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Hunting for Leopards

Long-Run Country Income Dynamics in Africa

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Abstract

This paper examines the country-level dynamics of long-run growth in Africa between 1975 and 2005. We are primarily interested in examining how growth has affected mobility and the distribution of income among countries. We analyse changes in the cross-country income structure and convergence. We also look for evidence of the formation of country groups or 'clubs'. Finally, we use a novel method of breaking up the growth histories of African economies into medium term spells of growth accelerations and declines to see if a group of African 'leopards'—the regional equivalent of Asia's 'tigers'—is beginning to emerge

Keywords: GDP per capita, growth, Sub-Saharan Africa

JEL classification: O11, O47, O55, O57

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Acronyms

CV coefficient of variation

PPP purchasing power parity

SD standard deviation

SSA Sub-Saharan Africa

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1 Introduction

After stagnating for much of its post-colonial history, economic performance in Sub-Saharan Africa (SSA) has markedly improved. Since 1995, average economic growth has been close to 5 per cent per year. Countries with at least 4 per cent GDP growth now constitute about 70 per cent of the region's total population and 80 per cent of its GDP. Per capita income grew by 1.6 per cent a year in the late 1990s and by 2-3 per cent in each year since 2000.

Recent popular and academic writing has suggested that Africa may be at a turning point in its long economic decline (see, for example, Commission for Africa 2005; Ndulu et al. 2007). But predictions of Africa's imminent economic recovery or demise have proved wrong on numerous occasions in the past 40 years. Growth in Africa since 1975 has been lower and more volatile than in any other region of the world—developed or developing (Table 1). And, unlike East and (more recently) South Asia it has had few regional 'champions' to serve as models of successful, rapidly growing economies.[1]

Using the most recent purchasing power parity (PPP) data for 44 SSA countries, this paper examines country-level dynamics of long-run growth in Africa between 1975 and 2005. The next section describes our data and the characteristics of Africa's long-run growth. Here we confirm previous findings that the major characteristics of growth in Africa are its low long-run trend and its extreme volatility at the country level. We find no persuasive evidence of growth persistence within countries and only weak evidence of persistence at the regional level since 1990.

Section 3 examines how the growth recovery has affected the distribution of income among countries in the region. We describe the country level distribution of income in Africa and test for convergence in per capita income levels between richer and poorer countries. We find no evidence that poorer countries in Africa are converging to the income levels of their richer neighbours. We find persuasive evidence of inertia in per capita incomes for economies in Africa. Where countries began in terms of relative income in 1975 is an excellent predictor of where they ended up in 2005. Because the rich economies are growing faster than their poorer neighbours we also find that inter-country distribution of income has become less equal over time.

The fourth section of the paper presents our hunt for the leopards. One indication that Africa has indeed reached a turning point, would be evidence that a group of African economies with high and accelerating long-run growth—'leopards', the regional equivalent of Asia's 'tigers'—is beginning to emerge. We first identify four groups of countries according to their income levels and growth experiences, and we look for some common characteristics that are associated with these groups. Two distinct and stable income groups or 'clubs', rich and poor, are identifiable in the data. Our most striking finding is that transitions from low income to higher income levels have been rare in the last 30 years. Only two countries, both oil exporters, made the transition. We then use the approach to growth accelerations and decelerations developed by Arbache and Page (2007) to see if a subset of countries with a high frequency of rapid growth

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[1] Botswana and Mauritius are notable exceptions to this statement, a theme to which we shall return below.

accelerations emerges during 1995-2005. Based on our results for income transitions, growth thresholds and growth accelerations, we identify six economies that show the potential to be Africa's growth leaders. Section 6 concludes.

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

Region	1975-80	1981-85	1986-90	1991-95	1996-00	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 calculations.
Source: Authors' computations.

2 Chaos without change: Africa's long-run growth, 1975-2005

This section describes long-run trends in per capita income growth for 44 African economies. Data on GDP per capita at 2000 international PPP prices are taken from the *World Development Indicators* and span the years 1975 to 2005.[2] Our sample contains all Sub-Saharan African countries for which PPP GDP data exist. There are no GDP per capita PPP data for Liberia, San Tomé and Principe, and Somalia, and they are excluded from the analysis.[3] The un-weighted mean GDP per capita between 1975 and 2005 for the 44 countries in our sample was US$2,306. Mean GDP per capita using GDP weighted data was US$1,702.[4] Appendix Table A1 presents descriptive statistics for income and growth at the country level.

Figure 1 presents the timepaths of un-weighted and GDP weighted per capita income growth rates.[5] Although the trajectories of the un-weighted and weighted series appear

2 1975 is the first year available for this indicator.

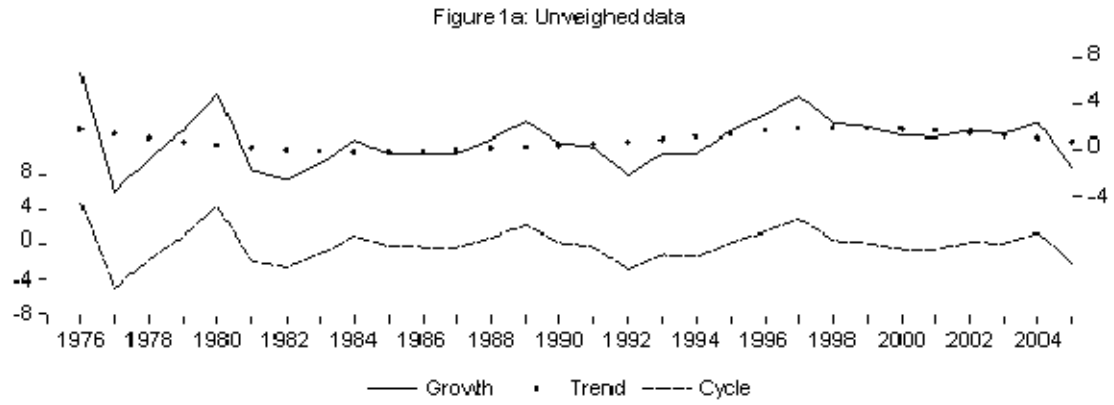
3 We, thus, have a panel of data with 44 countries and 31 periods. Our sample accounts for 98.4 per cent of population and 99 per cent of regional GDP in 2005. Although Equatorial Guinea is in our sample, we remove the country from charts, econometrics, and aggregate descriptive statistics because its extremely high growth rates in recent years distort many of the results.

4 Although there are differences between GDP per capita at PPP and non-PPP, those differences are confined to levels and do not affect growth trajectories. PPP and non-PPP growth data share similar statistical properties. See Arbache and Page (2008) for a fuller discussion.

5 We employ the Hodrick-Prescott filter in Figure 1 to smooth the estimate of the long-term trend component of the GDP growth series.

similar, their means and variances are significantly different. The region's un-weighted average growth rate was 0.71 per cent and its standard deviation (SD) was 6.32 per cent. The mean and SD of the weighted data are –0.17 per cent and 1.7 per cent, respectively, reflecting the fact that Africa's bigger economies grew more slowly than its smaller ones. Between 1975 and 2005, South Africa, which represents, on average, 42 per cent of the region's GDP, grew in per capita terms by an average of only 0.12 per cent a year; and Nigeria, the region's second-largest economy, (13.50 per cent of GDP) grew by 0.28 per cent.

Figure 1
GDP per capita growth, 1975-2005



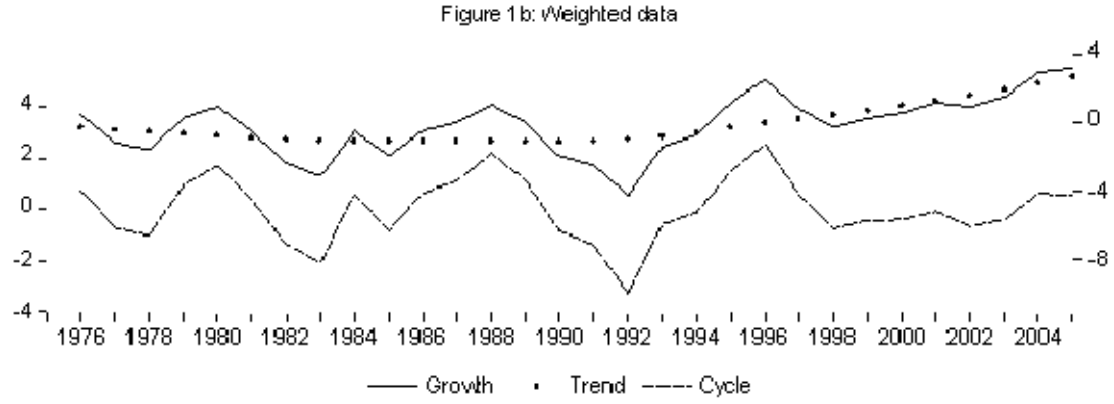


Figure 2
Stability test: Recursive residual estimation of growth rates

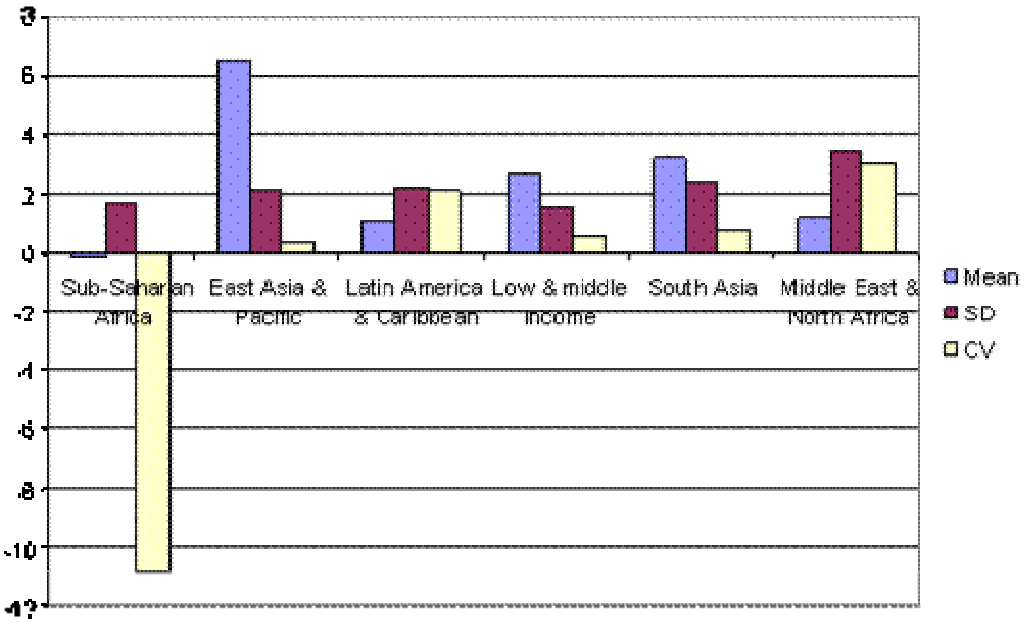
Source: Authors' computations.

Both the un-weighted and weighted series show a positive trend beginning in the mid-1990s. In the period 1995–2005, un-weighted average GDP growth per capita was 1.81 per cent, more than twice the long-term average. In order to test for statistically meaningful breaks in the mid-1990s, we ran recursive residual estimations and other stability tests. Figure 2 shows the recursive estimation for the growth series. There is statistical evidence that growth accelerated around 1995. Both the Chow breakpoint and forecast tests support the conclusion that a structural break in the income growth series occurred in the mid-1990s.[6]

Growth rates for individual countries were low, and the coefficient of variation was high, indicating that growth was highly erratic (Appendix Table A1). Figure 3 shows that African economies have by far the least predictable growth globally, as measured by the coefficient of variation (CV). Countries with different levels of income (like South Africa and Malawi), geographical locations (like Mali and Senegal), resource endowments (like Nigeria and Ethiopia), and long-term GDP per capita growth patterns (like Gabon, Niger, Madagascar, and Swaziland) share a common characteristic, high growth volatility.

Table 2 decomposes the standard deviation of GDP per capita and its growth into within- and between-country components. Growth is highly unstable in individual countries; the ratio of the within-country SD to the total SD of growth rates is 94 per cent. The Comoros (-22.6), Ethiopia (18.4), Guinea-Bissau (-11.9), Malawi (24.6), Mauritania (34.6), Namibia (19.8), Nigeria (18.7), and South Africa (20.6) are notable for their extremely high volatility, even by regional standards.

Figure 3
GDP per capita growth - man, standard deviation and
coefficient of variation by region (GDP weighted data), 1975-2005



Source: Authors' computations.

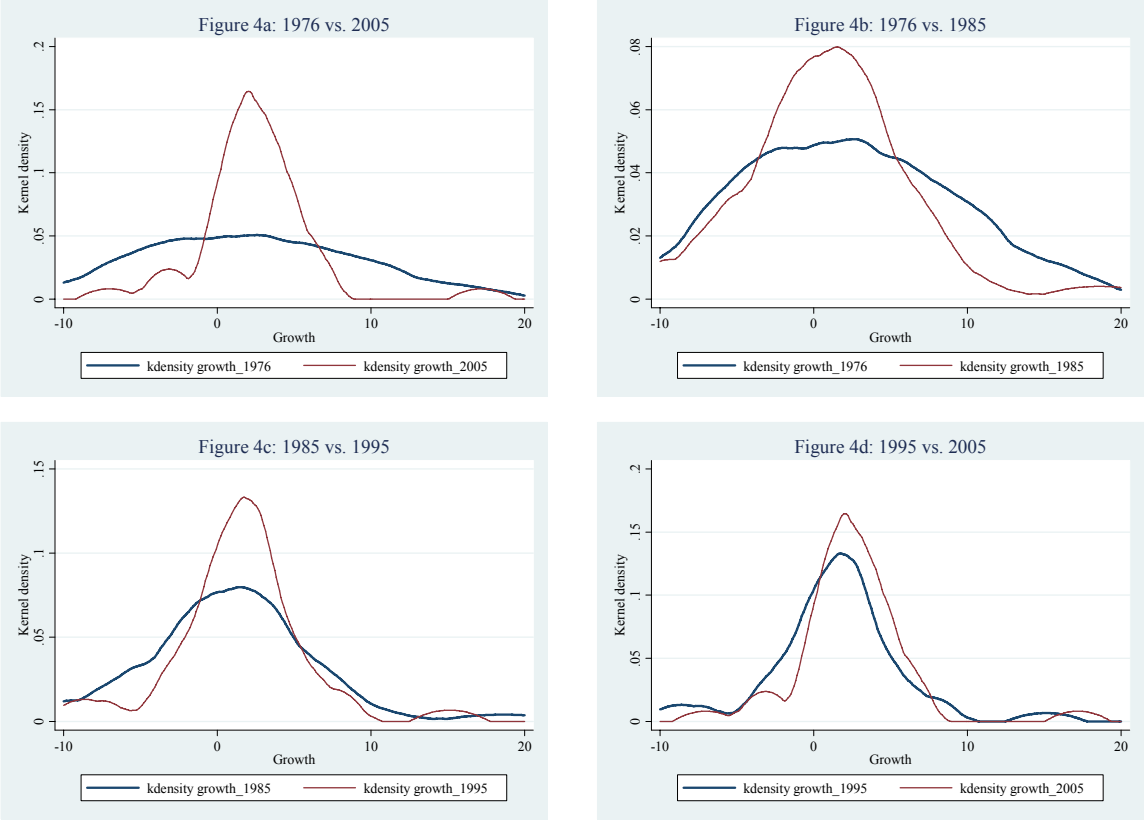
6 We also find evidence of a structural break in the per capita income series at about the same time.

Table 2
Decomposition of standard deviation of GDP per capita and growth, 1975-2005

Variable	Mean	Standard deviation		
		Overall	Between countries	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 4
Density of GDP per capita growth across countries



Source: Authors' computations.

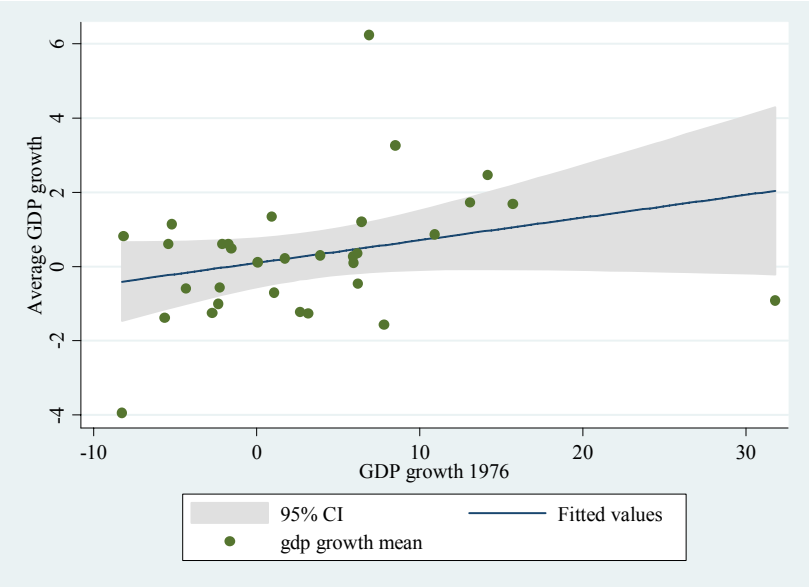
Only three economies—Botswana (0.5), Cape Verde (0.8), and Mauritius (0.4)—have coefficients of variation of less than 1.0. These three economies are also notable for their high long-term growth rates, ranking second through fourth out of the sample in terms of their overall rate of per capita income growth, 1975-2005.[7]

Kernel densities of the distribution of per capita GDP growth rates at ten year intervals are shown in Figure 4. The growth acceleration of 1995-2005 is clearly visible in the rightward shift of the distribution.

The most striking change in the distribution over time, however, is the extent to which growth rates have converged (Figure 4a). The 1976 distribution is remarkably flat. Since then, there have been increasingly more acute peaks around the mean (Figures 4b-4d).

7 Equatorial Guinea, which ranks first, and Lesotho, which ranks fifth, have the same coefficient of variation of growth of about 1.7.

Figure 5
GDP per capita growth as a function of initial conditions



Source: Authors' computations.

The SD of growth rates dropped from 8.2 per cent in 1976 to 3.6 per cent in 2005. Two sets of outliers—high performers and economies in decline—also appear to be emerging in the 1995 and 2005 distributions (Figures 4c and 4d).

An important question with respect to long-term growth is whether it has been persistent. Figure 5 shows the results of regressing average GDP per capita growth on growth in the first year of our series, 1975-76:

$$\Delta\overline{Y}_i = \alpha + \beta(\Delta Y_i^{76}) + \varepsilon\,, \tag{1}$$

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. Not surprisingly, given the extreme variability of growth rates, there is no evidence of growth persistence. The coefficient of β is close to zero and insignificant ($\beta = 0.061$, $t = 1.65$).[8] Growth in 1976 for the representative African country fails to predict average growth in the subsequent 30 years.

We also stratify the data before and after 1995 to assess whether there was evidence of persistence during either of the two subperiods:

$$\Delta\overline{Y}_i^{76-94} = \alpha + \beta(\Delta Y_i^{76}) + \varepsilon \tag{2}$$

$$\Delta\overline{Y}_i^{95-05} = \alpha + \beta(\Delta Y_i^{95}) + \varepsilon \tag{3}$$

where $\Delta\overline{Y}_i^{76-94}$ is average GDP per capita growth between 1976 and 1994, $\Delta\overline{Y}_i^{95-05}$ is average GDP per capita growth between 1995 and 2005, and ΔY_i^{76} and ΔY_i^{95} are the growth rate of country *i* in 1976 and 1991.

8 Gabon grew 31 per cent in 1976, biasing the results. Thus we remove it from the regression.

The results are shown in Figures 6a and 6b. The coefficients of β are 0.06 (1.38) and 0.21 (3.06), respectively, for the first and second periods, suggesting that growth became more predictable from the mid-1990s on, a result that is in line with the kernel density exercises.[9]

As an additional check for persistence at the individual country level, we calculate the correlation coefficients of growth over time for individual countries. Statistically significant coefficients indicate that country growth rates follow predictable patterns. The very large majority of correlation coefficients before 1995 are not statistically significant, but about a third of the coefficients of 1995-2005 are significant (Arbache and Page 2008). This suggests that at the individual country level, growth was generally erratic, although there was increased persistence between 1995 and 2005.[10]

In sum for the region as a whole, and for the vast majority of African economies, growth from 1975 to 2005 has been both disappointing and volatile. Growth on average has accelerated and has shown a weak tendency to become more persistent over time, but for the individual African country, past growth helps very little to predict future growth.

Figure 6
Average growth as a function of initial conditions by time period

Figure 6a

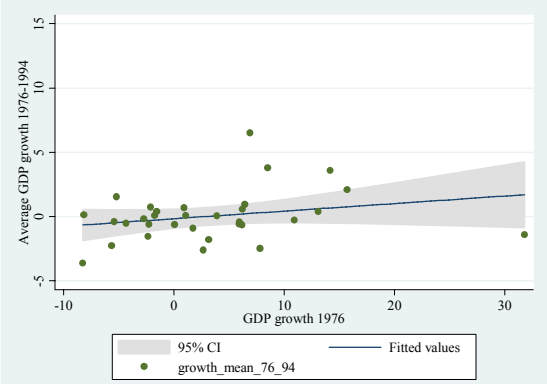
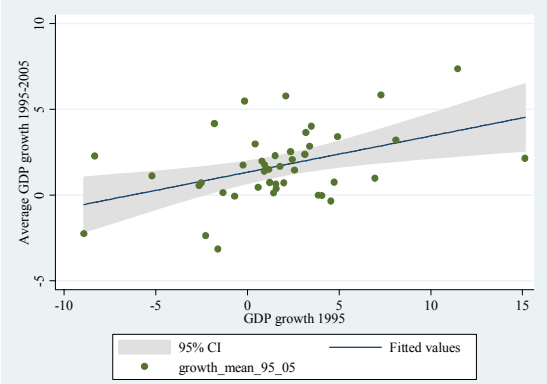


Figure 6b



Source: Authors' computations.

3 Rich country, poor country

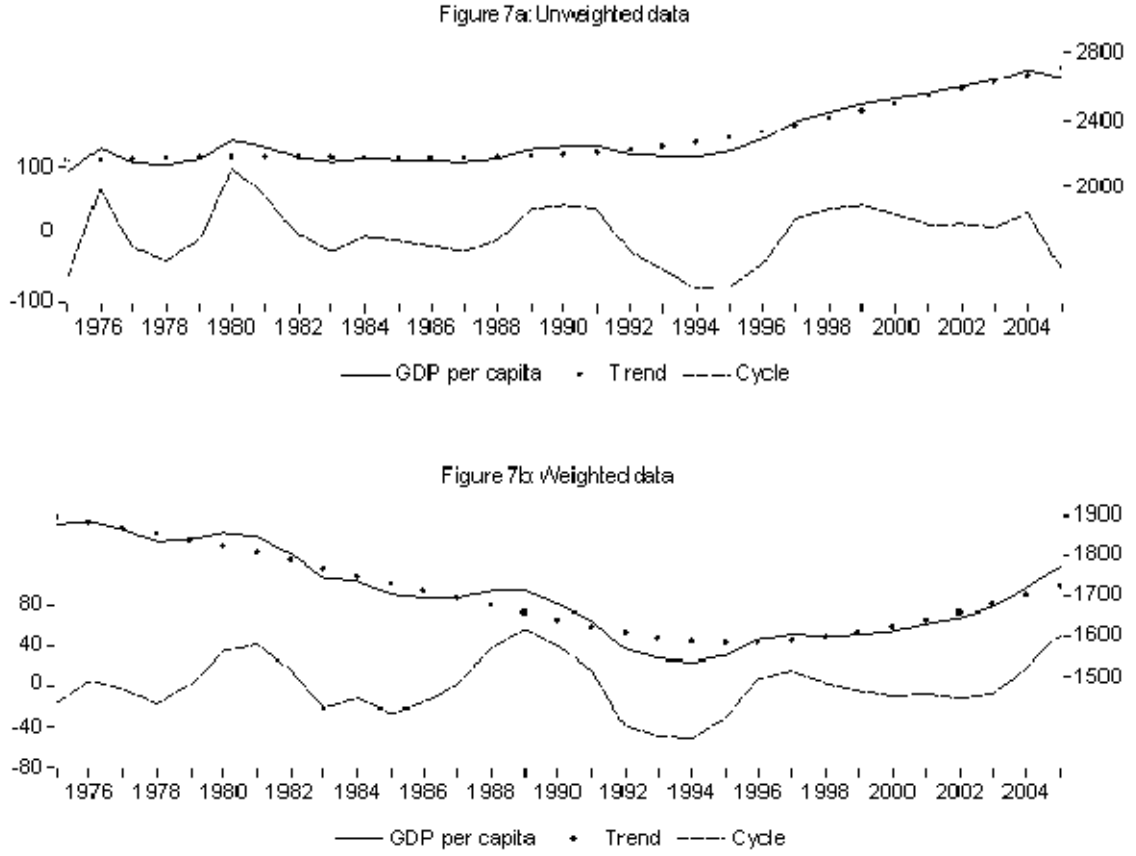
Africa's mean GDP per capita had a slowly rising long-term trend, consisting of about 20 years of virtual stagnation with an inflexion point upward in the mid 1990s (Figure 7).[11] Income per person in the average African economy declined towards the middle of the 1990s and then recovered. Weighting by GDP (Figure 7b) gives a U-shaped pattern of GDP per capita, reaching a minimum in the mid-1990s. Africa's

9 We have removed Rwanda from the regression and Figure 6b because it grew 37.5 per cent in 1995, distorting the results.

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

11 We employ the Hodrick-Prescott filter in Figure 7.

Figure 7
GDP per capita, 1975-2005



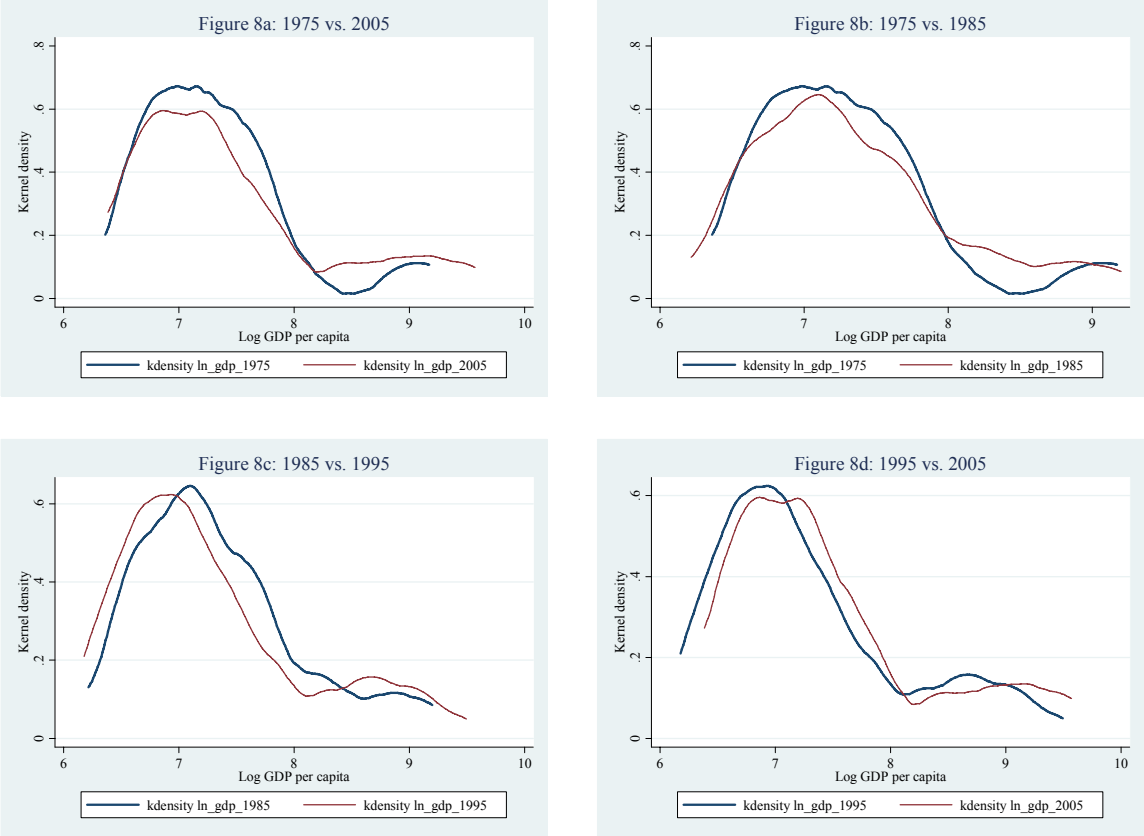
Source: Authors' computations.

largest economies, measured in terms of GDP, experienced some of its greatest income declines between 1975 and 1994. By 2005, income weighted GDP per capita had not yet recovered to the levels observed in the mid-1970s.

For most individual African economies GDP per capita registered only modest increases between 1975 and 2005, and many countries—such as the Democratic Republic of Congo, Côte d'Ivoire, and Zimbabwe—had declining per capita incomes over the period. The SD of income per capita was generally low, and the CV of many countries is close to zero. Most of the variation (69 per cent) in Africa's average income per person occurs between countries (Table 2) rather than within them.

Figure 8 shows comparative kernel density plots of GDP per capita for at 10-year intervals between 1975 and 2005. The kernel plot is helpful in identifying shifting patterns in the distribution of country level incomes per capita, such as the formation of identifiable groups or 'clubs' (Quah 1993a, 1993b). The slight movement toward the right of the GDP per capita plot of 2005 compared with that of 1975 (figure 8a) reflects the region's slow economic growth. Most of that movement took place between 1995 and 2005, when we observe a noticeable slide to the right, reflecting increasing incomes throughout Africa (Figure 8d). Since the mid-1990s, the variance of income per capita also appears to have declined.

Figure 8
Density of GDP per capita across countries



Source: Authors' computations.

Since 1975 there has been a pronounced bimodality in the distribution of income among countries in Africa. The twin peaks observed in each of the panels of Figure 8 define two groups of countries, rich and poor, which are relatively stable over the thirty year period. The most significant shift toward polarization of the country level distribution occurred between 1985 and 1995 (Figure 8c), a period when many countries were devastated by conflicts. Polarization was reduced somewhat between 1995 and 2005.

The second peak virtually disappears in each 10-year period when we remove Botswana, Cape Verde, Gabon, Mauritius, Namibia, the Seychelles, and South Africa from the data. Thus these seven countries form a stable, rich country club.[12] With the exception of South Africa, the members of the club are small economies, and they have relatively little in common with one another. Botswana, Cape Verde and Mauritius had high growth—even by global standards—and low growth volatility. The Seychelles had more moderate growth with high volatility. Namibia and South Africa barely grew but were highly erratic growers, and Gabon declined with high volatility. Cape Verde Mauritius and the Seychelles are islands. Botswana is landlocked and resource rich.

Table 3 shows, for 43 countries, the ratio of their GDP per capita to that of South Africa, the richest African economy in 1975. These data show little upward income

12 In 2005, those countries hosted about 8.5 per cent of the regional population, but produced 44 per cent of regional GDP.

Table 3
GDP per capita relative to South Africa

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
Côte 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: The ratio is the fraction of GDP per capita to South Africa's.
Source: Authors' computations.

mobility among African countries. Despite South Africa's long period of slow growth, only nine countries—Botswana, Cape Verde, Equatorial Guinea, Lesotho Mauritius, the Seychelles, Sudan, Swaziland and Uganda—had an increase in their GDP per capita of at least 5 percentage points relative to South Africa. Of these, only Sudan and Uganda are not members of the rich country club identified above. Botswana, Mauritius and the Seychelles were the only economies to overtake South Africa in terms of per capita income. An important 'neighbourhood effect' is apparent in the data. Botswana, Lesotho, and Swaziland, all to a large degree integrated into the South African economy, are among the faster converging economies.

Twenty-three countries experienced little or no change in their income levels relative to South Africa, and 11—including Côte d'Ivoire, Gabon, Madagascar, and Zimbabwe—had sharp deteriorations. The increase in income divergence was particularly sharp in Côte d'Ivoire, the Democratic Republic of Congo and Gabon. It is interesting to note that a majority of resource-rich countries (including oil exporters) did not improve their relative positions (Angola, Chad, Democratic Republic of the Congo, Nigeria and Zambia), providing support to the arguments of Collier (2007) and others that the 'natural resource curse' is particularly relevant in Africa.

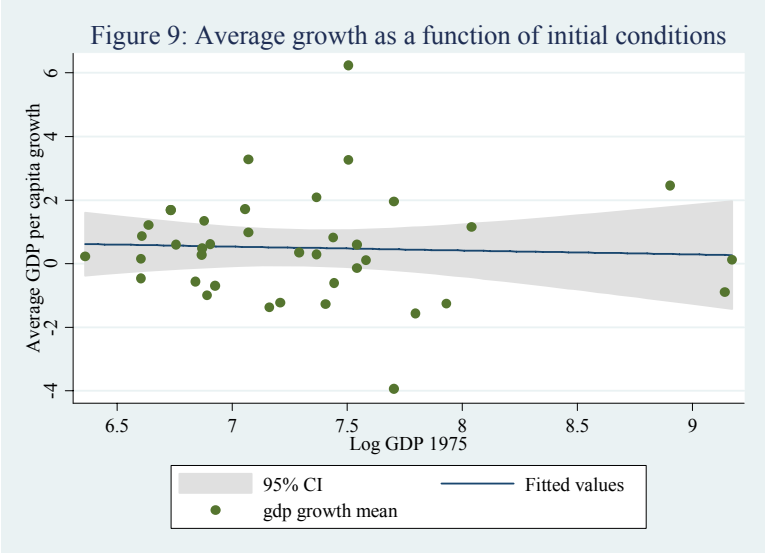
A more formal test of whether the income per capita of poorer African countries is converging toward the regions' richer ones can be conducted using the following unconditional convergence model:

$$\Delta \overline{Y}_i = \alpha + \beta Y_i^{75} + \varepsilon , \qquad (4)$$

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. For convergence to occur, poor countries have to grow faster (Barro 1991; Barro and Sala-i-Martin 1991), making the predicted sign of β in Equation (4) negative.

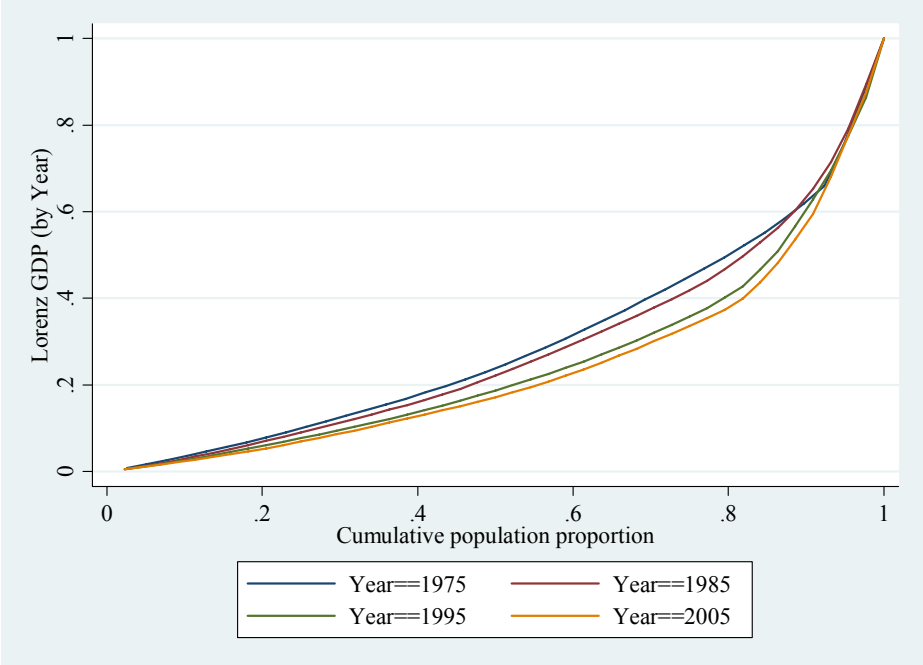
The regression, shown graphically in Figure 9, offers no evidence of unconditional convergence. The estimated coefficient is not significantly different from zero ($\beta = -0.122$, $t = -0.29$), indicating that in Africa the initial level of income alone has

Figure 9
Average growth as a function of initial conditions



Source: Authors' computations.

Figure 10
Lorenz curves—GDP per capita



Source: Authors' computations.

no effect on the growth rate.[13] These results confirm our heuristic evidence of substantial inertia in the income distribution and are consistent with other research. For example, McCoskey (2002) finds no evidence of unconditional convergence in Africa using long-run panel data. We also test for convergence in the period 1995-2005—due to the structural break that took place in the growth series at about that point—by regressing average growth during 1995-2005 on income in 1995. The results ($\beta = 0.43$, $t = 0.19$) are essentially the same as those reported for Equation (4).[14] Africa's poorer economies were not converging toward the income levels of their richer neighbours, even after the growth acceleration.

The lack of income convergence over the past 30 years has led to an increase in inequality of per capita incomes among countries across Africa. Lorenz curves of the GDP per capita at 10-year intervals 1975-2005 are presented in Figure 10. These show increasing income inequality in each 10-year period. The sharpest rise in inter-country inequality took place between 1985 and 1995. This is consistent with the growing polarization of income and the emergence of the rich country club shown in the kernel densities.

The ratio of income of the richest 10 per cent of countries to the poorest 10 per cent of countries rose from 10.5 in 1975 to 18.5 in 2005. In 1975–-0 South Africa's GDP per capita (then the highest in the region) was 17 times higher than that of Malawi. In 2000-05, the gap between the highest GDP per capita country, the Seychelles, and Malawi had grown to 24 times.

4 Where you start is where you end up

The previous sections identified some stylized facts about long-term GDP per capita growth and the distribution of income at the country level in Africa. These stylized facts—low and volatile growth, the formation of clubs, lack of convergence in income levels, and rising inter-country income inequality—point toward little dynamism in income growth. In this section, we examine the income dynamics of countries in greater detail.

We begin by asking the question: how stable is the per capita income of a typical country in Africa? To test for income stability we run the following regression:

$$\overline{Y}_i = \alpha + \beta Y_i^{75} + \varepsilon \qquad (5)$$

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. Given our prior evidence of little income dynamism, we expect that average income in a typical African economy will be close to its initial income in

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

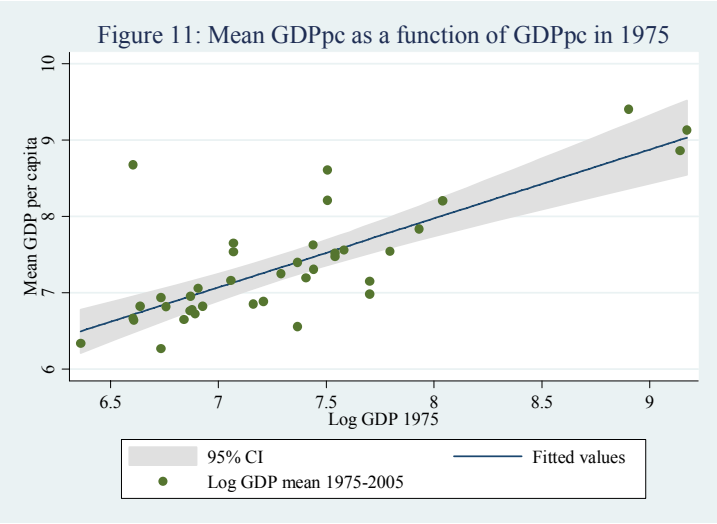
14 We also split the sample into subperiods before 1990 and after 1990 and regress average growth in each period on the level of income in 1975. The estimated coefficients of both equations are not significant.

1975.[15] If so, the coefficient estimate of β should be close to 1. A region with a large number of dynamic economies would have an estimated coefficient of significantly more than 1, indicating that initial income under-predicts average income.

The result, presented in Figure 11, shows a line near 45 degrees ($\beta = 0.901$, $t = 7.41$). Apart from a few cases, the average GDP per capita 1975-2005 closely mirrors that of 1975, reflecting a high degree of inertia.[16] There are some positive outliers, such as Botswana, Cape Verde, Lesotho, Mauritius and Namibia, whose average GDP per capita is well above their 1975 levels. Negative outliers such as the Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Gabon, Madagascar and Zambia, had average GDP per capita well below their initial levels of income.[17]

To check whether there was a change in income stability accompanying the growth acceleration after 1995 we run the same stability tests for average GDP per capita for the subperiods 1975-94 and 1995-2005 by regressing average income in those periods on the initial level of income in 1975. The results are highly significant and close to 1 (estimated coefficients of 0.891 and 0.909, respectively). These are virtually identical to the results of Equation 5, implying that the income structure remained highly stable, even after the break in the income and growth series in around 1995.

Figure 11
Mean GDP per capita as a function of GDP per capita in 1975



Source: Authors' computations.

5 Hunting for leopards

Our results up to this point are somewhat discouraging from the perspective of identifying a major turn-around in Africa's economic fortunes. We find no evidence of

15 For countries for which GDP data were not available in 1975, we use the earliest available year.

16 We also calculate the year-to-year correlation coefficients of GDP per capita within countries over time. Most coefficients are large and significant, thus supporting the finding of significant inertia in income levels.

17 We also run the same model while controlling for growth SD, and the results are virtually the same.

income convergence and very little evidence of significant income mobility across countries in the region. Low and volatile growth in Africa has been associated with a remarkably stable structure of incomes. For the most part, initial income in 1975 equals average income for the entire period 1975-2005 and average income during 1995-2005.

It is possible, however, that within this stable overall structure, individual countries stand out by exhibiting more dynamic behaviour. These 'leopards'—Africa's equivalent of Asia's tiger—might be expected to have made the transition from low income to higher income status, common to China, Korea, Malaysia, and other newly industrializing Asian economies. Korea, for example, began its rapid growth period at levels of income well below that of the average Asian economy (and equal to that of Ghana) and finished at levels well above.

In an attempt to identify dynamic economies we constructed a typology based on income levels. We split the timeseries into two subperiods, 1975-94 and 1995-2005. For each year, we calculate Sub-Saharan Africa's median GDP per capita and then check whether each country's GDP per capita was above or below the median. A country whose GDP per capita remained above the median for the majority of years in 1975-94 is assigned to category 'A', meaning that its GDP per capita was generally 'above' the benchmark. A country whose GDP per capita remained below the median for most years is assigned category 'B', meaning 'below'.[18] The same exercise is carried out for 1995-2005. Because it is possible for a country to switch categories, we have four possible combinations:[19]

AA – Countries with GDP per capita above Africa's median GDP per capita for most years of the first and second periods;

BB – Countries with GDP per capita below Africa's median GDP per capita for most years of the first and second periods;

BA – Countries with GDP per capita that switches from below to above Africa's median GDP per capita from the first to the second period;

AB – Countries with GDP per capita that switches from above to below Africa's median GDP per capita from the first to the second period.

The results of this classification exercise are presented in Table 4. Figure 12 shows the GDP per capita by country group over time. Basic statistics on the country groups are presented in Table A3 in the Appendix.

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18 Bosworth and Collins (2003) have a similar method for grouping countries. They group 84 countries from all regions as higher income and lower income, according to the per capita income above or below the median. However, they take the income per capita in 1960, their first year, as reference for grouping. Garner (2006) uses average long-term growth rates to classify African countries. We also have 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 provides the most robust results. We run the median exercise removing South Africa, but the classification of countries remains basically the same.

19 Appendix Table A2 shows the countries' GDP per capita and median by year and respective assignments to country groups.

Again, we find evidence of two clubs—rich nations and poor nations—with little mobility between them.[20] GDP per capita is four times higher in AA countries than in BB countries, and *t*-statistics reject the equality of means of GDP per capita between the two groups. There was also increasing divergence in income levels between the two groups over time (Figure 12). Income per capita on average remained largely stagnant for AA countries between 1975 and 1995, but it increased substantially thereafter. The average per capita income of the BB countries declined until around 1995 after which there was a slight recovery, but the average real income of the BB group was the same in 2005 as in 1975. The CV of GDP per capita of AA countries increased from 0.77 in 1975-94 to 0.87 in 1995-2005. The CV of the BB group increased from 0.26 to 0.30. Thus, part of the increasing income inequality identified in section 3 is driven by the large and rising income dispersion among countries in the richer group.

Table 4
Countries by country-groups, growth and other characteristics

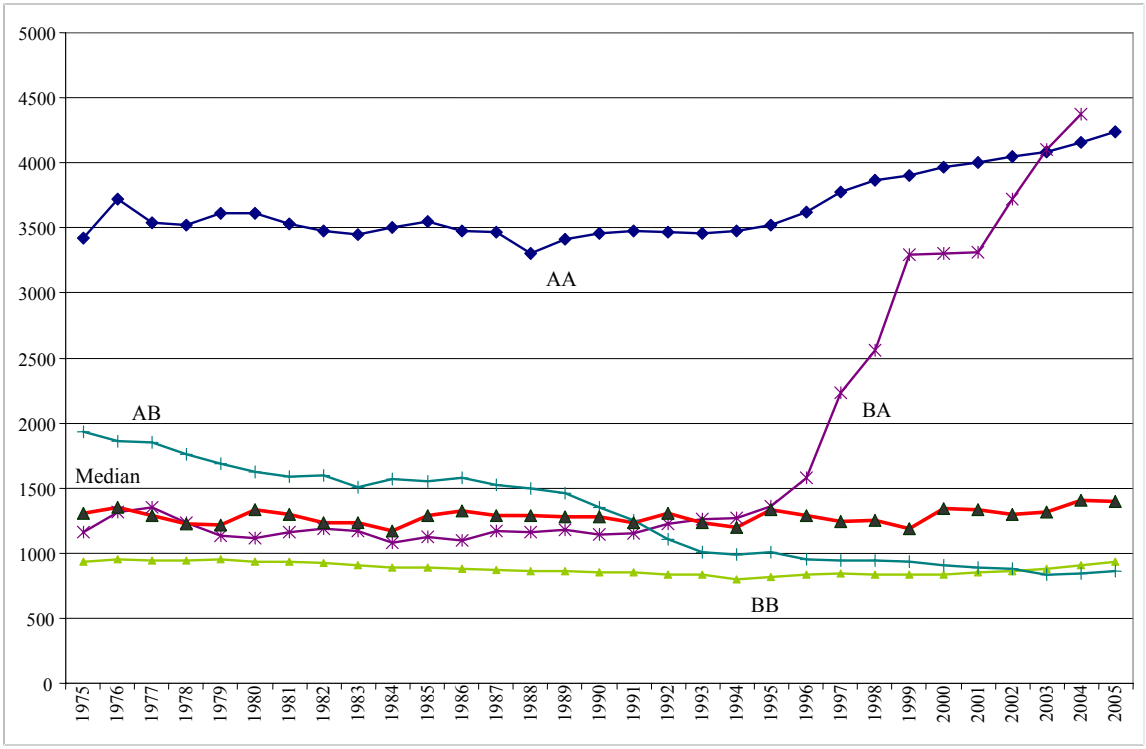
Country group	Shrinking economies (avg growth below 0)		Stagnant economies (avg growth between 0 & 0.71%)		Growing economies (avg growth above 0.71%)	
AA	Comoros [c]	(-0.14)	Angola [a]	(0.70)	Botswana [b]	(6.24)
	Côte d'Ivoire [a]	(-1.57)	Gambia [c]	(0.29)	Cape Verde [c]	(3.26)
	Gabon [a]	(-0.91)	Ghana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

Notes: 0.71% is the average growth rate in 1975-2005;
Average growth rate in parentheses;
[a] Oil exporter;
[b] non-oil resource intensive;
[c] Non-resource intensive, coastal country;
[d] Non-resource intensive, landlocked country.

Source: Authors' computations.

[20] To test the robustness of the country group classification we estimate pooled and fixed-effect regression models. Country group coefficients for income levels are statistically significant at the 5 per cent level; they are sizable and have the expected signs. These results suggest that the country group classifications are relevant and highly stable in predicting income levels (Arbache and Page 2008).

Figure 12
GDP per capita by country-group



Source: Authors' computations.

The AA group had higher mean growth over the whole period 1975-2005 (0.85 per cent) than BB (0.39 per cent). Growth was more erratic in the poorer countries. The coefficient of variation of growth is 4.67 for the BB category and 1.37 for the AA group. Given the high variance of growth rates, we cannot reject the hypothesis of equal mean growth rates in AA and BB countries between 1975 and 2005. Between 1995 and 2005 the two groups had virtually identical growth rates of about 1.60 per cent per year. Within each group there is a wide diversity of growth performance. Growth rates in the AA group, for example, range from 6.24 per cent for Botswana to -1.26 per cent for Zimbabwe. The range of growth outcomes is somewhat more compact for the BB group, varying between 2.07 per cent for Mozambique and -1.38 per cent for Madagascar. All five of the region's fastest growing economies for the period 1975-2005 are in the AA group.

One striking, and disappointing, feature from the point of view of hunting for leopards is the small number of transitional cases (BA or AB). BA countries comprise only Equatorial Guinea and Sudan, both oil exporters. These economies grew on average by 4.4 per cent a year over the entire period, but their expansion was driven by very rapid growth in 1995-2005, when annual growth was 8.3 per cent (from 1.8 per cent in the first period). That boom enabled their GDP per capita to increase by 60 per cent between 1975 and 2005. The AB economies—the Central African Republic and the Democratic Republic of the Congo—collapsed, mainly as a result of conflicts, leading average GDP per capita to shrink by more than half.

Given the diversity of growth experiences within our stable lower and higher income groups, it is possible our leopards are emerging within groups rather than between the groups. To continue our search for growth leaders, we use a variation of the methodology developed by Hausmann, Pritchett, and Rodrik (2005) to identify growth

accelerations (good times) and decelerations (bad times). Our approach (Arbache and Page 2007) differs from theirs and that of researchers applying their method to Africa (IMF 2007) in two important respects. First, it identifies both growth accelerations *and* decelerations in a cross-section of countries. Second, it does not use a common threshold growth rate to identify growth accelerations. Instead, it defines good and bad times relative to each country's long-run economic performance. This seems appropriate in Africa's volatile, low-growth environment.

Four conditions define good times for a given country:

- First, the 4-year forward-moving average of GDP per capita growth minus the four-year backward-moving average is greater than zero for a given year;
- Second, the 4-year forward-moving average of growth is above the country's long-run trend;
- Third, the 4-year forward-moving average of GDP per capita exceeds the four-year backward-moving average; and
- Fourth, the first three conditions are satisfied for at least three years in a row, followed by the three subsequent years after the last year that satisfies the first three conditions.

Growth decelerations—bad times—are defined by the opposites of the first three conditions for good times, and the presence of the fourth.

Table 5 shows the relative frequency of accelerations and decelerations, and their respective growth rates, for different periods. Between 1975 and 2005, there was a slightly higher probability that the representative African economy was in a growth acceleration than a deceleration: 25 per cent of the 1,243 total observations per country per year identify growth accelerations, while 22 per cent identify growth decelerations.[21] The remaining country-year observations reflect normal economic times with countries growing at about their trend growth rate. Countries that experienced growth accelerations managed to grow on average by 3.6 per cent per year during those episodes, compared with the region-wide average of 0.7 per cent. During decelerations, countries contracted on average by -2.7 per cent. Consistent with the region's long-run growth trend, the period 1995-2005 saw a substantial increase in the frequency of growth accelerations and a corresponding reduction in growth declines compared to the previous 20 years.

Table 6 shows the frequency of growth accelerations by country for the three periods of our analysis. Most countries experienced a higher frequency of growth accelerations after 1995 compared with 1975-94. Burkina Faso and Ghana were in a growth acceleration during the entire period 1995-2005, and Mali, Namibia, Nigeria, Sao Tome and Principe, Sudan, and Tanzania accelerated at a frequency above 70 per cent. Burundi, Congo, Guinea-Bissau, Kenya, Lesotho, Mauritius, and Swaziland in contrast had a reduction in the frequency of growth accelerations relative to earlier periods.

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21 As a means of checking the robustness of the results, growth accelerations and decelerations are also identified by replacing 0 with +1 per cent and −1 per cent for acceleration and deceleration, respectively, in condition 1, but the results do not change substantially. Therefore, only the base-case results are reported, because they are less restrictive

Table 5
Likelihood and growth rates of economic acceleration and deceleration in Africa, 1975-2005

	All country-years in the period		Country-years with acceleration		Country-years with deceleration		Country-years with trend growth
Period	Observations (country yrs)	Growth rate	Frequency (of country yrs)	Growth rate	Frequency (of country yrs)	Growth rate	Frequency (of country yrs)
1995-2005 (after trend break)	494	1.88	0.42	3.76	0.12	-1.29	0.46
1975-94 (before trend break)	749	-0.07	0.14	3.39	0.29	-3.14	0.57
1985-94	433	-0.23	0.21	3.21	0.36	-3.18	0.43
1975-84	316	0.13	0.04	4.61	0.18	-3.06	0.78
1975-2005 (all years)	1,243	0.7	0.25	3.64	0.22	-2.74	0.53

Source: Authors' computations.

Table 6
Likelihood of growth acceleration by country

Country	1975-05	1975-94	1995-05	Frequency of growth acceleration (1995-2005) above the region's average of 0.42?
Angola	0.48	0.43	0.55	Yes
Benin	0.27	0.11	0.55	Yes
Botswana	0.43	0.37	0.55	Yes
Burkina Faso	0.43	0.11	1.00	Yes
Burundi	0.20	0.32	0.00	No
Cameroon	0.23	0.00	0.64	Yes
Cape Verde	0.42	0.23	0.64	Yes
Central African	0.23	0.00	0.64	Yes
Chad	0.20	0.00	0.55	Yes
Comoros	0.24	0.00	0.55	Yes
Congo, Dem. Rep.	0.00	0.00	0.00	No
Congo, Rep.	0.20	0.32	0.00	No
Côte d'Ivoire	0.20	0.05	0.45	Yes
Equatorial Guinea	0.42	0.22	0.60	Yes
Eritrea	0.00	0.00	0.00	No
Ethiopia	0.25	0.15	0.36	No
Gabon	0.00	0.00	0.00	No
Gambia, The	0.00	0.00	0.00	No
Ghana	0.43	0.11	1.00	Yes
Guinea	0.37	0.25	0.45	Yes
Guinea-Bissau	0.23	0.37	0.00	No
Kenya	0.20	0.32	0.00	No
Lesotho	0.23	0.37	0.00	No
Madagascar	0.00	0.00	0.00	No
Malawi	0.23	0.16	0.36	No
Mali	0.33	0.05	0.82	Yes
Mauritania	0.00	0.00	0.00	No
Mauritius	0.28	0.50	0.00	No
Mozambique	0.32	0.07	0.64	Yes
Namibia	0.32	0.00	0.73	Yes
Niger	0.00	0.00	0.00	No
Nigeria	0.53	0.37	0.82	Yes

Table 6 continues

Table 6 (con't)
Likelihood of growth acceleration by country

Country	1975-05	1975-94	1995-05	Frequency of growth acceleration (1995-2005) above the region's average of 0.42?
Rwanda	0.20	0.00	0.55	Yes
Senegal	0.27	0.05	0.64	Yes
Seychelles	0.53	0.53	0.55	Yes
Sierra Leone	0.20	0.00	0.55	Yes
South Africa	0.23	0.00	0.64	Yes
Sudan	0.30	0.00	0.82	Yes
Swaziland	0.27	0.42	0.00	No
Tanzania	0.47	0.00	0.73	Yes
Togo	0.20	0.05	0.45	Yes
Uganda	0.30	0.25	0.36	No
Zambia	0.23	0.00	0.64	Yes
Zimbabwe	0.20	0.11	0.36	No
Total	0.25	0.14	0.42	

Source: Authors' computations.

Table 7 presents information on growth rates by country on average and during acceleration episodes for the relevant time periods. The last two columns show the deviation of the growth rate during accelerations from trend (1975-2005).[22]

We could attempt to use the increase in the relative frequency of growth accelerations as a criterion for identifying potential leopards. Using that criterion alone would lead us toward picking such dramatically improved performers as Burkina Faso, Ghana, Mali, Sudan and Tanzania, for example. It would, however, also lead us to exclude such historically strong economies as Botswana, Lesotho and Mauritius. This is partly an artifact of our method of identifying growth accelerations. Because we define an acceleration (or deceleration) relative to an economy's own long-run trend growth rate, a sustained small improvement from a low long-run trend, while clearly beneficial, would not qualify for leopard status.

Rather, we identify potential leopards as those countries that had both sustained long-term growth and a high frequency of growth accelerations using the following four criteria:

- The average growth for the economy equals or exceeds average per capita growth for the entire period 1975-2005 (0.71 per cent).
- The average growth rate for the economy in the period 1995-2005 equals or exceeds average per capita growth for 1979-2005 (1.88 per cent).
- The frequency of growth accelerations for the economy during 1995-2005 equals or exceeds the average frequency for 1995-2005 (0.42).
- The growth rate of the economy during growth accelerations in 1995-2005 equals or exceeds the average for all growth accelerations 1975-2005 (3.64 per cent).

22 Burundi, Côte d'Ivoire, Malawi and Mali show negative average growth rates during accelerations in 1975-1994. This is due to negative growth rates in the first year(s) of the acceleration episodes.

Table 7
Growth rate during acceleration, by country

Country	Growth rate (%)			Growth rate during acceleration (%)			Deviation from growth acceleration trend (%)	
	Average	1975-94	1995-2005	1975-2005	1975-94	1995-2005	1975-94	1995-05
Angola	0.70	-3.34	5.84	3.93	1.55	6.30	-60.49	60.49
Benin	0.60	0.07	1.50	1.60	0.22	2.07	-86.43	28.81
Botswana	6.24	6.50	5.78	6.87	7.41	6.24	7.85	-9.16
Burkina Faso	1.21	0.96	1.66	1.39	-0.06	1.66	-104.39	18.98
Burundi	-0.46	0.58	-2.26	1.48	1.48	NA	NA	Na
Cameroon	0.81	0.14	1.97	2.21	NA	2.21	NA	0.00
Cape Verde	3.26	3.14	3.40	3.57	3.19	3.73	-10.52	4.51
Central African Republic	-1.27	-1.81	-0.34	0.89	NA	0.89	NA	0.00
Chad	1.34	-0.30	4.18	7.66	NA	7.66	NA	0.00
Comoros	-0.14	-0.36	0.13	0.11	NA	0.11	NA	0.00
Congo, Dem. Rep.	-3.95	-4.85	-2.38	NA	NA	NA	NA	Na
Congo, Rep.	0.61	0.75	0.37	10.05	10.05	NA	0.00	Na
Cote d'Ivoire	-1.57	-2.47	-0.02	1.82	-2.12	2.61	-216.47	43.29
Equatorial Guinea	10.55	0.66	19.45	20.88	3.09	26.81	-85.19	28.40
Eritrea	1.96	17.24	-0.82	NA	NA	NA	NA	Na
Ethiopia	0.42	-1.37	2.54	3.71	8.16	1.49	119.81	-59.90
Gabon	-0.91	-1.43	-0.01	NA	NA	NA	NA	Na
Gambia, The	0.29	0.04	0.73	NA	NA	NA	NA	Na
Ghana	0.60	-0.40	2.31	2.15	1.30	2.31	-39.67	7.21
Guinea	0.97	0.31	1.46	1.78	0.28	2.39	-84.30	33.72
Guinea-Bissau	-0.70	0.08	-2.05	0.76	0.76	NA	0.00	Na
Kenya	0.48	0.39	0.64	1.76	1.76	NA	0.00	Na
Lesotho	3.27	3.78	2.39	3.83	3.83	NA	0.00	Na
Madagascar	-1.38	-2.26	0.14	NA	NA	NA	NA	Na
Malawi	0.22	-0.89	2.15	1.68	-3.54	5.59	-310.57	232.93
Mali	0.86	-0.29	2.85	2.75	-1.75	3.25	-163.73	18.19
Mauritania	0.10	-0.42	0.99	NA	NA	NA	NA	Na
Mauritius	4.22	4.67	3.65	5.65	5.65	NA	0.00	Na
Mozambique	2.07	-0.61	5.49	5.08	3.08	5.37	-39.32	5.62
Namibia	0.15	-1.12	1.75	2.14	Na	2.14	NA	0.00
Niger	-1.00	-1.55	-0.07	NA	NA	NA	NA	Na
Nigeria	0.28	-0.57	1.74	1.99	2.01	1.97	1.09	-0.85
Rwanda	1.68	-0.51	5.47	2.27	NA	2.27	NA	0.00
Senegal	0.36	-0.64	2.08	1.75	0.22	1.96	-87.61	12.52
Seychelles	2.47	3.58	0.54	4.01	4.27	3.58	6.43	-10.72
Sierra Leone	-0.57	-1.56	1.15	7.95	NA	7.95	NA	0.00
South Africa	0.12	-0.61	1.38	1.96	NA	1.96	NA	0.00
Sudan	1.72	0.39	4.02	3.90	NA	3.90	NA	0.00
Swaziland	1.15	1.56	0.45	4.63	4.63	NA	0.00	Na
Tanzania	1.69	-0.69	2.98	3.69	NA	3.69	NA	0.00
Togo	-0.60	-1.39	0.76	4.27	12.03	2.71	182.01	-36.40
Uganda	1.92	0.73	3.21	3.69	2.67	4.45	-27.66	20.74
Zambia	-1.23	-2.60	1.13	2.35	NA	2.35	NA	0.00
Zimbabwe	-1.26	-0.18	-3.14	2.61	2.95	2.45	12.89	-6.45

Source: Authors' computations.

We believe that these criteria reflect some of the most important characteristics of successful countries to emerge from our analysis of growth dynamics. A country meeting all four criteria would have grown faster than the regional average, both from 1975 to 2005, showing some growth persistence, and during 1995-2005, showing average growth above the rising trend. It would also have had a higher than average frequency of growth accelerations in 1995-2005 and would have grown during those accelerations at a rate that exceeded the overall regional average.

Eight countries—Angola, Botswana, Cape Verde, Chad, Mozambique, Equatorial Guinea, Sudan, and Tanzania—(18.2 per cent of our sample) meet all four criteria.[23] This is a small enough set of countries, set sufficiently apart from their regional neighbours to provide a basis for identifying them as high performers.[24] The criteria are sufficiently restrictive that only an additional four counties in the sample—Cameroon, Mali, Rwanda and Uganda—meet three out of four. The remaining 32 countries (73 per cent of the sample) meet two or fewer criteria.

There are some surprises in the results, at least from the perspective of popular views on recent African growth. Burkina Faso, Ethiopia, Ghana, Rwanda, Senegal and Uganda, all praised in recent donor publications as good performers (see for example World Bank 2007), do not appear among our leopard candidates, although most meet at least two of the criteria and Rwanda and Uganda meet three. Mauritius and Lesotho, sustained growers for the past 30 years, fail to make the cut due to the absence of growth accelerations in 1995-2005.

In terms of our prior classification of countries by income groups, both transitional (BA) economies, Equatorial Guinea and Sudan, meet our four criteria. The remaining countries are drawn equally from the growing economies of both the AA and BB classifications (Table 4). Angola, Botswana and Cape Verde are growing AA economies; Chad, Mozambique and Tanzania are growing BB economies. Angola, Chad, Botswana, Equatorial Guinea and Sudan are resource rich. Cape Verde, Mozambique and Tanzania are more diversified, coastal economies. Botswana is the only landlocked country.

Have we found the leopards in these six economies? In light of the income dynamics described in sections 1-4, we should be cautious before declaring the hunt over. Perhaps the most worrying feature of our set of high performers is the presence of five resource rich economies among the eight. One of these, Botswana, is a perennial growth leader, not just in Africa but globally. It certainly has much to offer to other resource rich countries in Africa in terms of lessons of 30 years of experience in transforming natural resource wealth into economic growth. But, given the history of resource abundant economies in Africa—and the negative income dynamics we note for several mineral dependent economies—we are somewhat reluctant to identify the other resource rich economies in the sample as long-term growth leaders. Elsewhere (Arbache and Page 2007) we have shown that conflicts are associated with a higher probability of growth declines. It is noteworthy that Angola, Chad and Sudan all have a recent history of conflicts, making the durability of their growth uncertain.

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23 Actually, as Angola misses the first criterion by only 0.01, we decided to include it in the list.

24 These countries represented 16.5 per cent of the population and 15.6 per cent of regional GDP in 2005.

Of the diversified, coastal economies, Cape Verde has the longest history of economic success, but it is extremely small (although so too were Hong King and Singapore at one time) and highly dependent on international migrant remittances for much of its income growth. Mozambique and Tanzania, both of which are diverse relatively large economies by African standards, may offer greater prospects of emerging as models for other coastal countries.

We may also have excluded some longer term good performers such as Lesotho, Mauritius, Rwanda and Uganda unfairly, by placing substantial weight on the frequency and pace of recent growth accelerations. Because our definition of growth accelerations is relative to the long-run rate of growth of the economy, these long-term growers may be victims of their own success; by growing relatively fast achieving further accelerations is made that much more difficult. Alternatively, had we placed even greater weight on growth accelerations, we might have included Burkina Faso, Ghana, Mali, Namibia and Nigeria among the list of countries with increasing growth potential, given the high frequency with which they experienced accelerated growth in 1995-2005.

To sum up, we believe that our hunt for leopards has been a moderate success. Not surprisingly, many of Africa's potential growth leaders are rich in natural resources. For them—to the extent that oil and minerals prices remain high—the challenge will be less about maintaining growth than about using resource rents well. Botswana has shown that this is possible, but, given the history of natural resource revenue management in Africa, it may be the only true leopard to emerge from this group. We are somewhat more optimistic about the group of diversified economies. Cape Verde has a long track record of good and accelerating economic growth. Mozambique and Tanzania clearly have shown growth potential. If we add the 'near misses'—Lesotho, Mauritius, Rwanda and Uganda—to the list, we have a group of economies from which some leopards seem likely to emerge.

6 Conclusions

This paper has described some long-term features of the growth and distribution of GDP per capita among countries in Sub-Saharan African. Our main goal was to identify the long-term patterns and regularities in income dynamics across countries and to search for leopards—economies that stood out with respect to the speed and persistence of their growth. Our main findings are the following:

Growth has been low and volatile. 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.

Growth has accelerated since the mid 1990s. A structural break in both the per capita income and growth series for the region took place around 1995, when the growth rate accelerated significantly across the continent. More countries experienced more frequent growth accelerations relative to their long-term trend, and the distribution of growth rates began to converge.

There is significant inertia in the distribution of income across countries. Our econometric results indicate that there is no convergence of incomes taking place across

Africa, and that at the individual country level there is a high degree of inertia in average per capita incomes. Income in 1975 is a good predictor of average income for both the whole of 1975-2005 and for 1995-2005.

Africa's cross-country income distribution is becoming less equal. Africa can be divided into rich and poor income clubs. Despite recent improvements in growth performance in poor countries, the richest countries have grown more in the long-run, and that has increased the income gap. As a consequence, the distribution of incomes among countries in Africa is becoming less equal.

Initial conditions matter a great deal for income distribution but not for growth. Initial conditions, represented by the economy's 1975 level of income, seem to be the single most important factor explaining income levels. Whatever the mechanics behind this phenomenon, it exerts a strong and persistent influence on income determination and on the structure of income among countries. We do not find evidence that initial conditions are associated with long-run growth.

A small number of countries have emerged as possible 'leopards', but we remain uncertain as to the durability of their growth. Using a combination of income transitions, growth thresholds, and growth accelerations, we identify eight economies as Africa's potential growth leaders. Five of the eight, however, are resource rich economies, which our analysis of growth dynamics suggests may underperform their potential. One of these, Botswana, is a long time high performer. The four other resource-rich economies—Angola, Chad, Equatorial Guinea and Sudan—meet our criteria, but we are somewhat reluctant to identify them as leopards. Of the diversified coastal economies Cape Verde has the longest history of economic success, but is highly dependent on international remittances for much of its income growth. Mozambique and Tanzania may offer prospects of emerging as models for other African economies.

We began this paper by asking whether the growth turn-around in Africa marked a reversal of the nearly three-decade decline in Africa's economic fortunes. We found evidence of a statistically significant rise in growth and per capita incomes for the region, but we are left wondering whether the good times will last. While growth on average has accelerated and volatility has declined since 1995, we still find considerable inertia in Africa's income dynamics, even post 1995. The level where the typical country had started in 1975 pretty much determined where it ended up in terms of average income. The rich and poor country clubs were remarkably stable and there were very few transitional cases. The rich were getting a bit richer, but the poor were getting richer more slowly, which led to rising inequality in the country-level distribution of incomes. We identify a small number of high performing economies, but most of these were resource rich. And, while we find some potential leopards among the region's more diversified economies, Africa will need more growth leaders, drawn from a wider variety of geological and geographical circumstances before we can confidently assert that it has turned the corner.

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Appendix Table A1: 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		2,077	1,608	242.5	0.151	0.70	8.31	-27.13	17.21	11.92
Benin	860	1,015	914	56.3	0.062	0.60	2.96	-7.64	6.38	4.95
Botswana	1,820	11,021	5,474	2637.0	0.482	6.24	3.36	-0.58	16.07	0.54
Burkina Faso	763	1,079	918	81.5	0.089	1.21	3.30	-4.36	7.16	2.72
Burundi	738	622	785	104.1	0.133	-0.46	4.65	-8.92	9.18	-10.02
Cameroon	1,702	2,045	2,054	345.6	0.168	0.81	6.51	-10.51	18.42	8.00
Cape Verde	-	5,162	3,686	799.0	0.217	3.26	2.52	-1.56	8.51	0.77
CAR	1,646	1,089	1,330	201.6	0.152	-1.27	4.42	-10.70	6.47	-3.48
Chad	972	1,270	879	133.9	0.152	1.34	9.57	-23.04	25.23	7.13
Comoros	-	1,773	1,845	107.1	0.058	-0.14	3.23	-7.85	6.24	-22.65
Congo, Dem. Rep.	2,214	635	1,271	539.4	0.425	-3.95	5.07	-16.59	3.54	-1.28
Congo, Rep.	998	1,123	1,163	181.6	0.156	0.61	6.77	-11.77	19.76	11.14
Côte d'Ivoire	2,433	1,466	1,881	429.3	0.228	-1.57	4.51	-15.14	7.81	-2.87
Equatorial Guinea	-	-	2,859	2110.0	0.738	10.55	17.62	-6.16	67.09	1.67
Eritrea	-	986	1,078	134.5	0.125	1.96	9.11	-16.30	20.92	4.66
Ethiopia	-	938	817	76.7	0.094	0.42	7.78	-13.87	16.43	18.41
Gabon	9,323	6,187	7,041	1389.3	0.197	-0.91	9.60	-26.25	31.80	-10.60
Gambia, The	1,584	1,709	1,633	50.9	0.031	0.29	2.92	-6.09	7.24	9.90
Ghana	1,885	2,206	1,756	201.1	0.115	0.60	3.78	-10.08	6.70	6.33
Guinea	-	2,060	1,873	122.0	0.065	0.97	1.55	-2.64	3.41	1.59
Guinea-Bissau	1,019	736	921	104.3	0.113	-0.70	8.36	-29.98	14.81	-11.95
Kenya	963	1,103	1,051	39.7	0.038	0.48	2.29	-3.89	5.49	4.78
Lesotho	1,176	2,967	2,102	517.8	0.246	3.27	5.47	-5.77	19.04	1.67
Madagascar	1,290	821	947	154.6	0.163	-1.38	4.68	-15.19	6.92	-3.39
Malawi	579	593	565	40.1	0.071	0.22	5.41	-11.03	15.13	24.57
Mali	742	919	764	80.0	0.105	0.86	5.49	-13.45	10.92	6.36
Mauritania	1,963	1,988	1,915	63.1	0.033	0.10	3.40	-6.62	6.96	34.58
Mauritius	-	11,312	7,318	2327.4	0.318	4.22	1.66	1.69	8.46	0.39
Mozambique	-	1,105	704	168.7	0.24	2.07	7.34	-17.45	14.75	3.54
Namibia	-	6,749	5,875	415.9	0.071	0.15	2.89	-5.11	5.03	19.82
Niger	985	695	829	150.5	0.181	-1.00	5.45	-19.42	10.04	-5.43
Nigeria	961	1,003	865	90.6	0.105	0.28	5.15	-15.54	8.20	18.67
Rwanda	840	1,073	1,031	123.9	0.12	1.68	12.25	-47.00	37.48	7.28
Senegal	1,468	1,594	1,408	80.3	0.057	0.36	4.12	-6.77	12.19	11.57
Seychelles	7,363	14,329	12,113	2954.6	0.244	2.47	6.91	-9.23	19.28	2.80
Sierra Leone	935	717	770	166.8	0.217	-0.57	7.97	-19.26	21.82	-14.04
South Africa	9,625	9,884	9,242	517.5	0.056	0.12	2.41	-4.33	4.17	20.64
Sudan	1,161	1,853	1,287	220.6	0.171	1.72	5.52	-8.80	13.09	3.21
Swaziland	3,103	4,292	3,664	578.0	0.158	1.15	3.64	-5.19	11.13	3.17
Tanzania	-	662	529	53.3	0.101	1.69	2.65	-2.73	5.06	1.57
Togo	1,708	1,340	1,490	182.5	0.123	-0.60	6.44	-17.14	12.05	-10.68
Uganda	-	1,293	976	181.3	0.186	1.92	3.15	-6.59	8.09	1.64
Zambia	1,351	910	981	182.3	0.186	-1.23	4.01	-10.92	4.31	-3.26
Zimbabwe	2,784	1,813	2,526	253.2	0.1	-1.26	5.71	-11.25	10.46	-4.53