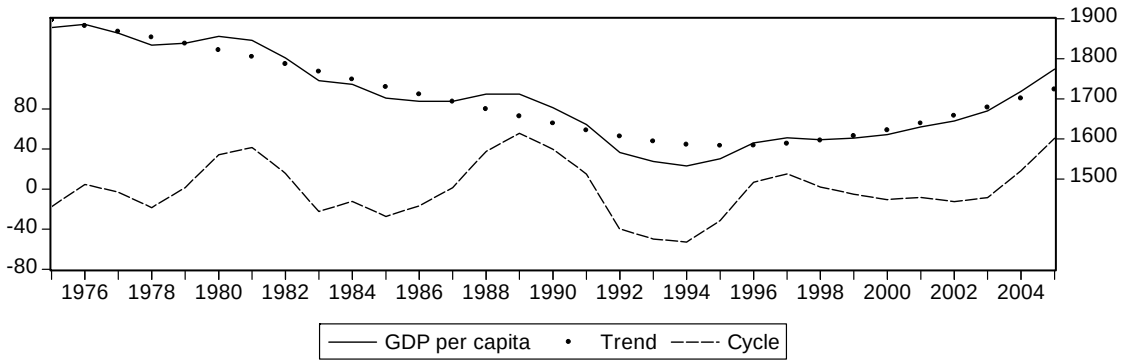


Figure 1b: Weighted data



Turning to growth rates, figure 2 presents the paths of unweighted and weighted data. The mean and SD of unweighted GDP per capita growth are 0.71 percent and 6.32 percent, respectively. Figure 2a shows that growth declined until the mid-1980s, but it has had a positive trend since then. The mean and SD of weighted data are –0.17 percent

and 1.7 percent, respectively. Although the trend line shapes appear similar, their means and variances are significantly different. The mean calculated from unweighted data is larger, suggesting that big economies grew less than small ones, as indicated above. Both small and large economies experienced high growth variation, however. The average SD of South Africa's growth is 2.41 percent; Nigeria's average is 5.15 percent; and the simple average of African countries is 2.26 percent.

Figure 2: GDP per capita growth

Figure 2a: Unweighed data

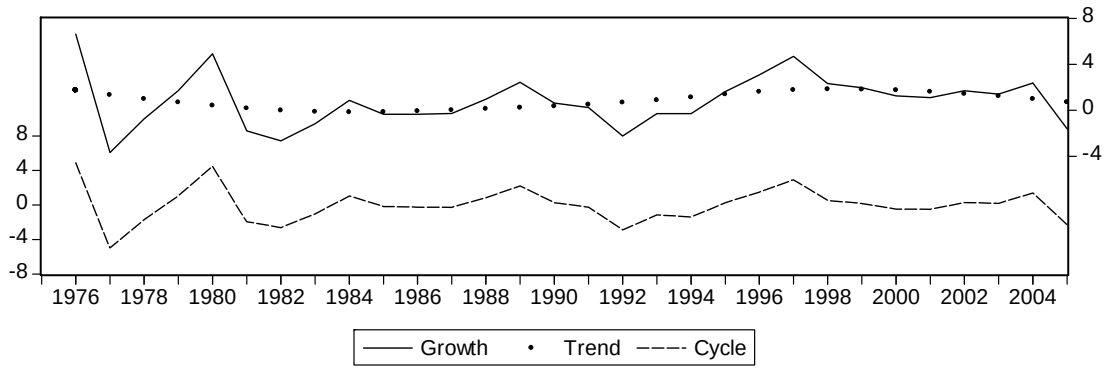
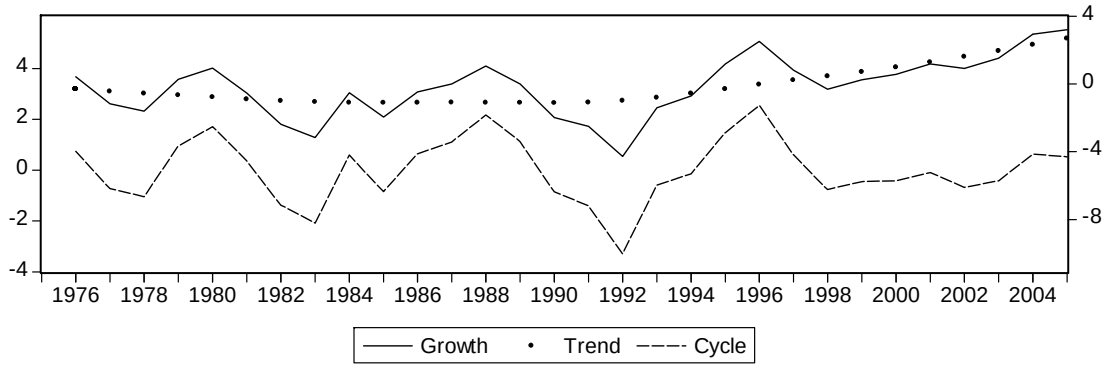


Figure 2b: Weighted data



Comparing Sub-Saharan Africa with Other Developing Regions

The African growth story looks bleak when compared with the growth performances of other developing countries. Whereas all other regions experienced significant income improvements, Africa's income shrank between the 1970s and the 2000s (see table 1). Africa is always among the weakest growth performers, although there has been some catching up recently.

Table 1: GDP per capita and growth by region (weighted data)

Region	1975-80	1981-85	1986-90	1991-95	1996-2000	2001-05
	GDP per capita					
Sub-Saharan Africa	1,928	1,844	1,782	1,648	1,668	1,768
East Asia & Pacific	905	1,227	1,686	2,407	3,399	4,595
Latin America & Caribbean	6,020	6,295	6,315	6,450	6,978	7,205
Middle East & North Africa	4,179	4,180	4,055	4,326	4,651	5,197
South Asia	1,132	1,268	1,505	1,745	2,110	2,530
Low & middle income	2,278	2,560	2,881	3,045	3,513	4,219
	Growth					
Sub-Saharan Africa	-0.06	-1.60	-0.21	-1.64	0.79	1.79
East Asia & Pacific	5.26	6.12	5.76	9.10	5.63	7.06
Latin America & Caribbean	3.31	-0.95	-0.43	1.61	1.53	1.21
Middle East & North Africa	-0.20	2.41	-1.20	1.18	1.91	2.78
South Asia	1.03	3.14	3.89	3.01	3.59	4.65
Low & middle income	2.79	1.99	1.93	1.56	3.23	4.58

Note: All Sub-Saharan African countries are included in claculations.

Figure 3 shows that Africa has the lowest CV of GDP per capita, which is due to its long economic stagnation. Figure 4 shows that African countries have the least predictable growth, as suggested by the largest CV. Numerous factors can explain this outcome, such as higher exposure to climatic shocks, changes in the international economic environment, political economy issues, and high incidence of conflicts. Guillaumont, Jeanneney and Brun (1999) found that, for Africa, these sources of instability contribute to the induction of bad policies that result in instabilities of the rate of investment and the real exchange rate and in lower total factor productivity.

Figure 3: GDP per capita - means, standard deviation and coefficient of variation of by region (weighted data)

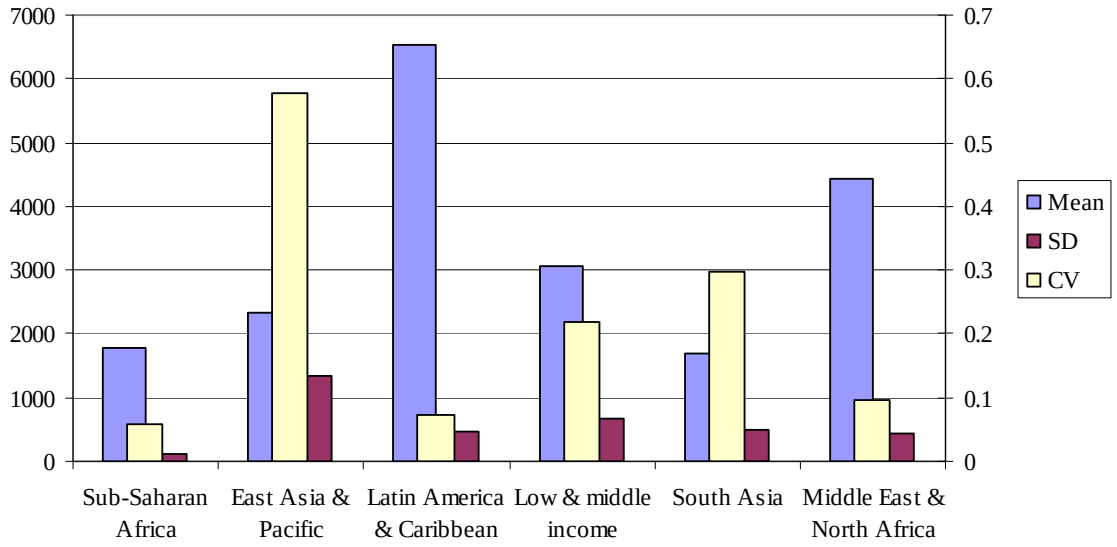
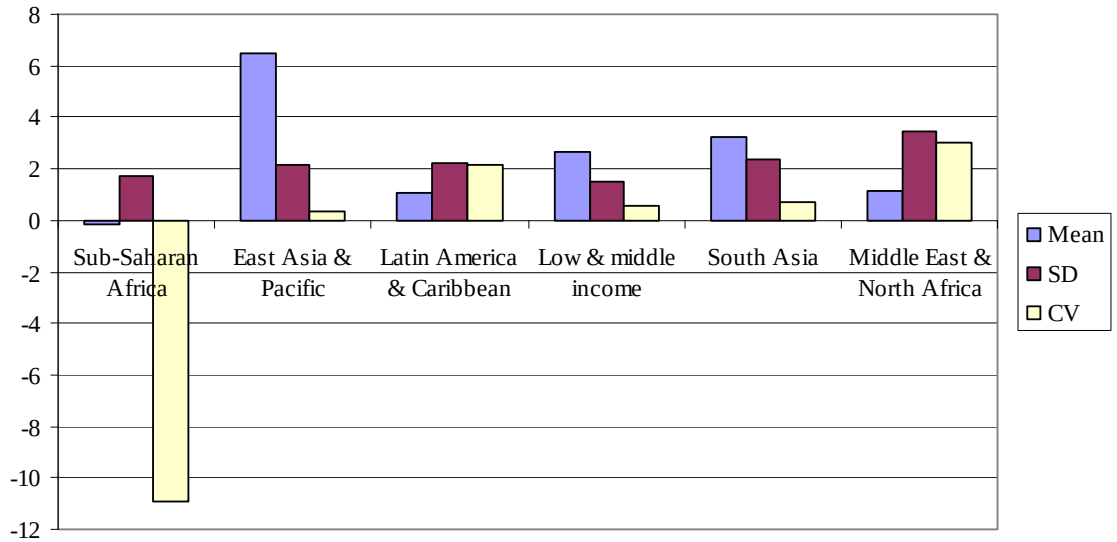


Figure 4: GDP per capita growth - means, standard deviation and coefficient of variation by region (weighted data)



Country-level growth patterns

Table 2 presents descriptive statistics at the country level. In general, African countries' GDP per capita registered only modest increases between 1975 and 2005, and many countries--such as the Democratic Republic of Congo, Cote D'Ivoire, and

Zimbabwe--and showed declining per capita incomes over the period. The SD of income per capita is generally low, and the CV of many countries is close to zero. Thus, the overall pattern of income growth in the region was both stagnant and stable.

Consistent with the relative stability of income, growth rates for most countries were low. Despite some statistical commonalities, however, there were highly diverse growth experiences in Africa, and they can be described by the metaphor suggested by Pritchett (2000): hills, plateaus, mountains, and plains (see the illustrative examples in figure A.2 in the annex to this paper). The CV of growth in many countries is very high, suggesting that growth is highly erratic. Some noteworthy cases are the Comoros (–22.6), Ethiopia (18.4), Guinea-Bissau (–11.9), and South Africa (20.6), all of which are associated, at least in part, with some kind of internal or external conflict. More remarkable is that countries at different levels of income (like Botswana and Malawi) or following diverse long-term GDP per capita patterns (like Cape Verde, the Comoros, and South Africa) also share the attribute of high growth volatility.

Table 2: Countries' descriptive statistics - 1975-2005

	GDP per capita					GDP per capita growth				
Country	1975	2005	Average annual	Standard deviation	Coefficient of variation	Average annual	Standard deviation	Min	Max	Coefficient of variation
Angola	..	2,169.5	1,973.7	242.3	0.123	1.66	13.50	-29.86	28.56	8.14
Benin	844.4	1,000.5	904.7	55.0	0.060	0.61	2.92	-6.88	6.47	4.80
Botswana	1,549.5	9,651.7	5,052.7	2,381.7	0.451	6.51	6.99	-4.62	18.27	1.07
Burkina Faso	781.7	1,092.9	927.1	83.2	0.086	1.17	3.26	-4.59	7.30	2.78
Burundi	691.0	584.2	728.9	95.1	0.132	-0.45	4.78	-8.88	9.17	-10.66
Cameroon	1,791.7	1,977.9	2,049.4	304.9	0.149	0.38	6.70	-11.32	26.19	17.42
Cape Verde	..	5,835.0	4,157.7	786.8	0.189	3.11	3.32	-1.44	12.71	1.07
Central African Republic	1,553.9	1,023.8	1,270.7	190.4	0.148	-1.28	4.46	-10.16	6.35	-3.47
Chad	997.2	1,616.4	937.5	199.4	0.216	2.15	10.60	-22.54	29.72	4.93
Comoros	..	1,795.2	1,882.5	115.8	0.062	-0.16	3.18	-7.87	4.59	-20.32
Congo, Dem. Rep.	2,269.0	678.6	1,388.9	572.3	0.410	-3.78	5.60	-21.00	5.01	-1.48
Congo, Rep.	665.3	931.5	893.6	158.7	0.173	1.83	12.74	-22.99	49.80	6.96
Cote d'Ivoire	2,333.5	1,400.8	1,891.5	394.8	0.209	-1.57	4.73	-15.26	7.60	-3.01
Equatorial Guinea	..	..	4,094.3	5,433.5	1.327	22.52	40.80	-5.65	156.86	1.81
Eritrea	..	907.1	965.2	120.3	0.125	2.20	9.21	-16.73	21.06	4.18
Ethiopia	..	896.4	782.5	72.1	0.092	0.43	7.78	-13.83	17.08	17.88
Gabon	8,546.4	5,839.4	6,732.9	1,192.6	0.175	-0.85	9.17	-22.89	30.20	-10.75
Gambia, The	1,601.6	1,780.6	1,696.2	88.2	0.052	0.53	5.94	-18.73	14.28	11.24
Ghana	1,818.4	2,148.9	1,711.4	196.5	0.116	0.63	3.75	-10.06	6.57	5.97
Guinea	..	2,040.0	1,894.3	99.2	0.052	0.62	1.97	-2.42	3.37	3.16
Guinea-Bissau	852.5	653.9	822.0	97.4	0.120	-0.49	8.59	-28.98	10.36	-17.71
Kenya	978.0	1,041.7	1,054.3	43.1	0.039	0.26	2.23	-4.11	4.91	8.58
Lesotho	720.6	2,472.2	1,447.6	591.8	0.399	4.51	8.43	-10.23	28.56	1.87
Madagascar	1,247.4	802.3	945.7	151.6	0.153	-1.36	4.49	-14.82	7.12	-3.30
Malawi	563.0	596.8	575.7	45.1	0.079	0.34	5.46	-9.40	14.83	16.19
Mali	736.6	930.3	764.9	86.9	0.115	0.87	5.80	-13.21	14.70	6.69
Mauritania	1,619.2	1,992.7	1,628.0	127.9	0.080	0.84	5.47	-13.22	11.74	6.52
Mauritius	..	11,141.2	7,335.3	2,249.9	0.307	4.10	1.51	1.30	6.91	0.37
Mozambique	..	1,219.9	751.6	195.5	0.260	2.56	7.58	-16.87	19.55	2.96
Namibia	..	6,979.6	6,377.0	718.9	0.113	-0.45	6.34	-12.21	13.51	-13.97
Niger	1,020.5	715.6	871.0	159.8	0.185	-1.03	5.47	-18.16	12.01	-5.34
Nigeria	921.9	1,057.9	870.7	95.4	0.111	0.65	6.18	-17.55	11.53	9.51
Rwanda	935.0	1,192.7	1,140.0	138.6	0.118	1.67	12.16	-47.14	36.31	7.27
Senegal	1,505.8	1,615.5	1,434.9	79.6	0.056	0.31	3.86	-5.45	12.23	12.64
Seychelles	7,354.6	14,865.8	12,428.0	3,227.5	0.250	2.65	7.66	-11.19	19.82	2.89
Sierra Leone	931.8	720.4	795.3	166.9	0.212	-0.52	8.19	-19.65	22.17	-15.62
South Africa	10,612.8	11,043.6	10,128.5	651.7	0.065	0.17	2.65	-4.57	5.46	15.89
Sudan	1,134.4	1,924.1	1,328.9	257.5	0.194	1.94	5.83	-9.26	12.70	3.01
Swaziland	3,470.5	4,595.3	3,805.8	587.8	0.156	1.11	6.11	-8.57	16.38	5.49
Tanzania	..	652.9	530.8	48.2	0.091	1.50	2.73	-2.61	5.04	1.81
Togo	1,783.6	1,410.9	1,594.8	199.1	0.125	-0.56	6.72	-16.70	15.74	-11.97
Uganda	..	1,363.4	1,034.4	192.8	0.186	1.91	3.17	-6.41	7.55	1.66
Zambia	1,361.9	930.0	1,011.9	197.4	0.190	-1.16	4.58	-12.11	8.61	-3.95
Zimbabwe	2,742.7	1,832.1	2,521.5	268.7	0.107	-1.17	5.85	-10.52	9.90	-5.01

Table 3 shows the decomposition of the SD of GDP per capita and its growth within and between countries. Variation of GDP per capita is mostly due to between-country variations, whereas the variation in growth is basically due to within-country variation. In short, the GDP per capita of individual countries is relatively stable, and the bulk of the variation in Africa's average income per person occurs between countries. Growth in contrast is highly unstable in individual countries. The bottom line is a high growth variation around a stable GDP per capita mean; the ratio of within-country SD to total SD of growth is 94 percent, although it is only 31 percent for GDP per capita.

Table 3: Decomposition of standard deviation of GDP per capita and growth - 1975-2005

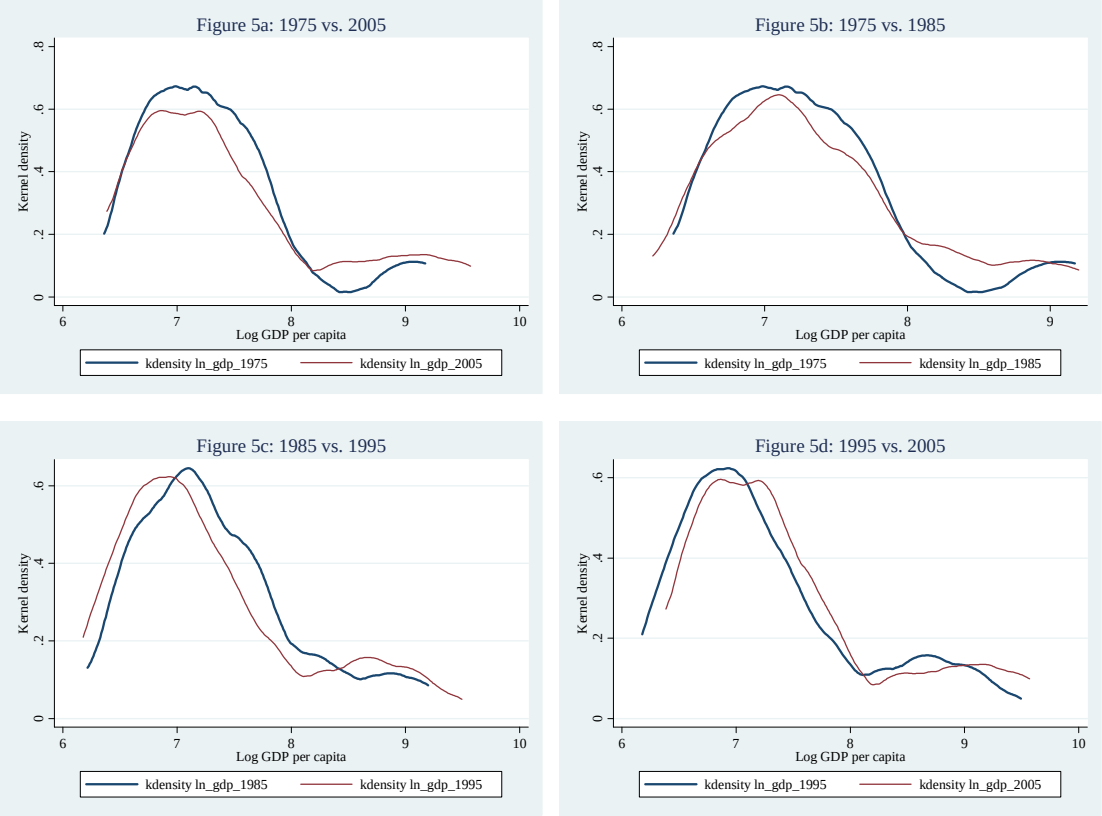
Variable	Mean	SD overall	SD between countries	SD within countries
GDP per capita	2,306	2,633	2,490	809
GDP per capita growth	0.71	6.32	2.26	5.95

Notes: Statistics calculated from panel data.

Figure 5 shows the comparative kernel density plot of GDP per capita. There has been slow economic growth as evidenced by the slight movement toward the right of the GDP per capita of 2005 compared with that of 1975 (figure 3a). The kernel plot identifies persistence and stratification, formation of convergence clubs, and the polarization of the distribution over time into twin peaks (Quah 1993a, 1993b) of relatively rich and poor African countries.

The most significant shift toward polarization occurred between 1985 and 1995 (figure 5c, a period when many countries were devastated by conflicts. Between 1995 and 2005 (Figure 5d), we observe a substantial slide to the right, meaning increasing income throughout Africa. The second peak virtually disappears when we remove Botswana, Cape Verde, Gabon, Mauritius, Namibia, the Seychelles, and South Africa from the data. For that reason, they could be considered regional champions.[5]

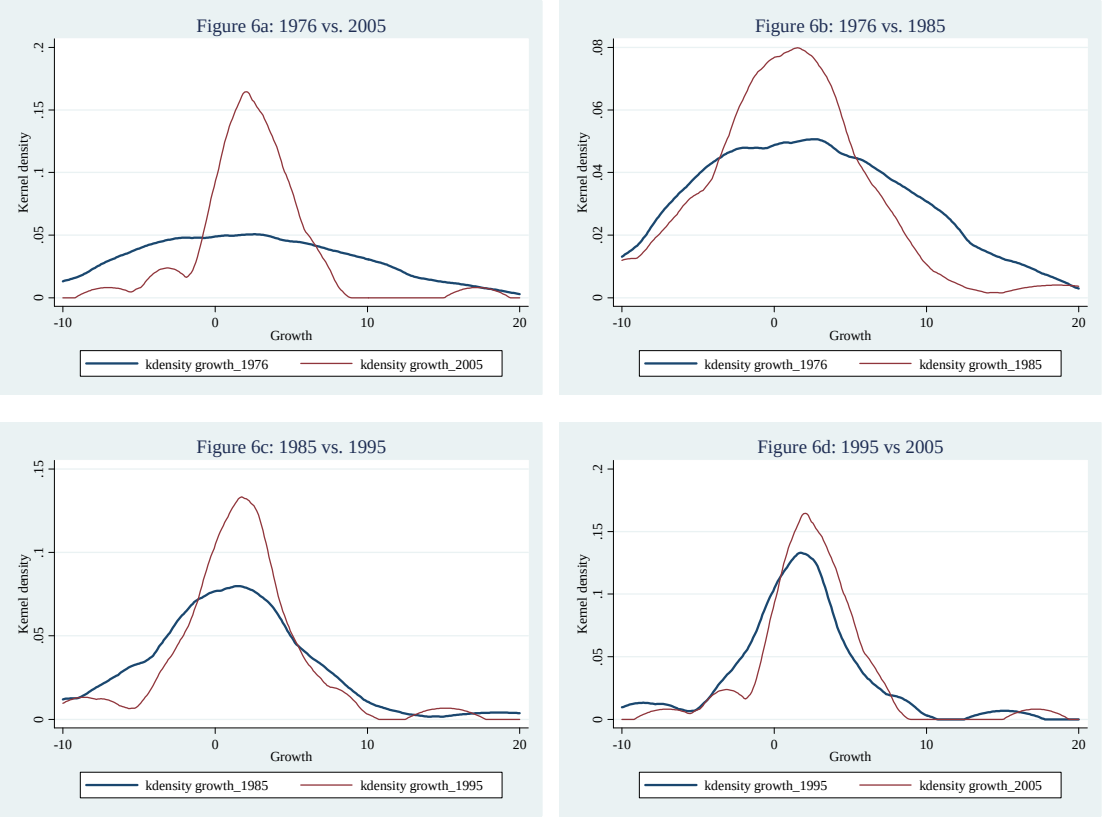
Figure 5: Density of GDP per capita across countries



[5] In 2005, those countries hosted about 8.5 percent of the regional population, but produced 45 percent of the regional GDP.

The comparative kernel density of GDP per capita growth is depicted in figure 3.6. It reveals that growth is becoming a more accurate predictor of economic performance and that growth is converging over time (see figure 6a). The SD dropped from 8.2 percent in 1976 to 3.6 percent in 2005. The decade 1976–85 marked the most significant change in growth distribution toward convergence (figure 6b). Since then, there has been an increasingly more acute peak around the mean (figures 6c and 6d).

Figure 6: Density of GDP per capita growth across countries



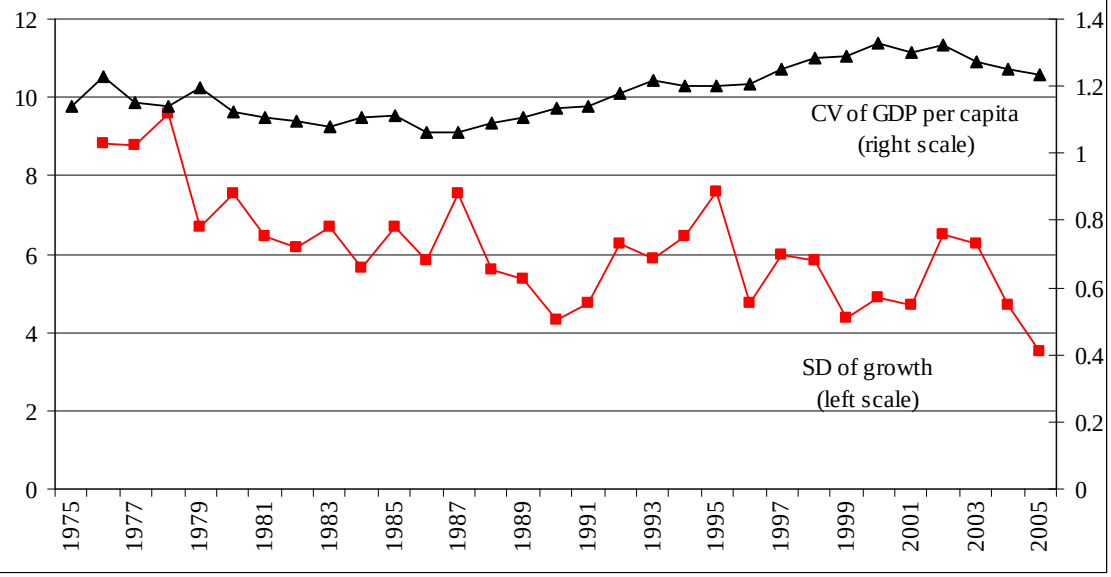
To examine further how the income distribution evolved over time, figure 7 shows the CV of GDP per capita and the SD of growth.[6] From 1986 until 2002, the distribution of GDP per capita became increasingly more dispersed, but, since then, there has been some convergence. The distribution of growth, however, shows a negative long-term trend toward convergence.

The reduction of growth dispersion did not lead to overall convergence of income, however. The opposite slopes of curves in figure 5 indicate that the poorest countries

[6] We present the SD of growth without extreme outliers. Among the observations removed from data are Angola (1992 and 1993), Chad (1993), and Rwanda (1992 and 1994). For example, Rwanda's growth in 1994 was –47 percent, and Angola's growth was 27 percent in 1993.

were growing less, allowing the richest countries to maintain or even increase the income gap. Accordingly, the ratio of income of the richest 10 percent of countries to the poorest 10 percent of countries was 10.5 in 1975, but it increased to 18.5 in 2005. In 1975–80, South Africa's GDP per capita was 17 times higher than that of Malawi. In 2000–05, the gap between the then-highest GDP per capita--the Seychelles--and Malawi had grown to 24 times. Africa is becoming an increasingly more unequal region in terms of its distribution of income among countries, despite the convergence of growth rates.[7]

Figure 7: Coefficient of variation of GDP per capita and standard deviation of growth



Growth persistence

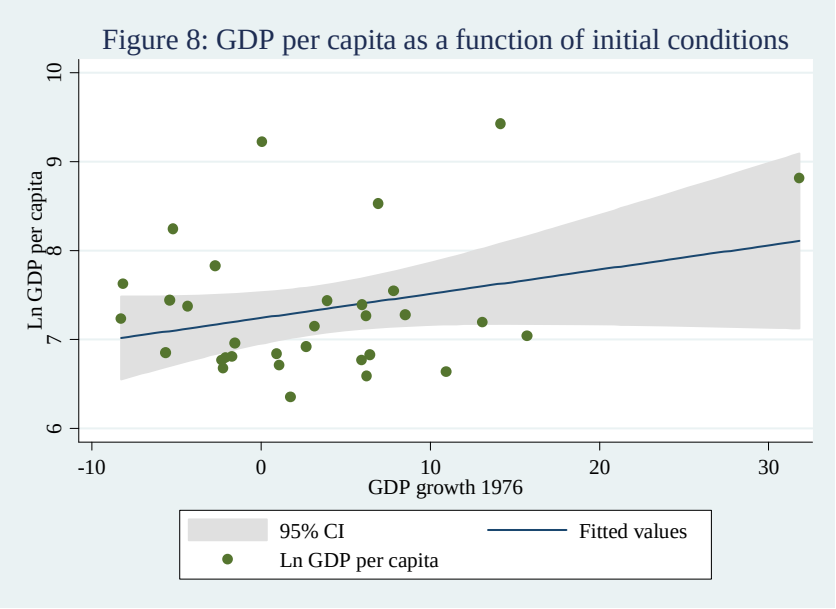
Another important aspect of long-term growth is whether it is persistent. Figure 8 shows the regression of average GDP per capita growth as a function of growth in 1976. We ran the following cross-country model:

$$\Delta\overline{Y}_i = \alpha + \beta(\Delta Y_i^{76}) + \varepsilon$$

where $\Delta\overline{Y}_i$ is the average growth of country *i*, and ΔY_i^{76} is the growth rate of country *i* in 1976, the first year in our series. The coefficient is positive and significant, (β = 0.013, *t* = 0.70).[8] So, there is no evidence of growth persistence.

[7] We show below more evidence against the neoclassical hypothesis of income convergence.
[8] Gabon grew 31 percent in 1976, biasing the results. We removed it from the regression.

Figure 8: GDP per capita as a function of initial conditions



We stratified the data before and after 1990 to assess whether there is persistence during the period when many economies experienced growth accelerations. We ran the following models:

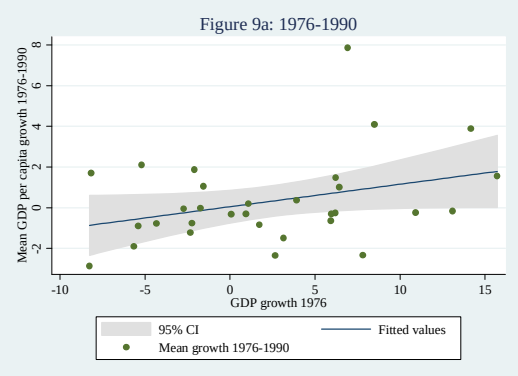
$$\Delta \overline{Y}_i^{76-90} = \alpha + \beta(\Delta Y_i^{76}) + \varepsilon$$

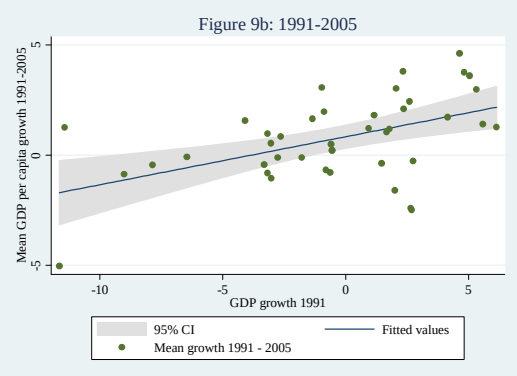
$$\Delta \overline{Y}_i^{91-05} = \alpha + \beta(\Delta Y_i^{91}) + \varepsilon$$

where $\Delta \overline{Y}_i^{76-90}$ is the average GDP per capita growth between 1976 and 1990, $\Delta \overline{Y}_i^{91-05}$ is the average GDP per capita growth between 1991 and 2005, and ΔY_i^{91} is the growth rate of country *i* in 1991.

The results are shown in figures 9a and 9b. Although the coefficient is statistically significant at the 7 percent level only in the first period ($\beta_{1976-90} = 0.110$, $t = 1.89$), it is significant in the second period ($\beta_{1991-05} = 0.218$, $t = 3.64$), thus suggesting that growth becomes somehow more predictable from the 1990s on--a finding that is in line with the kernel density exercises. The weak persistence is thus a phenomenon of the 1970s and 1980s.

Figure 9: Average growth as a function of initial conditions by time range





We also calculated the correlation coefficients of growth over time. Statistically significant (nonsignificant) coefficients suggest that country growth rates follow predictable (unpredictable) patterns. The results, presented in table 3.4, indicate that the large majority of coefficients is not statistically significant, including the vectors of 1991 and 2005. This suggests that growth is erratic, even when, on average, it shows some persistence, as seems to be the case in the second period under analysis. Also, it confirms the finding in table 3.3 that most growth variation comes from within individual countries rather than across countries, as suggested in the decomposition of SD in table 3.3.[9] Even though there is some persistence in more recent years, the results imply that past growth does not help predict future growth and that the growth process in Africa may be erratic.

[9] Easterly et al. (1993) found for a worldwide sample that correlation of growth across decades is also very low, averaging 0.3.

Table 4: Correlation coefficient of GDP per capita growth

Year	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1975																															
1976		1.00																													
1977		-0.19	1.00																												
1978		-0.32	*0.44*	1.00																											
1979		0.12	-0.01	0.27	1.00																										
1980		-0.18	-0.10	-0.13	0.18	1.00																									
1981		-0.07	-0.16	0.10	-0.07	0.10	1.00																								
1982		-0.07	-0.11	0.15	0.16	0.13	*0.43*	1.00																							
1983		0.20	-0.05	-0.08	-0.08	0.16	0.26	0.29	1.00																						
1984		-0.08	0.00	0.17	-0.02	0.02	0.15	0.07	0.09	1.00																					
1985		-0.14	0.18	0.34	-0.22	-0.16	-0.03	0.09	0.10	-0.07	1.00																				
1986		-0.05	*0.36*	0.08	0.27	-0.01	-0.15	-0.19	-0.03	-0.18	-0.12	1.00																			
1987		-0.30	0.28	0.31	0.12	0.15	0.02	0.10	0.01	-0.02	-0.05	*0.43*	1.00																		
1988		0.34	0.02	-0.09	-0.15	0.09	-0.17	-0.03	0.22	0.04	*0.45*	-0.04	-0.01	1.00																	
1989		0.43	0.05	0.05	0.14	-0.01	-0.23	-0.15	0.19	0.23	-0.07	0.22	0.33	*0.52*	1.00																
1990		0.19	-0.09	0.08	*0.40*	0.18	-0.20	-0.06	-0.12	0.22	0.12	-0.07	0.20	*0.41*	*0.43*	1.00															
1991		*0.44*	0.01	0.04	-0.13	0.02	0.10	0.14	0.22	-0.03	0.25	-0.12	0.08	*0.42*	*0.35*	*0.39*	1.00														
1992		*0.43*	0.14	0.16	0.12	-0.09	-0.08	0.00	0.32	-0.02	0.19	0.09	0.13	0.36	0.41	0.09	0.30	1.00													
1993		0.28	-0.12	0.12	0.46	-0.02	-0.08	-0.03	-0.19	-0.03	-0.24	0.12	0.17	-0.08	0.17	*0.48*	*0.38*	0.09	1.00												
1994		-0.25	0.10	-0.06	-0.34	-0.09	-0.10	-0.04	-0.20	0.20	0.15	0.00	0.09	0.27	0.27	0.10	0.03	*-0.36*	-0.25	1.00											
1995		0.33	0.01	0.11	0.19	0.08	-0.06	0.02	0.11	-0.11	-0.09	0.03	-0.23	-0.04	-0.08	-0.07	0.14	*0.44*	0.17	*-0.71*	1.00										
1996		0.15	-0.14	0.30	0.15	0.04	0.13	0.04	-0.11	-0.01	-0.07	-0.13	0.04	0.06	0.13	0.28	0.31	0.13	0.37	-0.14	*0.40*	1.00									
1997		0.32	0.19	0.33	0.01	-0.12	-0.13	-0.10	0.00	0.16	0.29	0.06	-0.07	0.50	*0.42*	0.15	0.21	*0.57*	0.00	0.10	0.29	0.25	1.00								
1998		0.10	0.28	-0.04	0.16	0.28	-0.28	0.05	0.26	-0.29	0.11	0.25	0.06	0.09	0.08	-0.13	0.06	0.10	0.03	0.02	-0.05	*-0.40*	0.04	1.00							
1999		-0.01	0.27	0.29	0.12	-0.26	-0.04	0.02	0.03	0.07	0.03	*0.49*	*0.35*	0.09	0.23	-0.01	0.07	*0.47*	0.26	0.06	0.14	0.08	0.50	-0.06	1.00						
2000		0.20	0.00	0.20	0.32	0.03	0.11	0.33	0.13	*0.39*	-0.15	-0.02	0.27	0.09	*0.36*	0.32	0.25	*0.40*	*0.46*	-0.07	-0.02	0.08	0.21	-0.07	*0.45*	1.00					
2001		0.08	0.21	-0.06	0.00	-0.01	0.01	0.15	0.25	-0.07	-0.21	0.19	0.16	-0.04	0.13	-0.12	0.13	0.10	0.00	0.02	-0.20	-0.07	-0.31	0.22	-0.06	0.30	1.00				
2002		0.04	0.22	0.10	-0.06	0.27	0.12	0.19	0.11	0.05	-0.09	0.03	0.22	-0.16	-0.09	-0.10	0.30	-0.13	-0.02	-0.16	0.04	0.09	*-0.37*	0.21	*-0.38*	0.05	*0.54*	1.00			
2003		-0.04	0.26	-0.12	-0.18	-0.04	-0.33	-0.02	*0.38*	-0.07	-0.01	0.08	0.10	0.19	0.05	-0.15	0.04	0.18	-0.09	0.01	-0.05	-0.02	-0.13	0.09	0.13	0.24	*0.49*	0.21	1.00		
2004		-0.07	0.17	-0.09	*-0.61*	-0.11	-0.10	0.14	*0.54*	0.08	*0.41*	-0.26	0.02	0.32	-0.03	-0.24	0.20	0.22	*-0.39*	0.05	-0.01	-0.15	-0.06	0.12	-0.04	0.00	0.30	0.27	*0.64*	1.00	
2005		0.03	0.11	-0.10	0.00	0.15	-0.05	0.27	0.19	0.00	*-0.36*	0.07	0.22	0.02	0.04	-0.26	-0.05	0.22	0.01	-0.26	0.18	-0.05	-0.21	0.03	0.14	*0.47*	*0.46*	*0.35*	*0.64*	*0.37*	1.00

Note: coefficients in italics are statistically significant at the 5% level.
n=44.

GDP per capita convergence

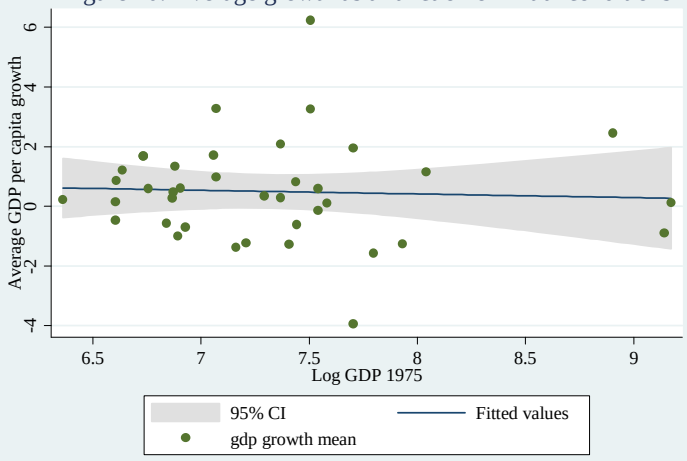
We examined further whether the income per capita of the poorest African countries tends to converge toward the regions' richest ones. For convergence to occur, poor countries have to grow faster (Barro 1991; Barro and Sala-i-Martin 1991). We ran the following unconditional regression:

$$\Delta\overline{Y}_i = \alpha + \beta Y_i^{75} + \varepsilon$$

where $\Delta\overline{Y}_i$ is the average growth rate of country *i*, and Y_i^{75} is the GDP per capita of country *i* in 1975.

The regression in figure 10 shows no support for the overall convergence hypothesis, which may result from the high income heterogeneity between African countries and from stratification of data in clubs, as suggested by figure 5. Although the estimated coefficient is negative as expected, it is not significant (β = –0.122, t = –0.29).[10] McCoskey (2002) examined whether there is income convergence in Africa, using long panel data, and likewise found no evidence of convergence.

Figure 10: Average growth as a function of initial conditions



We also split the sample into before 1990 and after 1990 to assess convergence in the second period when growth accelerated, and we ran the following models:

$$\Delta\overline{Y}_i^{76-90} = \alpha + \beta(Y_i^{75}) + \varepsilon$$

$$\Delta\overline{Y}_i^{91-05} = \alpha + \beta(Y_i^{75}) + \varepsilon$$

[10] The statistical and qualitative results remain the same when we remove outliers such as Botswana and the Democratic Republic of Congo from the regression.

The estimated coefficients of both periods are not significant, thus suggesting no convergence at all.

Cross-Country Structure of GDP Per Capita

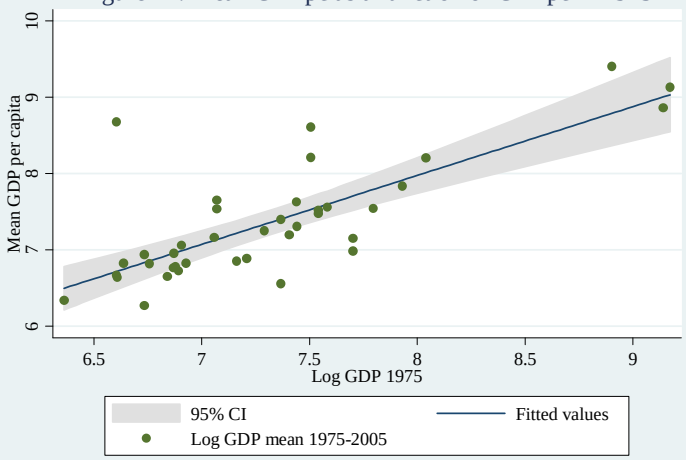
We now assess in more detail the structure of income per capita. A stable structure implies little income mobility, which, in turn, suggests that policies, external shocks, conflicts, and other factors may not substantially change the distribution of GDP per capita across countries in the long run.

We run the following regression:

$$\overline{Y}_i = \alpha + \beta Y_i^{75} + \varepsilon$$

where $\overline{Y}_i$ is the mean GDP per capita of country *i*, and Y_i^{75} is the GDP per capita of country *i* in 1975. The result described in figure 11 shows a line near 45 degrees (β = 0.901, t = 7.41) and suggests that, apart from a few cases, the average GDP per capita closely mirrors that of 1975--thus reflecting inertia, stratification, and the importance of initial conditions in economic output. Nevertheless, there are some outliers, such as Botswana and Namibia, whose average GDPs per capita are well above the 1975 levels, and Eritrea and Mozambique, whose average GDPs per capita were well below those levels.[11]

Figure 11: Mean GDPpc as a function of GDPpc in 1975



We calculated the correlation coefficients of GDP per capita over time. Statistically significant coefficients suggest that the GDP per capita hardly changed and

[11] We also ran the same model while controlling for growth SD, and the results were virtually the same.

its structure remained relatively stable. Table 5 shows that most coefficients are large, thus supporting the evidence of inertia and stable structure.

Table 5: Correlation coefficient of GDP per capita

Year	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1975	1.00																														
1976	0.99	1.00																													
1977	1.00	1.00	1.00																												
1978	0.97	0.96	0.98	1.00																											
1979	0.96	0.95	0.97	1.00	1.00																										
1980	0.97	0.95	0.97	1.00	1.00	1.00																									
1981	0.98	0.96	0.98	0.99	0.99	1.00	1.00																								
1982	0.97	0.95	0.97	0.99	0.99	1.00	1.00	1.00																							
1983	0.97	0.96	0.97	0.99	0.99	0.99	1.00	1.00	1.00																						
1984	0.97	0.95	0.97	0.99	0.98	0.99	0.99	1.00	1.00	1.00																					
1985	0.94	0.93	0.94	0.98	0.98	0.98	0.98	0.98	0.99	0.99	1.00																				
1986	0.93	0.92	0.94	0.97	0.98	0.98	0.98	0.98	0.98	0.99	1.00	1.00																			
1987	0.89	0.87	0.90	0.95	0.96	0.97	0.95	0.96	0.96	0.97	0.99	0.99	1.00																		
1988	0.88	0.87	0.89	0.94	0.95	0.96	0.95	0.95	0.96	0.96	0.99	0.99	1.00	1.00																	
1989	0.87	0.86	0.88	0.94	0.95	0.95	0.94	0.94	0.95	0.96	0.98	0.99	1.00	1.00	1.00																
1990	0.87	0.86	0.88	0.94	0.95	0.95	0.93	0.94	0.95	0.95	0.98	0.99	0.99	1.00	1.00	1.00															
1991	0.86	0.86	0.88	0.94	0.95	0.95	0.93	0.94	0.94	0.95	0.98	0.98	0.99	0.99	1.00	1.00	1.00														
1992	0.84	0.84	0.86	0.92	0.94	0.93	0.91	0.92	0.92	0.93	0.96	0.97	0.98	0.99	0.99	1.00	1.00	1.00													
1993	0.83	0.83	0.85	0.92	0.94	0.93	0.90	0.91	0.92	0.93	0.96	0.96	0.98	0.98	0.99	0.99	1.00	1.00	1.00												
1994	0.83	0.83	0.85	0.91	0.93	0.92	0.90	0.91	0.92	0.92	0.96	0.96	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00											
1995	0.84	0.85	0.86	0.92	0.94	0.93	0.91	0.92	0.93	0.94	0.96	0.97	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00										
1996	0.84	0.84	0.86	0.92	0.94	0.93	0.91	0.92	0.93	0.93	0.96	0.96	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00									
1997	0.82	0.82	0.84	0.91	0.93	0.92	0.89	0.90	0.91	0.92	0.95	0.95	0.97	0.97	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00								
1998	0.80	0.81	0.82	0.90	0.92	0.91	0.88	0.89	0.90	0.90	0.94	0.94	0.96	0.97	0.98	0.98	0.99	0.99	1.00	0.99	1.00	1.00	1.00	1.00							
1999	0.78	0.78	0.80	0.88	0.91	0.90	0.86	0.88	0.88	0.89	0.93	0.94	0.96	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00						
2000	0.76	0.77	0.79	0.87	0.90	0.88	0.85	0.86	0.87	0.88	0.92	0.93	0.95	0.96	0.97	0.97	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00					
2001	0.77	0.78	0.80	0.88	0.90	0.89	0.86	0.87	0.88	0.89	0.93	0.93	0.95	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00				
2002	0.75	0.76	0.78	0.86	0.88	0.87	0.84	0.85	0.87	0.88	0.92	0.92	0.95	0.96	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00			
2003	0.77	0.77	0.80	0.87	0.89	0.89	0.86	0.87	0.88	0.89	0.93	0.93	0.96	0.96	0.97	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00		
2004	0.77	0.78	0.80	0.87	0.89	0.89	0.86	0.87	0.89	0.90	0.93	0.94	0.96	0.97	0.97	0.98	0.98	0.98	0.98	0.99	0.98	0.99	0.99	0.98	0.99	0.99	0.99	0.99	1.00	1.00	
2005	0.77	0.77	0.79	0.86	0.88	0.88	0.86	0.87	0.89	0.90	0.93	0.93	0.96	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.98	0.97	0.98	0.98	0.98	0.99	0.99	1.00	1.00

Note: all coefficients are statistically significant at the 5% level.

n=44.

To assess further the GDP per capita structure, we calculated the ratio of 43 countries' GDP per capita to that of South Africa, the largest African economy, for 1975 and 2005. Table 6 shows that 19 countries experienced a relative improvement in their GDP per capita of 2 percent or more in relation to South Africa; 13 experienced slight or no change at all; and 11 experienced steep deterioration. These figures suggest little income mobility among African countries. The modest changes observed in relation to South Africa may be surprising in view of the long period of stagnation it endured until the late 1990s. Notable exceptions are Botswana, Cape Verde, and Equatorial Guinea--all mineral exporters that strongly improved GDP per capita. It is interesting to note that resource-rich oil exporters do not always improve their relative positions (Angola, Chad, and Nigeria). This finding suggests that mineral resources may help but do not determine successful development stories.

Table 6: GDP per capita disparities

Country	1975 or earliest year	2005 (or most recent year)	Country	1975 or earliest year	2005 (or most recent year)
Angola	0.19	0.21	Lesotho	0.12	0.30
Benin	0.09	0.10	Madagascar	0.13	0.08
Botswana	0.19	1.12	Malawi	0.06	0.06
Burkina Faso	0.08	0.11	Mali	0.08	0.09
Burundi	0.08	0.06	Mauritania	0.20	0.20
Cameroon	0.18	0.21	Mauritius	0.40	1.14
Cape Verde	0.23	0.52	Mozambique	0.07	0.11
Central African Republic	0.17	0.11	Namibia	0.65	0.68
Chad	0.10	0.13	Niger	0.10	0.07
Comoros	0.19	0.18	Nigeria	0.10	0.10
Congo, Dem. Rep.	0.23	0.06	Rwanda	0.09	0.11
Congo, Rep.	0.10	0.11	Senegal	0.15	0.16
Cote d'Ivoire	0.25	0.15	Seychelles	0.76	1.45
Equatorial Guinea	0.13	0.73	Sierra Leone	0.10	0.07
Eritrea	0.09	0.10	Sudan	0.12	0.19
Ethiopia	0.09	0.09	Swaziland	0.32	0.43
Gabon	0.97	0.63	Tanzania	0.05	0.07
Gambia, The	0.16	0.17	Togo	0.18	0.14
Ghana	0.20	0.22	Uganda	0.08	0.13
Guinea	0.19	0.21	Zambia	0.14	0.09
Guinea-Bissau	0.11	0.07	Zimbabwe	0.29	0.18
Kenya	0.10	0.11			

Note: Ratio is a fraction of GDP per capita in South Africa.

The limited income mobility over time suggests that African countries experience similar economic cycles, despite conflicts and other factors observed on the continent that could have affected productivity and changed the positions in the GDP per capita ranking. This empirical evidence suggests contagion, interdependence, regional

spillovers, and externalities among African countries.[12] Recorded and unrecorded trade, regional migration, remittances, and regional conflicts are among the potential channels through which countries affect others, eventually keeping productivity and GDP per capita relatively unchanged over time.

4. Checking for Common Country Features

The previous sections have identified some stylized facts about the long-term GDP per capita growth that cut across African countries. Despite sharing common attributes, however, African economies are quite diverse and their diversity is increasing. In this section, we examine if countries indeed follow common GDP per capita patterns and if there is a country typology based on economic outcomes.

Country groups

We split the time-series into two subperiods, 1975–90 and 1991–2005. Such periods are long enough to allow for the data to capture macroeconomic cycles and to get rid of short-run noises. For each year, we calculated the median of the African continent's GDP per capita, which served as a benchmark, and then checked for every year if each country's GDP per capita is above or below the benchmark. A country whose GDP per capita remained above the median for most years of 1975–90 was assigned category "A," meaning that its GDP per capita was generally "above" Africa's benchmark. A country whose GDP per capita remained below the median for most years was assigned category "B," meaning "below" Africa's benchmark.[13] The same exercise is applied for the second period, 1991–2005. It is also possible that a country switches categories, and we account for that by having four possible combinations.[14] In short, the combinations are

- **AA**--Countries whose GDP per capita is above Africa's median GDP per capita for most years of the first and second periods

[12] Internal conflicts in Africa often spill out into wider regions--for example, Sudan–Chad, Liberia–Sierra Leone, and the Democratic Republic of Congo and several neighbors.

[13] Bosworth and Collins (2003) had a similar method for grouping countries. They grouped 84 countries from all regions as higher income and lower income, according to the per capita income above or below the median. However, they took the income per capita in 1960, their first year, as reference for grouping. Garner (2006) used average long-term growth rates to classify African countries. We also tested other criteria for grouping countries, using means instead of medians, growth instead of GDP per capita level, and clustering analysis, among others; but the present exercise provided the most robust results. We ran the median exercise removing South Africa, but the classification of countries remained basically the same.

[14] Table A.4 in the annex shows the countries' GDP per capita and median by year and respective assignments to country groups.

- **BB--**Countries whose GDP per capita is below Africa's median GDP per capita for most years of the first and second periods

- **BA**--Countries whose GDP per capita switches from below to above Africa's median GDP per capita from the first to the second period

- **AB**--Countries whose GDP per capita switches from above to below Africa's median GDP per capita from the first to the second period.

The results of this exercise are presented in table 7. AA countries have a substantially larger average GDP per capita, $3,648, which is more than four times higher than that of BB countries; and AAs have higher mean growth, 1.05 percent than BBs, 0.37 percent. *T*-statistics do not reject the hypothesis of equality of growth means of AA and BB, but they do reject the equality of means of GDP per capita. When we split the series by period, we observe that AA countries grew substantially more than BBs in the first period, but BB countries undertook an impressive growth acceleration in the second period (from –0.07 percent to 0.81 percent), closing the gap with AAs. Table 7 also shows that countries at different levels of income experience high growth volatility, which confirms that volatility is a distinctive phenomenon of African economies.

In the first period, AA countries had a 64 percent share of regional GDP. That share fell slightly to 63 percent in the second period. BBs increased from 28 percent to 32 percent. This relative stability may be surprising in view of the economic and political ups and downs experienced by these countries over time. The AAs' share of the African continent's population was only about 31 percent, whereas BB countries hosted about 56 percent of the population.

BA countries comprise Equatorial Guinea and Sudan, both oil exporters. These economies grew by 4 percent a year, but the expansion was confined to the second period when the annual growth was 9.0 percent (from –0.7 percent in the first period). That enabled their GDP per capita to increase by 60 percent between 1975 and 2005.

The AB economies collapsed mainly as a result of conflicts, but the economic disintegration intensified in the second period when the annual growth rate was –3 percent. That disintegration led the average GDP per capita to shrink from $1,930 in 1975

to only $862 in 2005. It is more striking that in 1975 these economies were responsible for 4.3 percent of the region's GDP, but in 2005 their share had fallen to a mere 1.4 percent. The BAs' income rise along with the plunge of the ABs help explain the increasing dispersion of income per capita as identified in figure 5.

Table 7: Country groups - basic statistics

Country-group	Countries	# of countries	Average GDP per capita			Average growth			SD of growth	Coef. of variation of growth	Share of Africa's GDP (%)		Share of Africa's population (%)	
			1975	2005	1975-05	1976-90	1991-05	1976-05	1976-05	1976-05	1975-80	2000-05	1975	2005
AA	Angola, Botswana, Cameroon, Cape Verde, Comoros, Cote d'Ivoire, Gabon, Gambia, Ghana, Guinea, Lesotho, Mauritania, Mauritius, Namibia, Senegal, Seychelles, South Africa, Swaziland, Togo, and Zimbabwe	20	3,424	4,241	3,648	1.07	1.02	1.05	1.44	1.37	64.3	62.6	31.7	31.1
BB	Benin, Burkina Faso, Burundi, Chad, Congo, Eritrea, Ethiopia, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Sierra Leone, Tanzania, Uganda, and Zambia.	20	931	933	880	-0.07	0.81	0.37	1.73	4.67	28.3	32.1	56.2	56.7
BA	Equatorial Guinea and Sudan	2	1,161	1,853	1,787	-0.71	8.84	4.06	9.16	2.25	3.1	4.0	4.8	4.5
AB	Central African Republic and Democratic Republic of Congo	2	1,930	862	1,301	-2.18	-3.04	-2.61	3.46	-1.32	4.3	1.4	7.3	7.6

Notes: t-test does not reject the hypothesis of equality of means of growth rates (1976-2005) between AA and BB, but reject the equality of means of GDP per capita.

Figure 12 shows the GDP per capita by country group over time. AA countries have the highest GDP per capita, as expected, and the gap separating them from other countries has increased more recently. BAs' GDP per capita increased in the second period; the ABs collapsed; and the BBs remained flat all the way, only showing some modest improvement in the more recent past. Because AB and BA groups accounted for less than 6 percent of the region's GDP in the 2000s, and for about 12 percent of the population, it is reasonable to think that AA and BB countries alone guide the regional economy.

The CV of GDP per capita of AA countries increased from 0.027 in 1975–90 to 0.073 in 1991–2005; the BBs remained almost unchanged, increasing only from 0.038 to 0.041. Thus, the increasing income inequality identified in figure 7 is mainly driven by the large and rising income dispersion among AA countries.

We examined whether there is income convergence within country groups. For each group, we ran unconditional growth regressions against GDP per capita in 1975. The results showed no convergence between AA countries nor between the more homogeneous BB countries.

Figure 12: GDP per capita by country-group

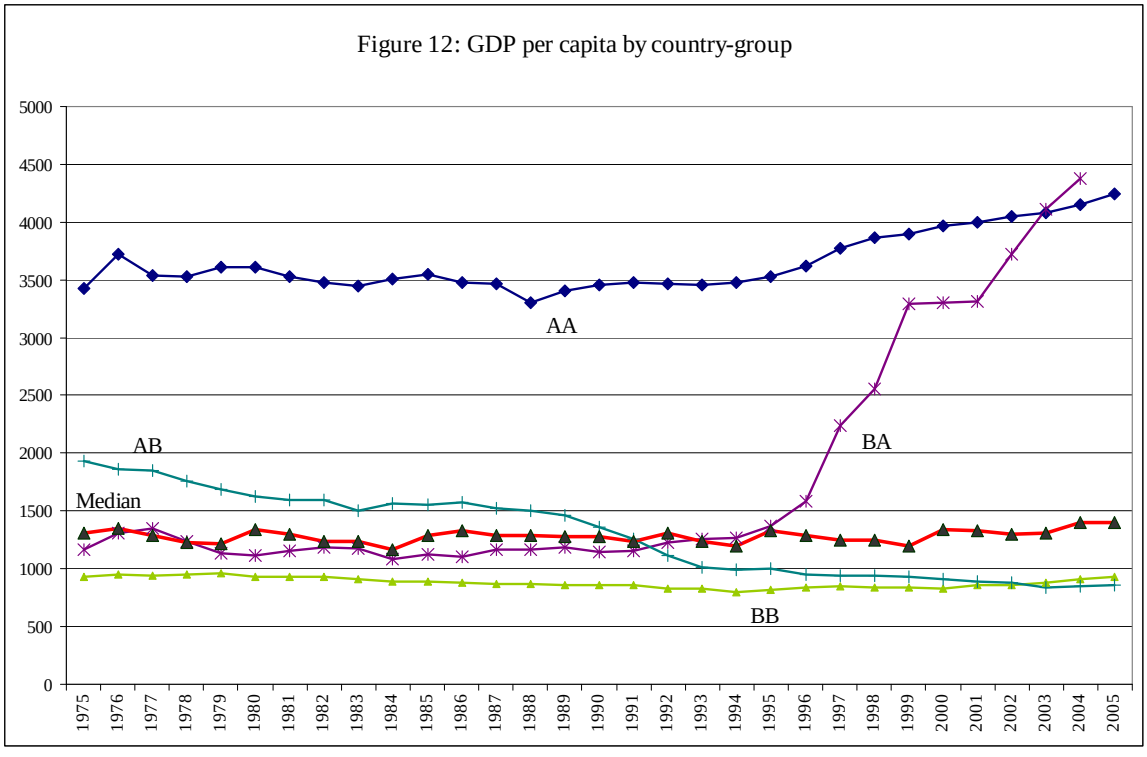


Figure 13 shows a more detailed examination of the share of country groups in the regional GDP. Apart from some swap in ranking between AB and BA groups, there is no significant change over time. This accords with the previous finding that initial conditions matter.

Figure 13: Share of country-groups in total GDP

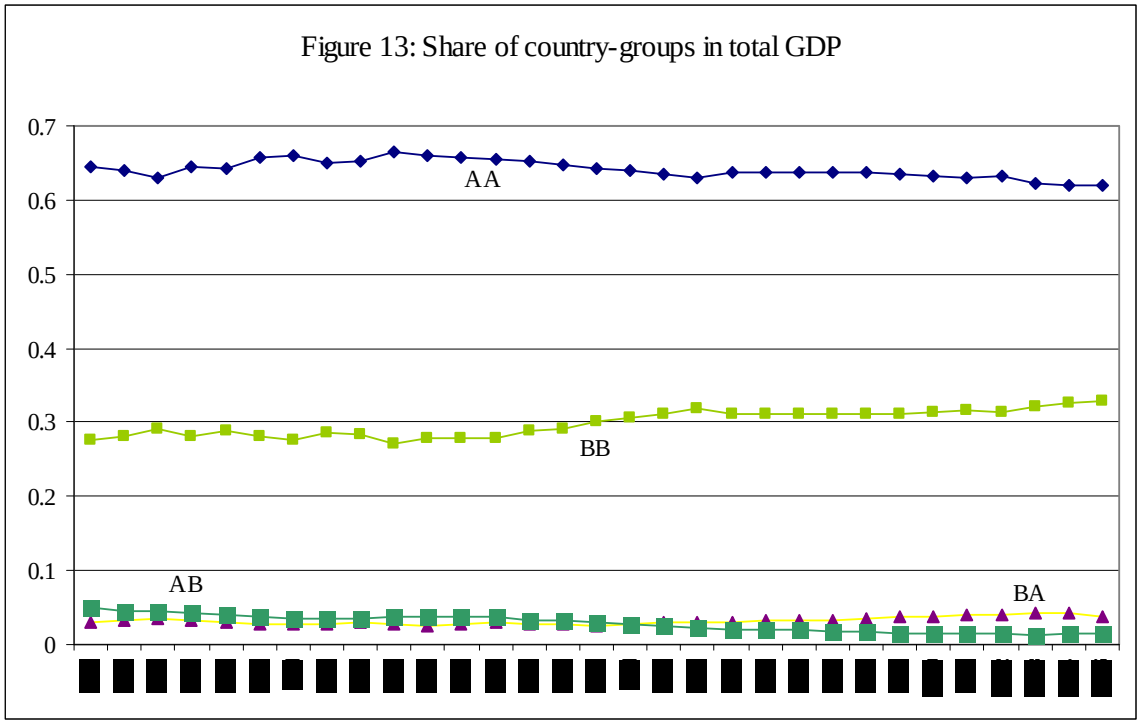


Table 8 sorts countries by country groups, long-term growth performance, mineral resources, and geography--the last two variables increasingly being identified in the literature as predictors of economic performance in Africa (Collier and O'Connell 2004). No pattern emerges, however. Within AA and BB country groups, there are oil-rich and non-mineral-intensive countries, landlocked and coastal countries, and both growing and shrinking economies. Table 8 also shows landlocked, non-resource-intensive countries growing at high rates (such as Burkina Faso, Rwanda, and Uganda) and shrinking oil exporters (such as Côte d'Ivoire and Gabon). These highly diverse experiences suggest that initial conditions and institutions may be more important than geographic attributes in explaining Africa's long-term GDP per capita.[15]

[15] The literature has suggested that mineral-dependent countries grow more slowly not only as a result of Dutch disease, but also because of civil strife and corruption associated with the rents engendered from those resources (Collier 2007; Sachs and Warner 1995). The diverse picture presented here opposes that view. Easterly and Levine (2003) and Rodrik, Subramanian, and Trebbi (2004) suggested that geography affects income only indirectly through institutions.

The feature that most distinguishes AA from BB countries is certainly not growth rates; rather, it is the AAs' much larger capability to create income and wealth. Shrinking AA economies, such as Côte d'Ivoire, Gabon, and Zimbabwe, have GDP per capita far above such BB growers as Mozambique, Tanzania, and Uganda (the GDPs per capita of the first three countries are $1,811, $7,041, and $2,526, respectively; those of the latter three countries are $704, $529, and $976, respectively). As a consequence, the AAs have more means to fight poverty and foster development if the right policies are in place. One cannot sort countries into a distinct pattern of winners and losers, however, based only on country groups. Actually, growing countries, whatever their groups, are those that are more likely to reshape the continent's economy in the long run.

Table 8: Sorting countries out by country-group, growth, and other characteristics

Country-group	Shrinking economies (avrg. growth below 0)	Stagnant (avrg. growth between 0 and 0.71%)	Growers (avrg. growth above 0.71%)
AA	$ Comoros (-0.14) # Cote d'Ivoire (-1.57) # Gabon (-0.91) $ Togo (-0.60) % Zimbabwe (-1.26)	# Angola (0.70) $ Gambia (0.29) $ Ghana (0.60) & Guinea (0.62) $ Mauritania (0.10) $ Senegal (0.36) $ South Africa (0.12)	& Botswana (6.24) $ Cape Verde (3.26) # Cameroon (0.81) % Lesotho (3.27) $ Mauritius (4.22) & Namibia (1.15) $ Seychelles (2.47) % Swaziland (1.15)
BB	% Burundi (-0.46) $ Guine Bissau (-0.70) $ Madagascar (-1.38) % Niger (-1.00) & Sierra Leone (-0.57) & Zambia (-1.16)	$ Benin (0.60) # Congo (0.61) % Ethiopia (0.42) $ Kenya (0.48) % Malawi (0.22) # Nigeria (0.28)	% Burkina Faso (1.21) # Chad (1.34) $ Erithrea (1.96) % Mali (0.86) $ Mozambique (2.07) % Rwanda (1.68) $ Tanzania (1.69) % Uganda (1.92)
BA			# Equatorial Guinea (10.55) # Sudan (1.72)
AB	% Central African Rep. (-1.27) % DRC (-3.95)		

Notes: 0.71% is the average growth rate in 1975-2005.
Average growth rate in parentheses.
Oil exporter.
& Non-oil resource intensive.
$ Non-resource intensive, coastal country.
% Non-resource intensive, landlocked country.

The Role of Initial Conditions at the Country-Group Level

To assess whether initial conditions play a role at the country-group level as well, we ran regressions of average GDP per capita on initial conditions and SD of growth, and the same model with average growth as the dependent variable. We estimated coefficients for AA and BB countries separately. The models are the following:

$$\overline{Y}_i = \alpha + \beta Y_i^{75} + \lambda SD(\Delta Y_i) + \varepsilon$$

$$\Delta \overline{Y}_i = \alpha + \beta Y_i^{75} + \lambda SD(\Delta Y_i) + \varepsilon$$

The results for GDP per capita suggest an almost perfect inertia for AA countries, as the estimated and statistically significant coefficient is 0.93. A hypothetical increase of $1 in the 1975 GDP per capita therefore would be almost entirely transmitted to the mean GDP per capita (see table 9). The estimated coefficient for BB economies is 0.15, but it is not statistically significant. These results suggest that initial conditions seem to play a larger role in explaining the economic performance of the better-off countries.

In the growth models, initial conditions are not statistically significant for both groups. This finding suggests no income convergence within and between groups, as already pointed out.

Table 9: Impact of initial conditions on GDP per capita

Dependent variable: GDP per capita				
Data	**GDP per capita in 1975**	**Standard deviation of growth**	**R^2**	**N**
AA & BB countries	1.00 (9.24)	-144.8 (-1.52)	.70	39
AA countries	.923 (4.83)	-181.7 (-.69)	.63	18
BB countries	.147 (1.35)	9.32 (.61)	.16	18
Dependent variable: Growth				
Data	**GDP per capita in 1975**	**Standard deviation of growth**	**R^2**	**N**
AA & BB countries	-.000 (-.27)	-.012 (-.10)	.00	39
AA countries	-.000 (-.28)	-.165 (-.63)	.04	18
BB countries	.000 (.47)	.100 (.96)	.09	18

Notes: t-statistics in parentheses.

Robustness of Country Groups

This section examines the robustness of country groups by testing their statistical significance. We estimated coefficients of country groups in GDP per capita pooled and fixed-effect regression models, as follows:

$$Y_{it} = \alpha_i + \beta G_g + \phi C_{it} + \lambda t_t + \eta t_t^2 + \varepsilon_{it}$$

$$\Delta Y_{it} = \alpha_i + \beta G_g + \phi C_{it} + \lambda t_t + \eta t_t^2 + \varepsilon_{it}$$

where Y_{it} is the GDP per capita of country *i* in year *t*, α_i is the country fixed-effect, ΔY_{it} is the growth rate of country *i* in year *t*, G_g is the dummy of country-group *g*, C_i is the dummy of country *i*, t_t is time, t_t^2 is time squared, and ε is the error term.

Table 10 shows the results. Country groups' coefficients are statistically significant at the 5 percent level; they are sizable and have the expected signs. After controlling for country fixed-effects, country groups, and time and its quadratic term,

model 2 explains 94 percent of the GDP per capita dispersion. If one moves residence from a BB country, the base group, to an AA country, she or he would enjoy a 193 percent income rise, on average. A person moving to a BA country could expect income improvement of 88 percent, and someone moving to an AB economy could expect 91 percent improvement. Wald tests strongly reject the notion that country groups' coefficients are zero or equal.

Model 4 presents the impacts of country groups on growth, after controlling for country fixed-effects. Only the coefficient of AAs is not significant, suggesting that they tend to grow at the same pace as BBs. As expected, Wald test rejects the hypothesis that groups' coefficients are all zero or equal. These results suggest that country groups are relevant in predicting income and growth.

Table 10: Impact of country groups on GDP per capita level and growth - pooled OLS regressions

	Dep. variable: GDP per capita		Dep. variable: GDP per capita growth	
Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
AA	1.237 (41.1)	1.929 (31.12)	.603 (1.63)	-.612 (-.30)
BA	.619 (8.29)	.879 (14.76)	4.761 (5.17)	9.107 (4.53)
AB	.362 (5.31)	.914 (15.35)	-2.979 (-3.55)	-5.49 (-2.98)
R2	.57	.94	.05	.13
F test	342 (.00)	402 (.00)	13.09 (.00)	3.81 (.00)
N	1,268	1,268	1,224	1,224
Country dummies included	no	yes	no	yes
Wald test that groups' coefficients are equal	108.01 [.00]	253.9 [.00]	21.21 [.00]	34.06 [.00]
Wald test that groups' coefficients are zero	569.7 [.00]	333.8 [.00]	15.05 [.00]	22.71 [.00]

Notes: t-test in parentheses.
p-value in brackets.
Time and time square included in all models.

If country groups indeed capture common country features, they need to fit not only income and growth data, but also other relevant economic and social variables. To assess this hypothesis, we ran models similar to the ones above, but with other dependent variables. Table 11 shows that most country-group dummy coefficients are statistically significant at the 5 percent level and have the expected signs. Model 1, for example, shows that agriculture value added as a share of GDP in AA countries is, on average, about 17 percent below that of BB countries, the base group; and that, as a share of GDP in AB countries, it is 5 percent higher. Accordingly, BB countries are more heavily dependent on agriculture. Country groups plus time and time squared can explain about 33 percent of the variance of agriculture value added.

Model 2 shows that AA and BA countries have a greater share of industry in GDP than do BB countries. Model 3 shows that AA countries have a larger service sector.

Model 4 shows that AA and BA economies are substantially more open than are BB economies. Considering the dynamic and static benefits of openness to growth, as suggested by the new growth literature (Grossman and Helpman 1991a, 1991b), it may help explain the poorer economic performance of BB economies.

Models 5 and 6 indicate that AA countries invest and save more than BBs do. Although the AAs' coefficient of fixed capital is perhaps modest, the productivity of investment, as suggested by Devarajan, Easterly, and Pack (2003), also may be important to explain the better economic outcomes of these countries. Models 7 to 10 show that AA countries have a better external balance, lower debt ratios, lower dependency ratio, and a significantly longer life expectancy. Perhaps it is surprising that model 11 shows that AA countries enjoy more aid per capita than do BBs.

These results are in harmony with the better economic and human development indicators of AA countries, as compared with BBs. They also suggest that there seem to be "two Africas," roughly represented by AA and BB country groups.

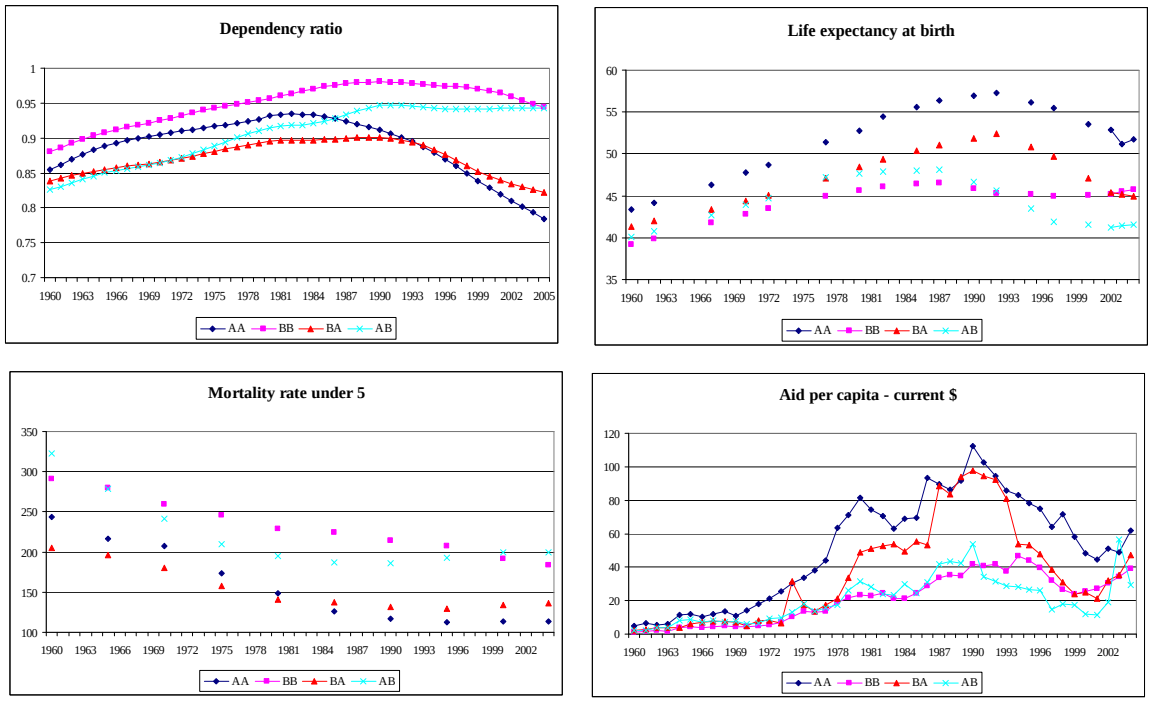
Table 11: Selected economic and human development variables as function of country-groups - pooled OLS regression

Variable	Agriculture value added	Industry value added	Service value added	Trade	Fixed capital formation	Savings	Current account	Debt	Dependency ratio	Life expectancy	Aid per capita ($)
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Model 11**
AA	*-16.80*	*8.17*	*8.60*	*39.73*	*4.94*	*6.17*	*2.71*	*-27.36*	*-.07*	*7.92*	*34.88*
BA	2.06	*6.17*	*-8.23*	*18.50*	*9.15*	3.28	*-4.28*	*22.47*	*-.10*	2.58	11.53
AB	*5.11*	.94	*-6.05*	-6.63	*-7.06*	-.45	3.30	-3.45	*-.03*	-1.29	-7.63
R^2	.33	.09	.18	.26	.11	.03	.03	.20	.19	.26	.14
F test	*122.06*	*27.3*	*56.16*	*89.66*	*30.86*	*8.70*	*7.51*	*60.80*	*64.97*	*40.51*	*42.54*
N	1,252	1,252	1,252	1,239	1,227	1,227	1,025	1,167	1,328	567	1,270
Wald test that groups' coefficients are equal	*116.4*	*9.10*	*89.57*	*54.90*	*46.04*	*4.37*	*8.52*	*15.16*	*9.61*	*26.18*	*22.21*
Wald test that groups' coefficients are zero	*195.8*	*40.48*	*93.24*	*142.60*	*48.86*	*13.33*	*9.87*	*19.80*	*79.80*	*61.72*	*48.25*

Note: Time and time square included in all models.
Dependent variable presented above each model #.
BB is the base country-group.
Dependent variables of models 1 to 8 are measured as percentage share of GDP.
Coefficients in italics significant at the 5% level.

Figure 14 illustrates the previous econometric results. Dependency ratios of AA and BB countries were somewhat comparable until the early 1980s, but then the ratio started to fall sharply in AA countries and continued to climb in BB countries, thus enlarging the gap between the two groups. The gaps are also big for life expectancy and under-5 mortality. In the 1960s, aid per capita was comparable for various groups, but the gap started to widen toward the end of the decade. In 1990, AA countries received, on average, almost three times more aid than did BB countries ($112 and $41, respectively). The gap has since narrowed, mainly as a result of a reduction in the aid received by AA countries.

Figure 14: Selected variables by country-group



Finally, we estimated multinomial logit regressions of country clubs against each of these variables at a time: GDP per capita, growth, savings, capital, trade, agriculture value added, life expectancy, and other independent variables. The estimated model is as follows:

$$\Pr ob(G_i = j \mid X) = \alpha + \beta X_i^t + \varepsilon$$

where $\Pr ob(G_i = j \mid X)$ is the probability of country-group dummy G_i taking value j given X_i^t; the independent variables for country-group i and time t, and j are country-groups AA, BB, BA, and AB.[16]

The model with GDP per capita as independent variable returns the following coefficients: AA=13.67 (z=15.78), BA=10.89 (z=11.95), and AB=6.81 (z=9.20). The model for growth as explanatory variable provides these coefficients: AA=0.02 (z=1.69), BA=0.09 (z=4.48), and AB=-0.07 (z=-3.58). In regard to life expectancy, for example, the coefficients are AA=7.99 (z=9.99), BA=3.14 (z=2.06), and AB=-1.34 (z=-0.88). These and the non-reported results have the expected signs and hierarchy, and confirm the robustness of country-groups to predict income and human development outcomes.

5. Growth Volatility

High growth volatility is one of the most distinctive features of African economies. In this section, we examine its relationship to economic performance and a number of factors that are correlated with it.

Growth Volatility and Economic Performance

The defining characteristics of the long-run pattern of growth described above are low output growth and high volatility. The literature long has attempted to explain the poor economic performance in Africa in the postwar period. Barro (1991), Levine and Renelt (1992), and Sala-i-Martin, Doppelhofer, and Miller (2004), among others, found a structural low-growth effect in Africa that remained even after controlling for investment, fertility, education, macroeconomic policies, and other conventional variables. Growth accounting exercises show that growth in physical capital per worker in Africa has been less than 0.5 percent a year since 1960, far slower than the world average of 1.0 percent. Capital deepening was negative between 1990 and 2003, suggesting low capital investment in the region (Bosworth and Collins 2003). The contribution of human capital to growth kept pace with the rest of the world and has increased lately, mainly as a result of rising average years of schooling. But the main contributor to Africa's disappointing growth is total factor productivity change, negative since the 1960s and –0.4 percent between 1990 and 2003.

[16] BB is the base category. For the sake of space, we report only a few results. The complete set of results is available from the authors upon request.

History and initial conditions are also found to play an important role in Africa's fate. According to Acemoglu, Johnson, and Robinson (2003), for example, countries that inherited institutions that supported rent-extracting activities from their colonial past were most likely to experience high volatility and economic crisis. Once they control for these institutions, the "Africa-dummy" tends to lose significance in cross-country growth models. Those authors concluded that poor economic policies are a result--not the cause--of poor economic outcomes. O'Connell (2004) suggested that political polarization at the time of independence is strongly associated with conflicts.

The literature on economic volatility in developing countries is large and focuses mainly on macroeconomic and financial sector issues. The standard macroeconomic view links volatility to bad macroeconomic policies. Accordingly, high inflation, misaligned exchange rates, large government sectors, and budget deficits will result in economic crisis. More recently, there has been increased focus on institutions (Acemoglu, Johnson, and Robinson 2003).

Given the magnitude of growth volatility in Africa, we examined whether it is associated with poor economic performance. Theoretically, this relationship can be positive or negative, depending on the mechanisms driving the relationship (Imbs 2002). But Ramey and Ramey (1995) and Hnatkovska and Loayza (2004) found empirical evidence of a negative relationship between the SD of growth and macroeconomic volatility for large cross-country data sets. Hnatkovska and Loayza also showed that this effect is particularly evident for institutionally underdeveloped countries undergoing intermediate stages of financial development or unable to conduct countercyclical fiscal policies. Thus, we also expected to find a negative and statistically significant relationship.

We estimate the following bivariate, unconditional regressions:

$$\Delta\overline{Y}_i = \alpha + \beta SD(\Delta Y_i) + \varepsilon$$

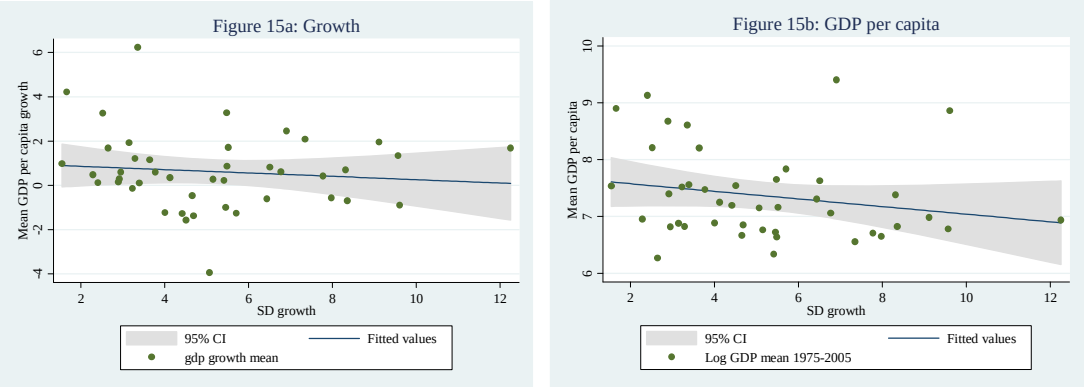
$$\overline{Y}_i = \alpha + \beta SD(\Delta Y_i) + \varepsilon$$

where $\Delta\overline{Y}_i$ is the average growth rate of country *i*, $\overline{Y}_i$ is the average GDP per capita of country *i*, $SD(\Delta Y_i)$ is the SD of growth of country *i*, and ε is the error term.

The results in figure 15 suggest a negative but statistically not significant association between volatility and growth (β = –0.075, t = –0.68, figure 3.15a) and between volatility and GDP per capita (β = –0.023, t = –0.61, figure 15b).[17]

One explanation for the lack of relationship is that it may require a conditional model using policy and structural country characteristics as controls. An alternative explanation for the lack of a direct, long-run relationship is that African economies are already in their steady-state equilibrium pattern and short-term volatility is not able to divert them significantly from their long-term track. This hypothesis is consistent with the poverty trap argument. Another potential explanation is the inherent endogeneity of these variables (Easterly and Levine 2003; Rodrik, Subramanian, and Trebbi 2004; and others). Acemoglu, Johnson, and Robinson (2003), for example, argued that high growth volatility and poor macroeconomic performance are both symptoms--and therefore not independent--of institutionally weak societies, in which distortionary macroeconomic policies are tools that groups in power deploy to reap rents and remain in power. This, in turn, leads the economies to further difficulties in dealing with political and economic shocks (Acemoglu and Robinson 2001) and makes economic adjustments in face of external shocks more difficult (Rodrik 1999), all leading to more political and economic instability.

Figure 15: GDP per capita growth and level as a function of growth volatility



Growth Volatility and Its Correlates

Although it does not seem to affect long-term economic performance significantly, volatility certainly must have short-term welfare effects via uncertainty,

[17] We ran regressions removing the middle income countries from the data (Mauritius, the Seychelles, and South Africa), but the results were virtually unchanged.

risks, and other channels on investments, savings, and credit, for example. In this section, we are interested in identifying variables other than institutions most likely to be associated with long-term growth variance in Africa.[18] We ran cross-country bivariate and multivariate models of the SD of GDP per capita growth as a function of selected economic variables as follows:

$$SD(\Delta\overline{Y}_i) = \alpha + \beta\overline{X}_i + \varepsilon$$

where $SD(\Delta\overline{Y}_i)$ is the average SD of growth of country *i*, and $\overline{X}_i$ is a vector of variables of country *i*. For brevity, only statistically significant variables at 5 percent and 10 percent are reported and discussed here. The results are presented in table 12.[19]

Models 1 and 2 show that a 1.0 percent change in the SD of savings and capital formation is associated with a 0.4 percent change in growth volatility. These results are expected for poor countries where investments are highly volatile because they rely on residents and nonresidents who usually bring in capital during an export bonanza but pull out as soon as crises appear or terms of trade change. Public investments are usually sensitive to foreign aid flow and political cycles, which are volatile variables, too.

Model 3 shows that the rise of one point in the diversification of exports index is associated with a reduction of 0.3 percent in growth volatility. This result is in line with the stylized fact that less-diversified economies are poorly protected from fluctuations in market conditions. Economies highly dependent on few products or a single product are vulnerable to external shocks and may suffer from the Dutch disease, which discourages domestic industry via an overvalued exchange rate. Table A.2 in the annex shows that export diversification in Africa is generally low, especially in oil-rich countries such as Angola, the Democratic Republic of Congo, Equatorial Guinea, Gabon, Nigeria, and

[18] As reviewed above, institutions are found to be a primary source of growth volatility in developing countries (Acemoglu, Johnson, and Robinson 2003; Rodrik, Subramanian, and Trebbi 2004; and others). As discussed in the methodology section, there is certainly enormous potential for endogeneity between growth volatility and the correlates under examination. But our primary interest is in identifying long-term associations, not in explaining growth volatility.

[19] We also tested other variables, including aid as a percentage of gross national income, terms of trade, exchange rate, inflation, initial conditions (GDP per capita in 1975), agriculture value added as a percentage of GDP (a variable that seeks to capture the impact of climate shocks on agriculture), population, and dependency ratio. All were nonsignificant at the 5 percent and 10 percent levels. Credit to the private sector as a percentage of GDP was statistically significant at the 10 percent level. Acemoglu and Zilibotti (1997) showed a strong relationship between initial income and volatility. They interpreted that as resulting from the fact that richer countries are able to achieve a more balanced sectoral distribution of output.

Sudan. The average diversification index in the region is 4.8 (the index goes from 0 to 100.0), which suggests that export revenues strongly rely on few tradable items.

Model 4 shows that a 1.0 percent change in the SD of openness is associated with a 0.2 percent change in growth volatility. Where foreign trade exerts an important influence in aggregate demand, volatility of openness may play a role in growth volatility. Because export revenues in poor countries usually are crucial to pay for imports of capital goods and raw material, to service foreign debt, and to use as collateral in foreign financial markets, adverse changes in trade may have significant implications for growth. Volatility of openness may result from internal factors, such as regulatory and trade policies; from external factors that also affect the exchange rate, terms of trade, and foreign demand; and from conflicts and natural disasters, like draughts and insect attacks in agriculture-intensive countries.

The weighted average openness ratio in Africa is 46 percent, whereas it is 37 percent and 35 percent, respectively, in low- and middle-income countries and in the world. (Table A.3 in the annex shows a proxy of openness--the merchandise trade as a share of GDP and its SD). Africa is more open but also more exposed to adverse trade shocks via a high SD of openness and low diversification of exports. In Ghana, for example, the SD of openness is 17 percent. Given that the average openness is 55 percent, it has varied in the range of 38 percent to 72 percent of GDP over time, which should have non-negligible effects on the Ghanaian growth volatility.[20]

Model 5 suggests that a 1.0 percent rise in volatility of aid per capita is associated with an increase of 0.2 percent in growth volatility. This result stresses the importance and impact that aid has on the economy. Among the main channels through which aid has such an effect are certainly the government budget--which has increased over time--and investments in areas such as utilities and infrastructure.

Model 6 suggests that an additional year in life expectancy is associated with a reduction of 0.17 percent in growth volatility. Low probability of survival affects

[20] Berg, Ostry, and Zettelmeyer (2006) found evidence in a large set of countries that more liberal trade regimes and competitive exchange rates are associated with longer spells of growth and less growth volatility. Johnson, Ostry, and Subramanian (2007) found that a strong exporting sector, especially in manufacturing, is strongly associated with longer growth spells. They argued that manufacturing exports help change the distribution of power and help create a middle class that favors the strengthening of institutions.

consumption and savings decisions. The lower the probability of survival, the lower will be the benefits of long-term investment, including formal education, because the returns to human capital accrue mainly over adult life. A shortened expected life span reduces incentives for capital accumulation and affects growth via lower levels of human and physical capital investments. Ndulu (2006) found that life expectancy is among the most influential variables associated with growth in Africa, and that it helps explain the growth gap between Africa and other developing regions. Lorentzen, McMillan, and Wacziarg (2006) found that a high adult mortality rate explains almost all of Africa's slow growth.

Model 7 presents a model with all the previous variables. The SDs of savings and life expectancy remained statistically significant, thus suggesting they are among the most influential variables associated with growth volatility.

Table 12: Variables associated with GDP per capita growth volatility - cross country OLS regression (Dependent variable is standard deviation of GDP per capita growth)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
SD of savings	.418 (4.53)						.371 (2.91)
SD of capital formation		.405 (6.00)					.162 (1.42)
Divesification of exports index			-.300 (-2.76)				-.074 (-.99)
SD of openness				.210 (5.40)			.030 (.53)
SD of aid per capita					.262 (3.17)		.020 (.31)
Life expectancy at birth						-.170 (-2.81)	-.099 (-2.91)
R^2	.33	.46	.17	.41	.20	.16	0.72
F-test	20.55	36.06	7.63	29.13	10.06	7.91	13.66
N	44	44	38	44	43	44	38

Notes: t-test in parentheses.
Savings and capital formation refer to percentage of GDP.
Diversification index refers to mean of diversification of exports (the higher the better).
Openness refers to exports + imports over GDP.

6. Conclusions

This paper has described the long-term features of GDP per capita growth in sub-Saharan African countries. Our main goal was to identify the relevant cross-section and long-term patterns and regularities. The main findings are the following:

- *Growth has been low and volatile*. Africa has grown little over the last three decades, and this low growth has helped widen the income gap with other regions. Africa has the lowest CV of income per capita, but the highest CV of growth. African countries have erratic growth around a low mean. Growth is extremely volatile across Africa, and this phenomenon is not restricted to economies with any specific economic or geographic attributes. The pervasiveness of growth volatility in the region suggests significant spillover and contagion effects between countries. Volatility in savings, investments, and openness and low life expectancy are among the factors associated with long-run growth volatility in Africa
- *The 1990s may mark a turning point.* It seems that the 1990s marked a shift in African economy when the growth rate improved significantly across the continent. It is necessary, however, to disentangle the main contributing factors--whether external factors, productivity growth, investments, better institutions, less conflict, or terms of trade growth, among others--or whether the shift reflects a structural break toward a more sustainable and inclusive growth pattern.
- *The cross-country income distribution is becoming less equal*. The growth rate is converging in Africa and is becoming a more accurate predictor of economic performance. This fact is explained mainly by growth convergence between the poorest countries. Despite recent improvements in growth performance in many poor countries, the richest countries have grown more in the long run, and that has increased the income gap. We identified an increasingly stratified distribution of income and the formation of clubs, which prevents overall income convergence. As a consequence, some growth champions are emerging in Africa, but laggards also are becoming more significant. We proposed a typology for grouping countries based on relative economic performance that looks useful to describe

the long-term economic potential of countries and to predict economic and human development outcomes.

- *Geography and natural resources do not seem to matter for growth.* We found high and increasing economic diversity in Africa, and no identifiable pattern emerged from classifying countries by geography or mineral resources. These facts suggest that institutions may play an important role through policies and other channels in explaining long-term economic performance.
- *Initial conditions matter a great deal for income distribution but not for growth.* Initial conditions seem to be the single-most important factor explaining income levels, and this is especially relevant for richer countries. Whatever the channels and the mechanics behind this phenomenon, it exerts a strong and persistent influence on income determination and on the structure of income between countries. We did not find evidence that initial conditions are associated with long-run growth.

Taken together, our results leave us with a puzzle. Low and volatile growth is the outstanding defining characteristic of Africa's growth experience since 1975. But, over the long run, we find no evidence that growth volatility is associated with economic performance. Considering that volatility is not neutral, this result is unexpected. One explanation may be that African countries are in their steady state and that growth volatility and economic performance are both symptoms of deeper characteristics, such as institutions and initial conditions. A second explanation is that long-term analysis can mask important medium-term patterns in a country's growth. If there are such patterns, it may be more relevant and rewarding to look for the causes of growth accelerations and decelerations--and what sustains growth--(as proposed by Hausmann, Pritchett, and Rodrik [2005]), rather than to investigate the determinants of growth over time and across countries.

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Appendix

Table A1: Basic statistics of GDP per capita PPP and non-PPP data, weighted - Sub-Saharan Africa

	Mean (1975-05)	SD (1975-05)	CV (1960-05)	CV (1975-05)
GDP per capita	533.6	32.8	0.08	0.06
GDP per capita PPP	1,702	108.3		0.06
GDP per capita growth	-0.16	1.74	3.44	-11.12
GDP per capita PPP growth	-0.17	1.70		-10.01

Figure A1: GDP per capita and growth rate (constant international $, PPP and non-PPP)

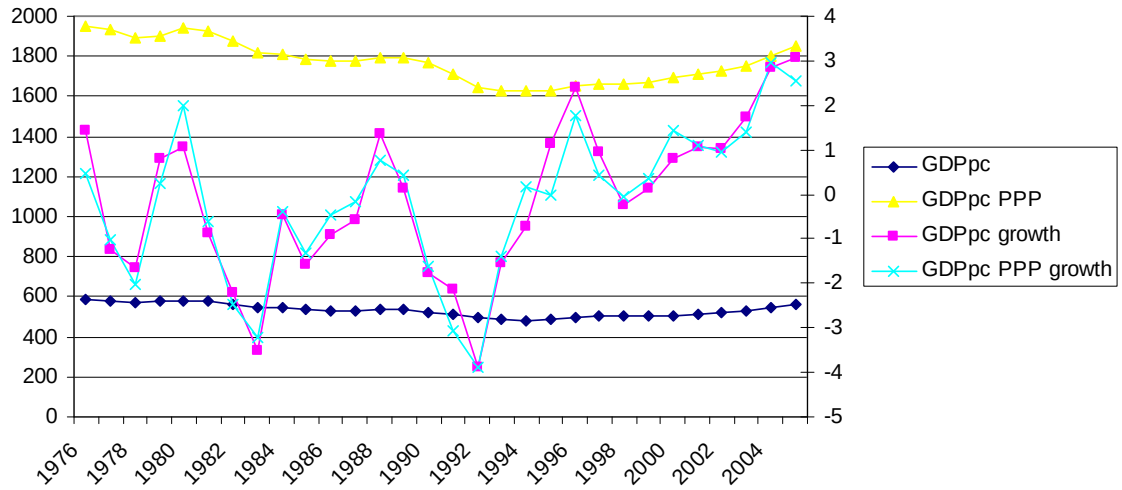

Figure A2: GDP per capita and growth – selected countries

Table A2: Export diversification index - 2003

Country	Index	Country	Index
Angola	1.1	Kenya	16.0
Benin	2.1	Madagascar	8.1
Burkina Faso	2.2	Malawi	3.0
Burundi	1.6	Mali	1.3
Cameroon	4.4	Mauritania	3.8
Cape Verde	9.2	Mauritius	11.7
Central African Republic	3.4	Mozambique	2.0
Chad	2.6	Niger	1.9
Comoros	1.3	Nigeria	1.3
Congo, Dem. Rep. of	3.0	Rwanda	2.4
Congo, Rep. of	1.6	Senegal	12.2
Equatorial Guinea	1.2	Seychelles	2.7
Eritrea	5.2	Sierra Leone	3.8
Ethiopia	4.0	Sudan	1.6
Gabon	1.6	Tanzania	21.7
Gambia, The	5.2	Togo	5.3
Ghana	4.0	Uganda	7.3
Guinea	4.2	Zambia	5.0
Guinea-Bissau	4.8	Zimbabwe	8.1

Notes: The index goes from 0 to 100. The higher the better.
Data from OECD.

Table A3: Merchandise trade as share of GDP - means 1975-2005

Country	Mean	SD	Country	Mean	SD
Angola	86.2	30.4	Lesotho	130.6	12.9
Benin	41.9	8.3	Madagascar	30.4	8.3
Botswana	98.6	14.1	Malawi	55.6	9.1
Burkina Faso	25.7	5.1	Mali	41.4	10.2
Burundi	28.5	6.0	Mauritania	69.9	10.2
Cameroon	31.7	6.7	Mauritius	90.9	12.1
Cape Verde	45.4	4.1	Mozambique	38.4	14.4
Central African Republic	24.8	4.5	Namibia	94.0	14.7
Chad	34.1	17.5	Niger	35.0	6.3
Comoros	33.4	6.9	Nigeria	62.5	9.0
Congo, Dem. Rep.	33.8	14.7	Rwanda	23.1	5.1
Congo, Rep.	82.6	24.1	Senegal	51.6	11.1
Cote d'Ivoire	58.8	7.6	Seychelles	80.0	19.5
Equatorial Guinea	117.1	61.2	Sierra Leone	35.1	11.5
Eritrea	77.9	16.5	South Africa	42.2	6.1
Ethiopia	20.0	9.5	Sudan	21.0	8.3
Gabon	68.9	9.5	Swaziland	148.7	13.7
Gambia, The	69.4	16.2	Tanzania	32.5	7.8
Ghana	55.3	16.9	Togo	62.2	13.8
Guinea	42.7	7.7	Uganda	26.6	9.0
Guinea-Bissau	50.2	11.0	Zambia	59.1	8.3
Kenya	42.6	6.2	Zimbabwe	47.3	19.4

Note: Merchandise trade as a share of GDP is the sum of merchandise exports and imports divided by the value of GDP, all in current U.S. dollars.

Table A4a: Country GDP per capita and median by year

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Angola						1,909	1,728	1,667	1,677	1,719	1,725	1,726	1,817	1,874	1,836	1,782	1,709	1,541	1,123	1,127	1,209	1,311	1,382	1,443	1,455	1,462	1,469	1,635	1,641	1,772	2,077
Benin	860	845	863	849	878	909	967	956	883	921	958	947	903	905	850	848	856	858	856	862	872	892	919	933	949	974	991	1,003	1,009	1,008	1,015
Botswana	1,820	1,946	2,107	2,328	2,523	2,731	2,880	3,123	3,419	3,593	3,730	3,913	4,250	4,933	5,423	5,633	5,894	5,911	5,877	5,949	6,074	6,279	6,784	7,374	7,795	8,349	8,724	9,184	9,761	10,354	11,021
Burkina Faso	763	812	798	818	831	821	838	898	881	845	894	944	905	937	918	878	927	904	919	902	918	957	980	963	1,000	986	1,013	1,024	1,056	1,063	1,079
Burundi	738	784	856	829	820	805	875	837	839	812	877	876	894	911	898	907	931	923	851	807	735	670	655	681	666	650	648	659	630	639	622
Cameroon	1,702	1,563	1,726	2,044	2,105	2,005	2,282	2,386	2,481	2,593	2,724	2,824	2,683	2,401	2,290	2,089	1,954	1,842	1,737	1,650	1,663	1,705	1,751	1,800	1,839	1,877	1,923	1,962	2,003	2,039	2,045
Cape Verde	..	..	..	..	..	..	2,409	2,492	2,704	2,922	3,086	3,097	3,112	3,230	3,341	3,289	3,257	3,283	3,429	3,578	3,754	3,813	3,927	4,121	4,373	4,555	4,618	4,717	4,893	4,994	5,162
Central African Republic	1,646	1,698	1,722	1,700	1,616	1,503	1,439	1,505	1,344	1,431	1,449	1,465	1,362	1,356	1,353	1,292	1,253	1,142	1,115	1,140	1,192	1,118	1,152	1,182	1,202	1,209	1,208	1,183	1,079	1,080	1,089
Chad	972	981	983	959	738	679	672	692	782	778	923	861	816	914	930	864	910	954	780	834	819	813	833	864	832	801	855	894	991	1,241	1,270
Comoros	..	..	..	..	..	1,861	1,883	1,951	1,993	2,021	2,014	1,999	1,979	1,980	1,867	1,912	1,762	1,872	1,888	1,751	1,776	1,717	1,749	1,727	1,740	1,718	1,739	1,773	1,779	1,737	1,773
Congo, Dem. Rep.	2,214	2,031	1,982	1,817	1,768	1,753	1,742	1,684	1,660	1,703	1,662	1,690	1,685	1,642	1,571	1,418	1,253	1,079	900	836	817	789	729	704	660	601	574	578	594	615	635
Congo, Rep.	998	977	862	889	947	1,079	1,230	1,473	1,510	1,564	1,497	1,350	1,310	1,290	1,282	1,254	1,244	1,236	1,185	1,085	1,102	1,112	1,069	1,073	1,007	1,055	1,061	1,077	1,053	1,059	1,123
Cote d'Ivoire	2,433	2,623	2,687	2,842	2,775	2,355	2,324	2,220	2,036	1,894	1,896	1,880	1,802	1,756	1,745	1,667	1,614	1,560	1,510	1,478	1,538	1,612	1,658	1,693	1,679	1,582	1,553	1,505	1,459	1,462	1,466
Equatorial Guinea	..	..	..	..	..	..	..	..	..	..	1,266	1,188	1,209	1,219	1,185	1,201	1,161	1,255	1,301	1,334	1,487	1,875	3,133	3,729	5,149	5,103	5,058	5,813	6,516	7,005	..
Eritrea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	804	913	1,104	1,126	1,210	1,277	1,263	1,221	1,022	1,071	1,031	1,046	1,021	986
Ethiopia	..	..	..	..	..	..	909	891	935	886	764	807	897	868	827	814	721	621	723	722	739	806	815	761	791	814	859	841	798	879	938
Gabon	9,323	12,288	10,435	7,696	7,506	7,469	7,614	7,155	7,326	7,632	7,220	6,934	5,561	6,073	6,380	6,496	6,674	6,254	6,205	6,225	6,465	6,606	6,796	6,758	6,188	6,175	6,208	6,100	6,159	6,149	6,187
Gambia, The	1,584	1,646	1,648	1,697	1,622	1,668	1,668	1,602	1,718	1,719	1,644	1,648	1,625	1,633	1,664	1,659	1,650	1,646	1,638	1,585	1,545	1,526	1,547	1,549	1,595	1,631	1,674	1,572	1,634	1,671	1,709
Ghana	1,885	1,783	1,792	1,912	1,827	1,790	1,676	1,507	1,387	1,454	1,478	1,507	1,534	1,575	1,610	1,618	1,656	1,673	1,706	1,716	1,742	1,779	1,811	1,854	1,893	1,920	1,954	1,997	2,056	2,126	2,206
Guinea	..	..	..	..	..	..	..	..	..	..	..	1,717	1,728	1,787	1,802	1,818	1,770	1,748	1,744	1,758	1,803	1,834	1,880	1,929	1,978	1,974	2,009	2,048	2,028	2,037	2,060
Guinea-Bissau	1,019	1,030	916	993	973	790	907	923	873	933	950	921	924	942	973	1,002	1,022	1,000	988	988	1,000	1,085	1,124	787	826	863	840	757	739	732	736
Kenya	963	948	1,000	1,030	1,068	1,086	1,084	1,059	1,033	1,012	1,018	1,051	1,075	1,102	1,115	1,124	1,104	1,061	1,033	1,030	1,046	1,062	1,041	1,050	1,050	1,033	1,049	1,032	1,041	1,067	1,103
Lesotho	1,176	1,276	1,519	1,755	1,761	1,669	1,637	1,633	1,539	1,657	1,701	1,677	1,708	1,859	1,982	2,080	2,134	2,205	2,255	2,305	2,377	2,581	2,756	2,597	2,577	2,592	2,662	2,750	2,834	2,927	2,967
Madagascar	1,290	1,217	1,213	1,149	1,228	1,204	1,057	1,009	989	978	961	953	937	942	953	955	869	854	847	822	811	804	809	816	829	843	869	737	788	807	821
Malawi	579	589	597	633	640	623	574	573	578	589	589	557	532	517	497	506	537	491	535	476	548	576	583	589	589	583	541	544	564	591	593
Mali	742	823	855	823	889	831	775	722	738	751	650	688	668	662	722	691	685	723	689	677	700	703	730	754	782	785	854	863	900	892	919
Mauritania	1,963	2,080	1,991	1,933	1,977	1,994	2,013	1,919	1,944	1,837	1,849	1,910	1,904	1,893	1,939	1,861	1,850	1,839	1,900	1,795	1,920	1,978	1,847	1,846	1,914	1,894	1,891	1,856	1,901	1,941	1,988
Mauritius	..	..	..	..	..	4,038	4,170	4,355	4,438	4,513	4,744	5,097	5,528	5,915	6,200	6,511	6,825	7,096	7,406	7,629	7,872	8,196	8,568	8,987	9,391	9,673	10,100	10,286	10,504	10,904	11,312
Mozambique	..	..	..	..	..	706	724	659	544	501	501	488	560	608	645	643	658	582	599	617	616	640	692	762	801	799	885	938	992	1,046	1,105
Namibia	..	..	..	..	..	6,573	6,502	6,347	6,094	5,911	5,743	5,772	5,707	5,489	5,338	5,245	5,462	5,655	5,366	5,582	5,635	5,638	5,702	5,724	5,767	5,838	5,868	6,163	6,295	6,592	6,749
Niger	985	962	1,006	1,107	1,150	1,090	1,064	1,048	968	780	815	840	815	844	826	790	785	711	699	704	699	699	694	741	712	678	701	698	711	687	695
Nigeria	961	1,018	1,047	957	992	1,004	848	823	759	703	751	748	722	770	802	844	859	860	855	833	831	845	846	841	830	854	860	854	924	959	1,003
Rwanda	840	972	959	1,013	1,096	1,156	1,183	1,172	1,208	1,121	1,128	1,138	1,082	1,083	1,058	1,036	1,048	1,187	1,183	627	862	932	974	957	940	931	951	1,012	1,005	1,030	1,073
Senegal	1,468	1,559	1,480	1,388	1,449	1,365	1,313	1,473	1,463	1,364	1,374	1,394	1,406	1,433	1,372	1,385	1,341	1,334	1,270	1,273	1,304	1,337	1,347	1,372	1,420	1,427	1,458	1,440	1,498	1,553	1,594
Seychelles	7,363	8,406	7,753	9,248	10,560	9,984	9,062	8,872	8,643	8,961	9,884	9,797	10,158	10,629	11,727	12,438	12,645	13,379	14,003	13,663	13,302	13,753	15,218	16,177	16,160	16,790	16,404	16,121	15,270	14,815	14,329
Sierra Leone	935	914	898	902	925	951	961	989	950	968	894	880	915	826	811	824	836	675	685	672	616	642	524	511	459	463	527	642	670	691	717
South Africa	9,625	9,631	9,422	9,503	9,649	10,051	10,335	10,041	9,606	9,837	9,469	9,231	9,193	9,353	9,365	9,147	8,869	8,501	8,426	8,514	8,592	8,765	8,793	8,633	8,626	8,764	8,841	9,064	9,229	9,533	9,884
Sudan	1,161	1,313	1,352	1,233	1,134	1,115	1,159	1,187	1,173	1,080	985	1,013	1,132	1,106	1,180	1,092	1,147	1,194	1,219	1,202	1,244	1,286	1,336	1,389	1,445	1,506	1,567	1,636	1,695	1,750	1,853
Swaziland	3,103	2,942	2,879	2,825	2,822	3,075	2,994	2,917	2,888	2,976	2,994	3,260	3,623	3,746	3,962	4,169	4,146	4,066	4,080	4,087	4,111	4,139	4,160	4,162	4,185	4,167	4,150	4,191	4,224	4,258	4,292
Tanzania	..	..	..	..	..	..	..	..	..	..	..	..	..	501	503	520	513	499	488	480	482	491	496	503	509	524	546	573	602	631	662
Togo	1,708	1,634	1,708	1,850	1,708	1,897	1,772	1,646	1,498	1,521	1,547	1,516	1,471	1,516	1,529	1,481	1,432	1,342	1,112	1,246	1,305	1,374	1,517	1,429	1,414	1,358	1,315	1,332	1,332	1,337	1,340
Uganda	..	..	..	..	..	..	..	844	865	834	779	754	755	787	807	829	846	846	887	915	989	1,047	1,068	1,087	1,140	1,167	1,185	1,219	1,234	1,257	1,293
Zambia	1,351	1,387	1,282	1,248	1,172	1,170	1,201	1,130	1,071	1,033	1,015	990	983	1,012	971	938	912	872	907	808	766	799	806	774	774	785	808	820	848	879	910
Zimbabwe	2,784	2,708	2,445	2,306	2,305	2,546	2,759	2,723	2,658	2,505	2,577	2,533	2,470	2,564	2,611	2,710	2,783	2,470	2,442	2,614	2,572	2,793	2,827	2,872	2,738	2,498	2,411	2,289	2,039	1,950	1,813
Median	1,290	1,313	1,480	1,388	1,449	1,586	1,538	1,505	1,463	1,454	1,464	1,465	1,406	1,395	1,363	1,339	1,253	1,236	1,183	1,140	1,209	1,286	1,336	1,372	1,414	1,358	1,315	1,332	1,332	1,337	1,317

Table A4b: Country-group assignment

Country	Period 1 - 1975-1990																	Period 2 - 1991-2005														Country-group
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Angola											0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	AA
Benin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Botswana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Burkina Faso	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Burundi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Cameroon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Cape Verde												0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Central African Republic	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	AB
Chad	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Comoros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Congo, Dem. Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	AB
Congo, Rep.	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	BB
Cote d'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Equatorial Guinea											1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0					BA
Eritrea																		1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Ethiopia	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Gambia, The	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Ghana	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Guinea												0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Guinea-Bissau	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Kenya	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Lesotho	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Madagascar	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Malawi	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Mali	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Mauritania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Mauritius						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Mozambique						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Namibia						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Niger	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Nigeria	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Rwanda	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	BB
Senegal	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Sierra Leone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Sudan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	BA
Swaziland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA
Tanzania														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	AA
Uganda								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	BB
Zambia	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	BB
Zimbabwe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	AA

Note: 0 if GDP > median; 1 otherwise.