

Policy Plus: African Growth Performance 1960-2000

Chapter 1 of volume 1

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1. Overview²

A collaborative effort of the African Economic Research Consortium, Harvard University, and Oxford University, the Growth Project was designed to produce the first comprehensive assessment by African research economists of the growth experience of Sub-Saharan Africa (SSA) in the post-independence period. At the core of the project is a tight integration of country-level research with global econometric evidence on economic growth. In this chapter we provide the building blocks of this approach and a perspective on the lessons it produced. The themes introduced here are developed in detail throughout this volume and in the accompanying volume of country studies. In the course of our analysis we provide a road map to the remaining chapters of this synthesis volume.

1.1 Economic growth in Africa, 1960-2000

Africa's growth record appears in Table 1, which focuses on the period from 1960 to 2000 and applies to all developing countries with continuous data. The post-1960 period corresponds closely to the era of political sovereignty in Sub-Saharan Africa.³ It is also by far the most intensively studied period in the global growth econometrics literature, reflecting the availability of comparable cross-country data on the contemporary nation-states of the developing world.

² The structure of the Growth project reflects the sustained collaboration of a steering committee composed of Olusanya Ajakaiye, Jean-Paul Azam, Robert Bates, Augustin Fosu, Benno Ndulu, Dominique Njinkeu, Paul Collier, Shanta Devarajan, Jan Willem Gunning, Stephen O'Connell, and Charles Soludo.

³ See Table 2 for a comparison of SSA's march to political independence with that of other regions.

Simple cross-country averages suggest, at best, a story of modest progress. Human development indicators showed a decided improvement over the 40-year period, and real GDP per capita rose by 60 percent.

But on a deeper look, the record is profoundly unsettling. Non-African growth consistently outpaced African growth after 1960, with the result that Sub-Saharan real incomes fell by over 35 percent relative to incomes in other developing regions and by nearly half relative to industrial countries. Human development gaps widened over time rather than narrowing, and Africa's cumulative progress was insufficient, by 2000, to reach the levels of human development the rest of the developing world had already attained in 1960.

More troubling still is the picture of absolute deprivation that emerges from a continent-wide perspective. As emphasized in Chapter 2, cross-country averages obscure the impact on African *populations* of slow growth in the continent's largest countries. Average real income per capita for the region as a whole barely increased between 1960 and 2000. Household survey data, moreover, suggest a sharp increase in income inequality over much of the period. In the context of slow overall growth, this meant an increase in income poverty. At the turn of the millennium, nearly half of the Sub-Saharan African population fell below an income poverty line of \$1.50 (PPP-adjusted) per day, up from 35% in 1970. Using the same poverty line, the global incidence of poverty fell from 20 percent to 7 percent over the same period (Sala-i-Martin 2006).

***Table 1: Regional growth comparisons (cross-country averages within regions).

***Table 2: Dates of political independence, developing countries.

While our central task is to explain persistent and widespread economic stagnation, the trends in Table 1 conceal a wide diversity of experience at the country level. In Figure 1 we line up the countries of SSA from left to right, in descending order of the long-run average growth rate of real GDP per capita.⁴ Dots indicate country-specific long-run averages, and for each country we use upper and lower 3-letter labels to indicate the extremes of medium-term growth experience, measuring these as the fastest and slowest 10-year moving averages of growth over the course of the sample.⁵ The figure provides a snapshot of the level and variability of long-run growth in the individual countries of SSA between 1960 and 2000.

Led by Botswana and Mauritius, five countries exceeded the non-SSA global median of 2.3 percent (indicated by the dotted line in Figure 4) over the full period. But many more grew at this rate, or faster, for extended periods. Nearly three-quarters outperformed the global median on a decadal-average basis, and some did so for considerably longer periods, including Cote d'Ivoire until the late 1970s, Ghana since the early 1980s, and Uganda since the late 1980s. More than 1 in 4 countries in SSA experienced at least one extended episode of extremely rapid growth after 1960, as indicated by a decadal moving average exceeding 5 percent. Not surprisingly, these

⁴ Upper-case horizontal labels identify growth project countries. Figure 1.1 excludes Liberia, the slowest-growing African country over the whole period. Liberia's measured real GDP per capita contracted at an average rate of 25.7 percent between 1986 and 1995, a rate large enough to throw off the scaling for the whole diagram. Our empirical work excludes Liberia, for which very little data are available.

⁵ The idea for this diagram comes from Ben Jones and Ben Olken, who presented a similar diagram at an NBER conference in April 2006.

within-SSA growth differentials mattered for human development: an increase of one standard deviation in the long-run growth rate of real GDP per capita was associated with an increase of nearly half a standard deviation in an index of cumulative human development constructed from the measures in Table 1.⁶ The diversity in Figure 1 suggests that models of development success exist not just outside Africa but within the continent itself.

***Figure 1: Country-level growth performance in SSA, 1960-2000

*1.2 Scope and structure of the project*⁷

Two research questions motivated the Growth project. For SSA as a whole and on a country-by-country basis,

- What were the key growth opportunities and constraints after 1960?
- What explains success or failure in seizing the opportunities?

⁶ Our index of human development is $0.5 * [(100 - illit) + priemnr] + 0.5 * lifxnorm$, where *illit* is the adult illiteracy rate (%), *priemnr* is the gross primary enrollment ratio (%), and *lifaxnorm* is a normalized life expectancy measure, which we calculate as the percentage ratio of years of life expectancy to average life expectancy (over the whole 1970-2000 period) in industrial countries. Using cross-sectional data on 35 SSA countries, we regressed the average annual change in this index between 1970 and 2000 on the average logarithmic growth rate of real GDP per capita, controlling for the initial 1970 level of human development. The coefficient on growth is 0.1037, with a robust *t*-statistic of 2.14 (significant at the 5% level) and an implied beta coefficient of 0.41 ($R^2 = 0.35$).

⁷ Portions of this sub-section and the next draw from O'Connell (2004) and Fosu and O'Connell (2006).

We approached these questions by combining global evidence on the determinants of growth with country-based work on the microeconomic behavior of firms and households, the organization of markets, and the political economy of policy and institutions. In a two-stage approach, research teams first used cross-country regression models to place their country's growth in comparative perspective and identify its major proximate determinants over time. The bulk of the research then took place at the country level, where the task was to marshal evidence on why the determinants evolved as they did. Episodes that were poorly captured by the first stage motivated a search for country-specific mechanisms omitted from the cross-country models. The two stages of analysis disciplined and informed each other, producing unified and comparable accounts of individual-country experience.

With 26 country studies covering over 75 percent of regional population, the Growth Project is by far the most comprehensive country-based assessment of Africa's growth experience to date.⁸ Table 3 shows the country cases along with their GDP and population shares in Sub-Saharan Africa and the ratios of their GDPs per capita to the regional average (all in 1960). The sample intentionally over-weights countries with large populations, reflecting their greater importance for region-wide performance and implicitly shifting the unit of analysis from African nation-states to the experiences of African people. At the other extreme the sample includes Botswana and Mauritius, both

⁸ A number of country teams had access to excellent recent country studies from the *EAGER* project and/or the *Emerging Africa* project (Berthelemy and Soderling (2001, 2002)), both of which provide sustained treatments of country-level growth experience that are deeply informed by the cross-country literature.

tiny in terms of population; these countries loom large as examples of sustained growth success, not just within Africa but on a global basis. Collapsed states like the Democratic Republic of Congo and Somalia, where data limitations are severe, are under-represented to some degree, although as we will see, state breakdown represents a plausible characterization of over 10 percent of the country-years in our sample. The most important omission among our case studies is South Africa, a country representing nearly 8 percent of population and 30 percent of regional GDP in 1960. We are fortunately able to draw on a rich existing literature here, so that the South African case contributes materially throughout this volume.

Figure 2 depicts the episodal analysis the country teams were asked to adopt in organizing the central themes of their case study. Each country's growth experience was to be divided into a small set of episodes corresponding to major changes in the incentive structure facing private economic activity, particularly with respect to government interventions in markets. Within each episode, researchers focused on two questions. First, how did policies and shocks combine to produce the observed growth outcomes? Researchers developed microeconomic evidence linking policies and shocks to the resource allocation decisions of households and firms, and particularly to the scale and *ex ante* efficiency of investment in human and physical capital. Where growth appeared to be dominated by factors poorly proxied in cross-country growth regressions, these factors were identified and evidence brought to bear on their importance. Second, why were these policies chosen? Researchers developed evidence on the beliefs of the political elite, the interests to which they responded, and the institutions through which political competition was mediated.

***Table 3: Countries in the Growth Project.

***Figure 2: Episodal growth analysis.

1.3 *A taxonomic approach to synthesis*

The structure of this volume reflects a two-way taxonomy developed by the project editors in the course of reviewing draft versions of the country studies. To proxy for growth *opportunities*, we re-grouped the country studies—previously organized by sub-region—by aspects of location and resource endowment that have powerfully differentiated growth experience on a global basis. As discussed in detail in Chapter 2, the high-opportunity *coastal, resource-scarce* group includes countries like Tanzania or Senegal; the low-opportunity *landlocked, resource-scarce* group includes countries like Burkina Faso and Burundi; the *resource-rich* group includes economies like Botswana or Nigeria.⁹

After an intensive review of the draft country studies, the editorial team identified four broad anti-growth syndromes that emerged repeatedly in the country evidence. Three directly reflect the choices of incumbent state actors – in turn, control or *regulatory* regimes that severely distort productive activity and reward rent-seeking, regimes of *ethno-regional redistribution* that compromise efficiency in order to generate resource

⁹ In Chapter 2, Collier and O'Connell use time-varying criterion to identify resource-rich countries. Thus Nigeria (for example) becomes resource-rich in 1971 when its exploitation of oil resources passes a set of quantitative thresholds; for 1960-70, Nigeria is classified as coastal and resource-scarce. The resource-rich group in Table 3 is composed of countries classified by Collier and O'Connell as resource-rich for more than half of the 1960-2000 period.

transfers to sub-national political interests, and regimes of *intertemporal redistribution* that aggressively transfer resources from the future to the present. The fourth, *state breakdown*, refers to situations of civil war or intense political instability in which a government fails to provide security or to project a coherent influence in a substantial portion of the country. We asked country teams to corroborate our proposed classification of episodes and syndromes for their country, a process that led in some cases to substantial modifications. The editorial team then extended this judgmental classification to all other African countries, based on a consultation of the relevant literature. These syndromes do not exhaust the ways in which African governments have actively shaped the growth environment, and in a substantial portion of episodes, countries avoided all four syndromes, a category we call *syndrome-free*. Nor do the patterns revealed in our two-way taxonomy constitute a complete account of growth outcomes; this requires controlling for exogenous shocks and initial conditions, and for a wide range of detailed and often country-specific and opportunities and choices. But the analysis of opportunities, episodes, and syndromes constitutes the heart of our contribution to understanding African growth experience.

1.4 A guide to this volume

The four sections of this volume provide an overview of Africa's growth experience, an analysis of the anti-growth syndromes and their impacts, an explanation of observed policy patterns in terms of political and economic geography, and an application of the syndrome taxonomy to issues of contemporary growth strategy.

The chapters of Section 1 provide an integrated review of Africa's post-independence growth experience, adopting in turn an econometric, analytical, and descriptive perspective on the evidence. Our task in the present chapter is to provide the context for subsequent contributions, in the form of a self-contained review of the stylized facts and the growth econometrics literature. In Chapter 2, Collier and O'Connell develop the taxonomy of opportunities and choices and present a full classification of anti-growth syndromes for 46 countries of SSA between 1960 and 2000. They apply the taxonomy to cross-country growth differentials and show that Africa's growth opportunities – weighed down by physical remoteness and natural resource wealth – and its policy choices – undermined by narrow political interests and weak institutions – provide a powerful account of the region's overall growth shortfall. Coastal and resource-scarce economies, which prospered globally after 1980, did particularly poorly in SSA; their failure, Collier and O'Connell argue, worsened the growth environment for their landlocked neighbors. Anti-growth syndromes have a large impact on growth across all opportunity groups, and where syndrome-free status was sustained over time, moderate growth was also sustained. Rapid growth was virtually never sustained in the absence of syndrome-free status. Moreover, these impacts are robust to the possible endogeneity of policy. In Chapter 3, Augustin Fosu draws extensive illustrations of each of the syndromes from of the 26 country studies of the project. Fosu also initiates the analysis of adoption and abandonment of syndromes, themes taken up further in Sections 2 and 3. Among the key influences, Fosu highlights the importance of initial conditions (including group-identity rivalries, global development paradigms, the backgrounds of initial leaders, and the quality of initial institutions), natural-resource endowments, supply

shocks, domestic institutions (especially the military), and economically-driven political expediency.

The chapters of Section 2 provide sustained explorations of each of the four main anti-growth syndromes. In Chapter 4, Robert Bates assesses the economic tactics and domestic politics of African 'control' regimes, drawing on the country evidence to reassess his celebrated treatment of these regimes during their heyday (Bates 1981). In Chapter 5, Collier and Jan Willem Gunning explore the economic trajectory and political-economy logic of intertemporally unsustainable regimes. These include the public spending booms that have sometimes accompanied reversible commodity price shocks, but also the more acute phenomenon of 'looting' by narrow political elites. In Chapter 6, Azam reinterprets the use of redistributive policy instruments in the context of political polarization. When *ex ante* ethno-regional polarization is high, some form of redistribution may be a necessary component of nation-building. Accomplishing this credibly and efficiently constitutes a challenge of critical and continuing relevance for many African countries. In Chapter 7, Bates turns to violence and state failure, endogenizing the security of property and the quality of the investment environment as functions of the government's tax base, its discount rate, and its access to natural resource rents.

Jan Willem Gunning closes out Section 2 by studying the impact of risk on growth, a theme of relevance both in the presence of anti-growth syndromes and in the absence of policy-related risks. He shows that when farms and households must rely on risky assets as stores of value, their self-insurance against future consumption volatility may well involve reducing their overall accumulation of wealth. Microeconomic

evidence suggests that this negative effect of risk on growth can be large. The relevant risks may be exogenous, but policy-induced risks – such as inflation-induced risks to currency and bank liabilities, tax-rate risks to investment in export crops, or property risks associated with inadequate security – may also contribute to the persistence of poverty by undermining microeconomic incentives for capital accumulation.

Section 3 pushes further into the task of explanation. What historical, structural, and institutional features of African economies explain the adoption and abandonment of anti-growth syndromes? Ndulu begins in Chapter 9, by examining the role of outside influences in the evolution of development paradigms in SSA. In Chapter 10, Bates turns to the role of domestic political institutions, focusing particularly on how the nature of political succession affects the incidence and durability of pro-market economic reforms. In Chapter 11, Collier, Bates, Hoeffler and O'Connell develop a theory of political evolution under conditions of sub-national regional polarization. They use it to endogenize the policy choices of political elites as functions of the degree of ethno-regional polarization and economic structure. They show empirically that the incidence of anti-growth syndromes reflects the nature of the party system, the size and composition of the selectorate, and the level of knowledge possessed by political leaders.

Chapter 12 concludes the volume by putting the synthesis taxonomy to work. If growth depends on opportunities and choices (Chapter 2), then country-level growth strategies must be opportunity-specific. In terms of our own opportunity categories, resource-rich countries must spend public resources well; landlocked and resource-scarce countries must upgrade infrastructure and exploit regional markets; coastal and resource-scarce countries must focus on creating competitive platforms for serving global markets.

If there is a single central lesson from the growth project, however, it is that recognizing opportunities is only half the battle. The other half is building the political and economic institutions for seizing these opportunities on a sustainable basis. Chapter 12 takes a first cut at this two-fold analysis by exploring not only the nature of growth opportunities but also the political foundations for seizing them.

The remainder of the present chapter provides a foundation for what follows and a summary assessment of lessons learned. In Sections 2 and 3, we lay out the main stylized facts of African growth and interpret these observations from the viewpoint of the growth econometrics literature. Section 4 then previews the main conclusions of the synthesis, including the argument that avoiding anti-growth syndromes is both a necessary condition for sustained rapid growth and a sufficient condition for the avoidance of short-run collapses. In Section 5, we take a forward-looking stance, returning to the growth literature and the country evidence to explore the scope for opportunity-specific growth strategies in the period ahead.

2. Five features of African growth

We begin by setting out five key features of the African growth record.¹⁰

¹⁰ The global econometric literature relevant to understanding Africa's growth experience is immense. Recent Africa-focused surveys include Collier and Gunning (1999) and our own framework paper for the Growth Project (O'Connell and Ndulu 2001), which cover the literature through the late 1990s. Much has been added since then, and we provide a compressed update in Section 3 below. The cross-country literature on economic growth now has its own journal (the *Journal of Economic Growth*, since 1995), a Ph.D.-level text by Barro and Sala-i-Martin (1995), undergraduate-level texts by Jones (1998) and Van den

2.1 Divergence

The most widely noted feature of African growth after 1960 is the divergence of African incomes from incomes in other developing regions (Table 1).¹¹ Divergence is not solely an African phenomenon (consider Haiti, for example, or North Korea), and there are dramatic exceptions within the region, as we saw above. But the African growth “tragedy” – the term comes from Easterly and Levine (1997) and Artadi and Sala-i-Martin (2002) – is a staple of the cross-country growth literature, and one that easily matches its distant counterpart, the East Asian “miracle,” in its cumulative impact on thinking about economic growth.

Table 4 places the contemporary record in a longer-term perspective, using region-wide GDP and population estimates constructed by Angus Maddison (Maddison

Berg (2001), and forthcoming *Handbooks of Economic Growth* from both North-Holland and Elgar. As many have observed, most of the important ideas in the modern growth literature have precursors dating from the 1950s or earlier. The emergence in the late 1980s of global datasets with wide developing-country coverage provided key impetus for the contemporary literature, as did the successes of “new growth theorists” in formally breaking out of the neoclassical tradition of diminishing returns to capital and exogenous technological progress. Easterly (2001) provides a masterful introduction to the interaction between the modern growth literature and post-WWII development experience. Hayami (2001) provides a complementary account with deep roots in the development economics literature and the history of economic thought.

¹¹ In the cross-country growth literature, *convergence* refers to a situation in which cross-country differences in real income per capita shrink over time and *divergence* to the opposite phenomenon. See Barro and Sala-i-Martin (1995) for a thorough discussion and Pritchett (1997) for a demonstration of the long-run divergence between the now-rich and now-poor countries of the world.

2001). Data limitations are severe before 1960, and particularly so for SSA where the GDP aggregate is based on scaled-up estimates for Ghana and South Africa. With this caveat in mind we stress three observations. The first is that protracted slow growth, with divergence from similar or higher-income cohorts, is not an outlier by historical standards. The stagnation of African incomes between 1950 and 2001 matches that of the entire non-African periphery during the last great phase of globalization, between 1870 and 1913. Second, however, if we focus on the period since the Industrial Revolution, Africa's divergence appears to be concentrated after 1950. Having weathered the disintegration of the world economy between 1913 and 1950, perhaps even with modestly greater success than the non-African periphery, African populations missed out on the unprecedented economic transformation that took place in the rest of the developing world after 1950. The comparison with Asia, which looms large here by virtue of its large population, is striking: per-capita growth in Asia advanced by almost 4 percentage points relative to SSA, between the 1913-1950 and 1950-2001 periods.

***Table 4: Long-run growth rates of regional population, GDP, and GDP per capita.

Third, comparing Tables 1 and 4, the data suggest a sharper divergence between African and non-African *populations* than between African and non-African *countries*. We saw a hint of this in Figure 1, where the collective population (in 1990) of the five Sub-Saharan countries that exceeded the global median growth rate over the full period was fewer than 5 million people. This is in sharp contrast with global experience since 1960, which tends to display divergence across countries but convergence across people.

As emphasized by Sala-i-Martin (2006), divergence across countries is largely driven by slow growth within the numerous African sub-sample, while divergence across people is driven by the strong growth performance of populous non-African countries like China, India, and Indonesia. Figure 3 follows Collier and O'Connell (Chapter 2) in comparing unweighted and population-weighted regional time series for African and non-African developing countries. Large population has been positively correlated with growth among non-African developing countries, particularly after 1980. This effect is largely absent in SSA, however, where the population-weighted data suggest, if anything, lagging performance by the larger countries. Within SSA, not a single country among the 13 with populations exceeding 10 million in 1990 grew faster than 2 percent over the 1960-2000 period.

***Figure 3: Smoothed average growth in real GDP per capita.

As a final dimension of divergence, we focus on the time pattern of Africa's growth shortfall. Africa's unweighted average growth rate shows a decidedly U-shaped pattern in Figure 3: highest in the 1960s, then falling steadily through the early 1990s before rebounding strongly for most of the decade. The shortfall relative to other regions shows a muted version of this U-shaped pattern, complicated by a transitory narrowing during the early to mid-1980s as commercial borrowers in other regions weathered the international debt crisis. But the population-weighted comparison again suggests a dramatic U shape: Africa's relative performance deteriorates sharply in the 1970s, before beginning a fitful recovery that gathers final steam only after 1994. Both in absolute

terms and by comparison with other regions, therefore, Africa's shortfall is sharpest during the 20-year period from roughly 1974 to 1994.

2.2 Slow accumulation and productivity growth

Early development theorists viewed low national investment as the essential constraint on development (e.g., Lewis 1954). To what degree can Africa's growth performance be traced to a shortfall of capital accumulation? Table 5 employs an economy-wide growth-accounting framework to decompose the growth in real GDP per worker into the contributions of physical and human capital accumulation per worker and a productivity growth residual. The sample is considerably smaller than in previous tables and figures, mainly reflecting the limited availability of survey data on education per worker. The underlying production function is Cobb-Douglas in physical capital and effective labor, where the latter is measured as human capital per worker multiplied by the population of working age.¹² Exploiting the assumption of constant returns to scale, we can divide output and physical capital by effective labor and obtain the per-worker production function¹³

¹² Human capital per worker is calculated by applying a fixed percentage wage premium of 7 percent to each additional year of schooling, as described in Collins and Bosworth (1996). As described in the next footnote, we have recalculated the Collins/Bosworth growth accounts using PPP-adjusted data, but without changing the contribution of human capital accumulation. We thank Susan Collins for access to an updated version of the Collins and Bosworth (1996) dataset.

¹³ Collins and Bosworth (1996) perform the same calculation using GDP and capital stock series measured in constant local currency. They assume a Cobb-Douglas production function with effective labor input given by hL , where h is a measure of education per worker and L is the labor force. Capital's share is .35.

$$ypw_{it} = A_{it} \cdot kpw_{it}^{\alpha} hpw_{it}^{1-\alpha}, \quad (1)$$

where ypw_{it} , kpw_{it} and hpw_{it} are real GDP per worker, physical capital per worker, and human capital per worker in country i in year t . Capital stocks are measured at the beginning of period t , and A_{it} is the level of total factor productivity (TFP). Following Collins and Bosworth (1996), we set the share of physical capital in national income to $\alpha = 0.35$. Using the difference in logs as an approximation to the growth rate, we can then obtain the implied growth of TFP over any k -year period from the exact decomposition

$$\Delta_k \ln ypw_{it} = 0.35 \Delta_k \ln kpw_{it} + 0.65 \Delta_k \ln hpw_{it} + \Delta_k \log A_{it}, \quad (2)$$

where Δ_k denotes a k -period average difference ($\Delta_k x_t \equiv k^{-1}(x_t - x_{t-k})$ for any variable x_t). The second and third terms on the right-hand side of (2) give the contributions of

The capital stock is estimated from starting values in 1960 using the perpetual inventory method with a depreciation rate of 5 percent. To apply the decomposition to PPP-adjusted real GDP series, we first converted the initial capital stock to PPP dollars by assuming the same ratio between PPP-adjusted and constant-local-currency initial capital stocks as between PPP-adjusted and constant-local currency investment rates (this is required to reflect the very different relative price of investment in PPP-adjusted data versus national accounts: investment tends to be much more expensive at international than domestic prices in low-income countries.). We then recalculated the capital stock series using investment at constant international prices.

physical and human capital accumulation per worker to the growth of real GDP per capita; on the right-hand side, *ex post* TFP growth is calculated as a residual.

Table 5 shows regional averages of country-by-country calculations using equation (2), for the full period 1960-2000. In the bottom row we compare the 18 countries in SSA for which data are available with 41 other developing countries. Measured capital accumulation accounts for about half of the long-run differential in growth rates of real GDP per worker; the other half, by definition, reflects the stagnation of African productivity. The striking fact is that on a country-by-country basis between 1960 and 2000, cumulative productivity growth in SSA was as likely to be negative as positive.¹⁴

***Table 5: Regional growth accounting decompositions.

Above we noted the U-shaped time pattern of Africa's average growth shortfall. This pattern reappears in the growth accounting subsample. As indicated by the heavy lines in Figure 4, the bulk of Africa's shortfall occurs between the mid-1970s and the mid-1990s. The early portion of this pattern is associated with a steady decline in physical capital accumulation per worker, both in absolute terms and relative to other developing regions. Africa's recovery in the second half of the 1990s, by contrast, is

¹⁴ Using a similar methodology, Hall and Jones (1999) estimated the *level* of total factor productivity in the late 1980s, for a global sample of countries. They showed that the differences in PPP-adjusted incomes in Table 2 are mainly driven by differences in the apparent productivity of measured inputs, rather than by differences in their availability per worker.

entirely accounted for by rapid increases in the productivity residual, an observation emphasized by Berthelemy and Soderling (2001).

***Figure 4: Regional growth accounting over time.

As indicated in Figure 5, the empirical link between physical capital accumulation and growth was weaker in SSA than it was in other developing regions between 1960 and 2000.¹⁵ This suggests a low *ex ante* yield on investment in SSA, a phenomenon widely observed in the growth literature and consistent with evidence of substantial capital flight from the region (Collier, Hoeffler and Pattillo 2004). The dominant interpretation stresses failures in governance, citing the predominance of inefficient public sector investment (Artadi and Sala-i-Martin 2003), the prevalence of tax avoidance and self-insurance by firms and households (Collier and Pattillo 2000), and the diversion of resources into rent-seeking and corruption (Vishny and Shleifer 1993). Our country studies provide powerful evidence for these channels, and in subsequent chapters the editors explore their roots in political conflict. A more speculative but potentially complementary view appeals to increasing returns and threshold effects, arguing that investment yields would have been sharply higher if investment rates had been well above historical averages (Sachs *et al*, 2004). We return to this possibility in Section 5.

¹⁵ In Figure 1.5, the estimated slope coefficient on physical capital's contribution to growth in real GDP per worker is 45 percent higher for non-SSA countries than in the SSA sample. The difference in slopes is highly statistically significant (an *F*-test for equality of coefficients yields $p = 0.03$).

***Figure 5: Capital accumulation and growth.

2.3 Limited structural transformation

African economies were overwhelmingly rural in 1960, with agriculture accounting for some 40 percent of GDP and 85 percent of the labor force. While the rural share of the population fell steadily over the next 40 years, in 2000 it was still, at 63 percent, slightly above the 1960 average for non-SSA developing countries. In the context of very rapid population growth, this modest shift meant that rural population density increased substantially, reversing Africa's initial advantage in arable land per capita relative to other developing regions. It also meant that urban populations, given their small initial size, grew spectacularly.

A contraction of the agricultural share of the labor force is one of the most durable features of the structural transformation that takes place in the course of development. In a closed-economy context, this transfer can be sustained only if labor productivity in agriculture increases rapidly enough to feed a growing urban population. In an open economy food can be imported, but agricultural productivity remains a key determinant of overall living standards and an essential source of foreign exchange for imported capital goods. Consistent with Africa's slow overall growth, there is little evidence that the modest observed shift out of agriculture was driven by advances in rural labor productivity. Agricultural value added per worker rose at a trend rate of one half of one percent per year in SSA, less than a third of the prevailing rate within other developing regions. Cereal yields did only slightly better, rising at 0.74 percent per year as compared with 2.4 percent outside of SSA. Relative food prices show little evidence of

a systemic food crisis, but the answer may lie in rising food imports: the ratio of net imports of food to GDP rose by 1.4 percentage points a decade in SSA, 8 times faster than outside of SSA.

The massive growth rate of urban populations in Africa – exceeding 6 percent per annum through about 1980 – was initially associated with a marked increase in the shares of industry and especially services (including the public sector) in GDP. This process came to a halt during the 1980s, however, and was partly reversed during the 1990s as the GDP share of agriculture actually rose, at the expense of the industrial share (the share of services remaining constant).

Export diversification is a second area in which the structural transformation of African economies has been limited (Gersovitz and Paxson 1990, Berthelemy and Soderling 2001, 2002). Exports have tended to remain concentrated in a narrow band of primary commodities, and in many cases have become more concentrated over time via the exploitation of mineral resources. In Chapter 2, Collier and O'Connell use global data on primary commodity exports and rents from energy, mineral and forest resources to identify resource-rich economies. Comparing SSA with other developing regions outside of the Middle East and North Africa, they find that a stark difference already existed in 1960, with 12.5 percent of the SSA sample classified as resource-rich and only 7 percent of the non-SSA sample. Over time, however, this difference expanded: another 16.7 percent of the African sample acquired resource-rich status by 2000, compared to only 10.5 percent of the non-African sample. While this suggests a hardening of the continent's existing primary commodity specialization, Collier and O'Connell also find in Chapter 2 that among coastal and resource-scarce countries, significant export

diversification has taken place among countries that have maintained trade-promoting policy reforms undertaken by the early 1990s.

2.4 Lingering volatility

Table 6 examines the intertemporal variation of growth rates within countries, both on a year-to-year basis and over longer periods. Annual growth in SSA has been highly volatile, and this is true both of growth itself and of the unpredictable component of growth, proxied here by the prediction error from a country-by-country AR(2) process. Five-year averages smooth out this volatility considerably—consistent with the presence of transitory shocks to growth (including classical measurement error)—but medium-term volatility remains distinctly higher in SSA than elsewhere.

***Table 6: Regional comparisons of volatility.

Since volatility tends to decrease with income on a global basis, we check at the bottom of the table whether African volatility remains high after conditioning on the region's low income. The answer is yes for the annual data: the standard deviation is roughly 2 percentage points higher for African countries than would be predicted on the basis of income alone. But the volatility of African growth looks less distinctive when we move to 5-year periods: the SSA effect becomes small and statistically insignificant. Africa's medium-term volatility is therefore not unusual once we control for low income. What is unusual, as we emphasized above, is the persistence of low income and the

concomitant lack of structural diversification, during a period of global growth. These have implied a continued exposure to substantial medium-term volatility.

Period-to-period correlations between 5- and 10-year non-overlapping averages provide a further indication of the episodal character of African growth: correlations are virtually zero across 5-year periods but rise to 0.30 across decades, consistent with protracted but ultimately temporary periods of boom and bust.

2.5 Diversity

As a final broad feature of growth experience in Africa we return to the cross-country diversity noted in Figure 1. The variation in long-run growth within SSA dwarfs the difference between average growth in SSA and average growth in any other region. This is true not just for overall growth outcomes, but also for each of the growth-accounting components that appear in Table 5 (recall Figure 4 in which we showed the half-decadal contributions of physical capital, human capital and productivity growth, with standard-deviation bounds to indicate the wide range of outcomes in SSA.). These observations underscore the perils of regional generalization as well as the urgency of understanding the sources of differential growth success within Africa.

3. The view from growth econometrics

What are the *determinants* of the growth record we have just outlined? Cross-country regressions provide a natural approach to this question, and in the Growth Project we used the growth econometrics literature to structure the country studies and to develop

our synthesis of the case material. The literature identifies *resource endowments* and *governance* as the critical determinants of growth performance in SSA.. Some of the most fundamental issues of growth strategy lie at the intersection of these two areas, a premise that underscores the significance of case-study analysis and motivates our taxonomy by opportunities and choices. We begin, however, with a brief digression on the interpretation of regression evidence and its use in country analysis.

3.1 Regression models of growth

Like growth accounting, the typical growth equation starts from an aggregate production function. In the augmented Solow model of Mankiw, Romer and Weil (1992), for example, the aggregate production function takes the form $Y_{it} = K_{it}^{\alpha} H_{it}^{\beta} (A_{it} \cdot L_{it})^{1-\alpha-\beta}$, where K , H and L are aggregate physical capital, human capital, and raw labor, α and β are the shares of physical and human capital in national income, and A is the level of productivity (assumed to be embodied in raw labor; the implied measure of total factor productivity is $A^{1-\alpha-\beta}$). With $\alpha + \beta < 1$, the production function is subject to decreasing returns to scale in physical and human capital per effective worker, implying that output per effective worker, $\tilde{y} \equiv Y / AL$, approaches a unique steady-state value. Convergence is monotonic, at a speed that is proportional to the distance from the steady state. The average growth of output per *actual* worker, $y = Y / L$, over any k -year period is therefore given by

$$\Delta_k \ln y_{it} = -\gamma \ln y_{i,t-k} + \gamma \ln \tilde{y}_i^* + \Delta_k \ln A_{it} - \gamma \ln A_{i,t-k}. \quad (3)$$

where Δ_k is defined as above (see equation 2) and $\gamma > 0$ is the speed of convergence to the steady-state path.¹⁶

Equation (3) is the basis for regression models of the form

$$\Delta_k \ln y_{it} = -\gamma \ln y_{i,t-k} + \phi'x_{it} + \lambda'z_i + \varepsilon_{it}. \quad (4)$$

where ε_{it} is a country/period disturbance. The presence of initial income is a hallmark of the neoclassical or “conditional convergence” paradigm, in which diminishing returns to all forms of reproducible capital (including human) ultimately limit the contribution of capital accumulation to growth. In this paradigm, countries that are poorer *relative to their country-specific steady states* grow faster. The vectors x_{it} and z_i enter the equation as time-varying and time-invariant determinants of the three other variables in equation (3): steady-state income per effective worker, the rate of productivity growth, and the initial level of productivity.

Applications of the conditional convergence paradigm range from the parsimonious augmented Solow model, in which productivity is exogenous and steady-state output y^* is a function of a few behavioral parameters,¹⁷ to the looser tradition

¹⁶ *Conditional* convergence refers to convergence towards a country-specific steady-state. It is to be distinguished from *absolute* convergence, which refers to a tendency for poor countries to grow faster than rich ones (as if all countries were converging to the same steady-state path). See Barro and Sala-i-Martin (1995). Our earlier discussion of divergence refers to absolute convergence.

¹⁷ See Hoeffler (2001) for an application to Africa. The key behavioral parameters are the national investment rate and the population growth rate.

initiated by Barro (1991), in which the x and z variables include a wide array of theoretically plausible determinants of either factor accumulation or productivity (e.g., policy variables, institutional quality, political instability, geographical location). A version of equation (4) can also be derived directly from the production function, by differentiating it to obtain an equation like (2) and then modeling factor accumulation and productivity growth as functions of other variables (Temple 1999). In such cases conditional convergence is not necessarily implied, and initial income is therefore excluded; the x and z variables operate directly on long-run growth rates, via either factor accumulation or productivity growth. Applications within the endogenous growth tradition typically take this form.¹⁸

3.2 Interpreting regression evidence

Cross-country regressions rely on two types of pooling to extract information on the growth process. The first is implied by the level of analysis: any study of country-wide growth outcomes ends up aggregating the information, constraints, and choices of diverse agents interacting in complex ways over time. The second is more explicit and takes place across countries: in the absence of controlled experiments, each country's experience is used as a counterfactual for the experience of other countries.

If observations for different countries and time periods are governed by the same joint distribution of variables, regression models estimated using ordinary least squares provide a good approximation to the expected value of growth conditional on observed

¹⁸ In models with constant or increasing returns to reproducible capital per worker (e.g., Lucas 1988), conditional convergence is not implied.

determinants (Wooldridge 2003). As such, these models (i) have very strong descriptive content; (ii) provide a reliable basis for conditional predictions within any sample drawn from the joint distribution that produce the data at hand; and (iii), very importantly for our purposes, can exert a powerful discipline on any causal account of growth.¹⁹ In our framework paper for the Growth Project, we used least-squares “conditional models” to help country authors place their country’s experience in global perspective and to identify leading themes to be explored at the disaggregated levels of sectors, markets, and agents. We provide an updated version of this analysis in Section 3.4.2 below.

Economists remain sharply divided, however, over whether growth regressions can be given a causal interpretation (Temple 1999, JEP symposium). At issue here is the nature of the regression counterfactual. If the determinants of growth were assigned to countries on an experimental basis, OLS regressions would pick up the *ceteris paribus* impact on growth of each determinant, given a sufficiently large set of observations. But history is not a controlled experiment. The typical growth regression is therefore likely to be subject to some degree of endogeneity bias, whether from true simultaneity – investment determines growth, but growth also determines investment – or from the omission of key determinants that are correlated with the included variables. OLS regressions retain their status as conditional expectations in the face of these realities, but something is unavoidably lost: if the determinants of growth are not statistically predetermined, then each country’s experience no longer represents a clear counterfactual

¹⁹ Any causal account implies a particular joint distribution of growth and its determinants, and therefore a particular form for the conditional expectation of growth. OLS regressions are therefore capable of ruling out certain causal claims about growth, even if the determinants are not econometrically predetermined.

– an indication of well-defined opportunities seized or missed – against which to assess the experience of other countries in the sample.²⁰

Growth regressions can be pushed beyond description and conditional prediction by isolating predetermined variation in the determinants of growth. There are a variety of ways of doing this, each with some cost in terms of description and prediction, and in Box 1 we briefly review the main approaches. The bottom line, however, is that no single econometric approach can do justice to the growth evidence. In our framework paper (O'Connell and Ndulu 2001), therefore, we used the full set of approaches – conditional models, reduced-form models, fixed-effects estimation, and instrumental variables – to identify the key determinants of African growth on a country-by-country basis. We follow the same approach below in summarizing the literature, generally relying on the reader to consult the methodologies adopted in the original papers.

***Box: The Endogeneity Problem in Growth Econometrics

Two observations will become clearer as we proceed. First, the cross-country literature provides an indispensable resource for country-level growth analysis. Country studies face a massive degrees-of-freedom problem: with only 4 decadal (8 half-decadal) observations on long-run growth, there is too little information to run an empirical horse

²⁰ Observing a large and positive coefficient on the investment rate, for example, one can always say that Sierra Leone's predicted growth rate would have been 3 percentage points higher if Sierra Leone's investment rate had equaled Singapore's. It does not follow that low investment determined low growth in Sierra Leone, or that a policy package that raised Sierra Leone's investment rate to that of Singapore could be expected to close the growth gap between the two countries.

race among alternative hypotheses about what drove observed growth outcomes. By identifying systematic features of the growth process and documenting their relative importance on a global basis, growth regressions can direct country-level work into its most productive areas (Collier and Gunning 1999).²¹ Second, however, detailed country research remains indispensable. The scope for regression-based counterfactual analysis is narrower than is often acknowledged, and even the best growth regression falls short, by construction, of addressing a set of research questions that are of central importance at the country level (O'Connell 2004):

- With respect to opportunities and constraints: what evidence is available to corroborate the importance of particular growth determinants in particular countries, and to identify the channels through which these variables operated?
- Why did the growth determinants evolve as they did, particularly when subject to policy choice?
- What features of country experience might account for why growth was more rapid, or less rapid, than predicted?

Cross-country econometrics and case analysis therefore have powerfully complementary roles to play in the analysis of growth.

²¹ Cross-country regressions also face a degrees-of-freedom problem, given the large number of potential determinants and the non-experimental, one-time nature of the data. For systematic approaches to identifying “robust” determinants, see Levine and Renelt (1993) and Sala-i-Martin, Doppelhofer and Miller (2004).

3.3 *A shifting platform: geography and human resources*

The growth econometrics literature took off in the late 1980s as large sets of comparable cross-country data became available from the World Bank and the UN's Income Comparison project. Early contributions (e.g., Barro 1991) noted that a dummy variable for SSA typically accounted for between 1 and 2 percentage points of growth, suggesting that a substantial portion of Africa's overall shortfall was unaccounted for by included determinants. An Africa-focused sub-literature has subsequently labored to uncover the forces proxied by the Africa dummy variable, largely by introducing novel growth determinants that matter for growth on a global basis and that tend to cluster, within SSA, in the upper or lower portions of the global distribution.²² A number of cross-country studies have focused explicitly on explaining within-Africa growth differentials, either by restricting attention to Africa-only samples or by allowing parameters to vary across regional sub-samples; notable among these are include Ghura and Hadjimichael (2002) on sources of African growth, Block (2001) on differences between African and non-African growth dynamics, Fosu (1992, 2002) on political instability, and Berthelemy and Soderling (2001) on episodes of rapid growth.

The current state of the literature can be summarized under the headings of resource endowments and governance. We begin with resource endowments, first considering demographics and human development, two areas not strongly emphasized in

²² This is not the only strategy; Hoeffler (2002) finds that the Africa dummy disappears when the Arellano-Bond GMM technique is applied to instrument for investment and initial income in the augmented Solow model.

the individual country studies, and then turning to geography, which constitutes one of the two dimensions of our synthesis.

3.3.1 *Demography*

Both theory and evidence suggest that a population explosion is responsible for some portion of Africa's economic divergence after 1960. In Figure 6, African fertility rates, age dependency ratios, and population growth rates were similar to those of other regions in the 1960s. The demographic picture diverged sharply over the next 40 years, however, as public health improvements reduced infant mortality rates and raised life expectancies throughout the developing world. Outside Africa fertility rates fell rapidly enough that population growth declined. Within Africa fertility behavior barely changed, and as a result population growth accelerated. Starting in the early 1970s (and through the remainder of the century), African populations grew more rapidly than non-African populations had *ever* grown on a sustained basis.

***Figure 6: Demographic pressures, developing regions.

Growth theory stresses two channels of the adverse impact of population growth on real incomes. The first arises from diminishing returns, as land and physical capital are spread over more workers. This effect this can be counteracted by higher investment rates per worker or faster increases in total factor productivity, but as we have seen, there was no systematic tendency for either of these to occur. The second arises from the impact of increased population growth on the ratio of dependents to working-age population. In

Figure 6, Africa's dependency ratio rises steadily, exceeding historical developing-country norms by 1970 and remaining above these through the remainder of the century. Rising dependency ratios have a mechanical impact on growth, by diluting the contribution of any given real GDP growth per worker to real GDP growth per capita: Table 1 indicates that this effect alone is worth nearly 4/10 of a percent of per-capita growth per year over the full 1960-2000 period, comparing SSA with other developing regions.²³ Bloom and Sachs (1998) emphasize additional adverse impacts operating through the discouraging effect of high dependency ratios on national saving and the quality of human capital formation.

The fertility rate began to decline in Africa in the mid-1980s, suggesting entry into the final phase of the demographic transition, during which family sizes begin to shrink as parents invest more intensively in a smaller number of children. Maddison's data place the turning point for regional population growth at 1983 (Table 4). As stressed by Artadi and Sala-i-Martin (2003) and Lucas (2003), any acceleration in this development will bode well for Africa's future growth.

3.3.2 Human development

In global growth regressions, the initial health and – less robustly – education status of the population are often strong predictors of subsequent growth. In Table 1 we showed that over the entire 1960-2000 period, the gap between African life expectancies and literacy rates and those in other developing regions did not widen as rapidly as did the

²³ Bloom and Williamson (1998) emphasize the “demographic dividend” that accrued to East Asian countries over this period as a result of a falling ratio of dependents to workers.

gap in incomes. Figure 7 provides an alternative perspective on the same phenomenon.

We plot the estimated coefficients $\hat{\gamma}_t, \hat{\gamma}_{t+1}, \dots, \hat{\gamma}_{2000}$, along with their 2-standard-deviation bounds, from OLS regressions of the form

$$d_{it} = \alpha + \beta \ln y_{it} + \sum_{j=t}^{2000} \gamma_j (SSA_i \cdot year_t),$$

where d is the life expectancy rate at birth, or the adult illiteracy rate, for country i in year t , and y (as before) is PPP-adjusted real income per capita. The estimated coefficients provide a measure of year-by-year gaps in average human development between countries in SSA and other developing regions, controlling for the gap readily attributable to differences in real GDP per capita. At the time of political independence for much of SSA, life expectancy rates were 15 years below those of countries with similar incomes globally, and adult illiteracy rates were 25 percentage points higher. By the early 1990s, African illiteracy rates were statistically indistinguishable from those of similar-income countries. Life expectancy rates had also converged steadily to global income-adjusted norms for much of the period, but in contrast with literacy rates they show a marked slowdown starting in the mid-1980s and a striking reversal with the onset of HIV/AIDS in the 1990s.

***Figure 7: Life expectancy and adult illiteracy: SSA/year interactions.

While Figure 7 documents a reasonably rapid convergence of African human development measures to income-adjusted global norms, the adjustment for income, is

crucial. We have already seen that on average, African incomes stagnated over the period, diverging sharply from incomes in other regions. Figure 7 simply confirms that human development measures did better: they continued to advance at a slow pace, in the face of very limited improvements in overall living standards.²⁴

The growth impact of education has been the subject of a celebrated conundrum in growth econometrics. Microeconomic evidence suggests that the private returns to education are substantial, and growth theory routinely imputes a social return to human capital investment that is at least as great as the private return. But growth researchers have had an extraordinarily difficult time finding statistically significant and economically plausible impacts of educational variables in global growth regressions (Pritchett 2001). In our own framework paper (O'Connell and Ndulu 2001), measures of educational attainment and enrollment performed very poorly in conditional OLS regressions incorporating demographic measures and life expectancy rates, and their limited availability dramatically reduced the size of the African sub-sample.

Recent research has begun to reconcile the microeconomic and growth evidence via better measurement of educational attainment and greater care in the treatment of collinearity and endogeneity. Using an improved dataset on educational attainment, Cohen and Soto (2001) and Soto (2002) uncover statistically significant impacts of human capital investment on growth that are in the range of 7 to 10 percent.²⁵ Others

²⁴ Easterly (2004) argues that in global samples, human development indicators display a broad tendency to improve that is not tightly tied to differences in national growth performance.

²⁵ There is some evidence that human capital accumulation induces accumulation of additional physical capital. Taking this indirect effect into account, these authors estimate the total long-run impact of an additional average year of education on income per capita at between 12 and 16 percent.

have found significant impacts once thresholds are passed; Barro (1999), for example, finds that school attainment at the secondary and higher levels for males aged 25 and over has a positive effect on the subsequent rate of economic growth. The estimated impact for this category is such that an additional year of schooling raises the growth rate impact by 0.7% per year, a very large effect indeed for slow growers. This impact is mediated predominantly via improved capabilities to absorb technological advances.

Barro's results are consistent with those of Borensztein, De Gregorio, and Lee (1998), who find that the productivity advantages latent in foreign direct investment (FDI) are subject to human-capital threshold effects. These authors find that the growth contribution of FDI exceeds that of domestic investment only when the host country's average secondary-school attainment exceeds 0.52 years (for the male population of working age). This level is far above that of the majority of African countries. Consistent with these results, the vast bulk of FDI into Africa flows into the mineral and energy sectors. Within Africa, Lumbila (2005) finds a similar threshold effect using secondary enrollment rather than attainment rates: returns to FDI are significantly higher in countries with secondary enrollment rates exceeding 25 percent.

3.3.3 Geography

Cross-country evidence has played a central role in the revival of geographically-based explanations of African growth. The dominant strands in this literature focus on the disadvantages of location in the ecological tropics, the physical isolation of African populations, and the costs of resource-based comparative advantage. A final line of

argument, overlapping with the others but raising a separate set of issues, emphasizes vulnerability to external shocks.

Location

Bloom and Sachs (1998) and Masters and McMillan (2001) show that in global samples, malaria prevalence and location in the ecological tropics are associated with systematically slower growth. While a high disease burden (to humans, animals, or both) would be expected to undermine productivity in agriculture and the quality of labor input more generally, these are *level* effects on real income; the channels through which a hostile natural environment affects the rate of factor accumulation or the growth rate of productivity are less obvious. In the case of human capital, factor accumulation effects may come from the impact of poor health on the returns to education. Evidence from northern Kenya, for example, suggests that treatment for intestinal worms has a major impact on school attendance (Miguel and Kremer 2004). A second, indirect impact on both human and physical capital accumulation per worker may come via population growth, if high levels of fertility reflect a demand for surviving children as old-age security.²⁶ The regression evidence implicates productivity growth as a key channel as well, since these regressions typically hold national saving or investment rates (and sometimes measures of human capital accumulation) constant.

²⁶ As proxied by life expectancies, health standards have generally been rising over most of the period. This mechanism can only explain the persistence of high fertility behavior if anticipated morbidity lags actual morbidity.

Isolation

The original geography of economic growth comes from Adam Smith, who in his *Wealth of Nations* placed the extent of the market at the heart of both accumulation and productivity growth. African populations are in fact unusually isolated, both from each other and from global populations. Frankel and Romer (1999) use a gravity model to calculate the distance of countries from potentially important trading partners, and then use this distance variable as an instrument for actual international trade.²⁷ They find that distance strongly undermines growth, via its impact on international trade. Africa is by far the most remote continent by this measure, and as we confirmed in our framework paper, trade is an even stronger predictor of growth for African countries than it is for non-African countries (O'Connell and Ndulu 2001). Bloom and Sachs (1998), Gallup, Sachs and Mellinger (1999), and Limão and Venables (2002) examine economic isolation more broadly and show that political landlockedness, remoteness of populations from ports or ocean-navigable rivers, large over-land transport distances, and poor transport infrastructure all reduce growth in global samples. African populations face unusually high costs in each of these areas.

Endowments

The *natural resource curse* refers to a broad empirical consensus – illustrated by the travails of many oil-exporting countries, including Nigeria, starting in the 1970s – that

²⁷ See the discussion in section 3. The idea here is that distance is more plausibly predetermined with respect to economic growth than trade is, so that variation in distance induces quasi-experimental variation in trade, and allows them to isolate the causal component of the observed positive correlation between trade and growth.

natural-resource exporters grow more slowly, other things equal, than exporters of manufactures and services (Sachs and Warner, 1997, 2001). While the inability of African countries to break out of narrow commodity specialization has been widely noted (Gersovitz and Paxson 1990), the sources of this pattern remain contentious. Wood and Berge (1997) appeal to geography, arguing that Africa's low ratio of skilled labor to natural resources generates a deep comparative advantage in primary exports. Collier (1997) focuses on governance, arguing that natural resource exports dominate because they are unusually robust to institutional failures in the public sector. In Chapter 2, Collier and O'Connell document a divergence in African trade patterns starting in the 1990s: the emergence of new oil exporters has sharpened the primary commodity specialization of the continent, but among coastal and resource-scarce countries, those that have maintained strong policy environments have experienced significant diversification into manufacturing and services.

The literature identifies two main channels through which natural resource wealth may undermine long-run growth. Both involve failures of governance, a topic we treat more directly in the next section. The first is through a market failure associated with other sectors that produce traded goods. If agriculture, manufacturing or traded services (e.g., tourism) generate learning-by-doing effects or other positive externalities, then the tendency for these sectors to shrink as natural resource exports are exploited undermines aggregate growth (Rajan and Subramanian 2005). This is the *Dutch disease*; it implies a policy error because an optimal subsidy to traded goods can internalize the externality and convert commodity wealth into a source of net gains (Adam and O'Connell 2004).

Other channels for the natural resource curse implicate governance even more directly, by characterizing resource rents as a source of institutional failure in the public sector. An important strand of this literature focuses on short-run commodity booms rather than long-run resource endowments, and here the cross-country evidence is, at first glance, puzzling: terms of trade improvements play a notoriously modest role in explaining growth cross-country regressions. But this is consistent with an extensive case-study literature that emphasizes the diversity of country-level policy responses.²⁸ Nigeria and Indonesia, for example, received similar oil windfalls in the 1970s but undertook dramatically different policy responses and experienced divergent growth outcomes (Bevan *et al.* 1999). The management of natural resource rents features critically in many of the country studies of the Growth Project, particularly within the “resource-rich” category where these rents were typically the dominant source of government revenues. Chapters 6, 7 and 8 draw on the case study evidence to explore the impact of these rents on fiscal sustainability, violence, and political accountability.

Vulnerability

A final line of argument, included here with some violence to the ‘geography’ category, emphasizes the vulnerability of non-diversified economies to external shocks (Guillaumont, Guillaumont-Jeanneney and Brun 1999). Cross-country evidence confirms that countries with more volatile growth rates – recall Table 6 – grow more slowly on average (Ramey and Ramey 1995; Gunning, Chapter 8). While a substantial portion of

²⁸ It should also be recalled that terms of trade shocks are first-order shocks to national income, not to GDP. Impacts on growth would occur via factor accumulation or productivity growth.

observed volatility is driven by economic policy (Gavin and Hausmann 1995), external shocks contribute both directly and via the policy responses they provoke. In Table 7 we show cross-country regressions of growth volatility on the standard deviations of rainfall shocks (weighted by the share of agriculture in total employment), terms of trade shocks (weighted by the share of exports in GDP), and partner-country growth rates (weighted by bilateral trade shares). Each of these variables provides some leverage over cross-country differences in volatility. Low-income economies face larger income risks in these arenas, as suggested by the declining size and significance of the lagged income variable when these regressors are incorporated.

We noted earlier that growth rates in African countries are unusually volatile on an inter-annual basis, even after controlling for income. This effect appears to be mediated by our measures of externally-induced volatility, because an SSA dummy variable falls considerably in size and loses significance when these variables are included (compare regressions 2 and 4). In separate regressions (not shown) we find that Africa's exposures to rainfall volatility and partner growth volatility are not in fact unusually high given the region's low income. The exposure of African countries to terms of trade volatility, by contrast, is over 50 percent higher than that of other developing countries after controlling for income. The estimated difference exposure is statistically significant and is consistent with the region's unusually strong dependence on a few primary exports.

***Table 7 External shocks and the volatility of growth.

With rudimentary domestic financial markets and procyclical (if any) access to foreign capital markets, credit markets provide very limited scope for the management of shocks to income in SSA. At the macroeconomic level, international reserves provide scope for offsetting temporary shocks to net foreign exchange receipts, but until the 1990s few countries outside of Botswana maintained prudent levels of reserves. Foreign aid is in principle a natural source of countercyclical finance, and the level of aid is large in SSA²⁹, but the evidence suggests that aid has been a net source of volatility in foreign exchange receipts, not of insurance (Bulir and Hamman 2003).

With risks to income persisting at the microeconomic level, households and firms are likely to turn to self-insurance mechanisms in an effort to reduce their *ex ante* exposure to shocks. Such mechanisms may operate in such disparate domains as fertility behavior, the choice of crops or seed varieties, the speed of adoption of new technologies, the scale of commercial enterprises, and the size of business inventories. The hallmark of self-insurance is to sacrifice expected yield for greater safety, thereby reducing the average yield on investments in physical and human capital. An increase in income uncertainty may therefore reduce the expected growth rate of income even if the volume of investment – as suggested by theories of precautionary saving – rises.³⁰ In Chapter 8 Jan Gunning takes this argument a step further by arguing that rural households in SSA typically lack access to a safe asset. This undermines the precautionary saving motive to

²⁹ The median ratio of net official development assistance to GNP was 13.4 percent for SSA during the 1990s, as compared with a global median of 4.5 percent for all aid recipients (O'Connell and Soludo 2001).

³⁰ An increase in income uncertainty may reduce *domestic* investment even if overall saving rises, if it stimulates a shift into foreign assets.

such a degree that increases in uninsured income risk now sharply reduce long-run asset accumulation by rural households.

It is difficult, however, to econometrically disentangle the effects of *ex ante* uncertainty and *ex post* shocks. This is particularly true in aggregate data, where uncertainty changes only slowly over time as a function of observed shocks. This is an active and as yet inconclusive area of research. In the commodity price arena, Blattman, Hwang, and Williamson (2006) use panel data to distinguish trend from volatility in the terms of trade before World War I. They find that among countries in the periphery of the industrial world, *ex ante* volatility undermined growth, in part by discouraging direct foreign investment. Dehn (2002), however, finds that in a panel of panel of contemporary developing countries, measures of *ex ante* volatility have very little impact on growth, relative to the impacts of actual shocks (particularly adverse ones). Research on rainfall shocks is beginning to proceed in the same spirit; Ndulu and O'Connell (2001) and Miguel *et al* (2004) confirm the importance of rainfall shocks for growth in Africa-only samples, but as yet little is known about the relative macroeconomic importance of shocks and *ex ante* exposure.

3.4 Governance and growth

It is tempting to read the evidence on resource endowments and growth, and particularly on the salience of geographical variables, as uncovering essentially permanent sources of slow growth in Africa. But there is nothing in what we have reviewed that would sharply distinguish North from South Korea in 1960, Botswana from Zambia at independence, China before and after 1980, or Uganda before and after 1986. These contributions map

out *diagnosis* rather than *destiny*. They reveal systematic tendencies, but unexplained variance remains very high. Moreover, where geographical constraints are important, their salience is ultimately endogenous to human action.³¹

This brings us to governance, a central preoccupation of the literature on African economic growth since the early 1980s. The study of governance is the study of how states deploy the coercive power that distinguishes them from markets or communities (Hayami 2001). Even at this high level of abstraction, two distinct but complementary questions can be distinguished. First, like any collective good, national growth will be under-provided by markets and communities in the absence of institutional structures to compel collective action (Olson 1965). But what are the appropriate spheres of such action? A minimalist tradition dating from Adam Smith and reinforced by the new institutional economics of North (1981, 1991) places the security of individual rights to property and income at the center. In 1755 Smith reduced the core functions of government to “peace, easy taxes, and a tolerable administration of justice,” famously arguing that these were sufficient for rapid growth.³² North and his contemporaries are closer to viewing these functions as *necessary* rather than sufficient, and contemporary minimalists invariably place some categories of public infrastructure investment (e.g., in

³¹ Jeffrey Sachs is by far the single most influential contributor to the geography-and-growth literature (references in text), and at the same time the most urgent champion of a big push to overcome these constraints (e.g., Sachs *et al* 2004).

³² “Little else is requisite to carry a state to the highest degree of opulence from the lowest barbarism, but peace, easy taxes, and a tolerable administration of justice; all the rest being brought about by the natural order of things.” The date 1755 comes from Jay (1996), who cites Smith’s 1755 *Essays on Philosophical Subjects*.

ports, agricultural research, and primary education) among the necessary conditions (Lal 2000, Easterly 2001). But as emphasized by Bates in Chapter 4 and Ndulu in Chapter 9, African governments initially embraced a very different view of the appropriate division of labor between markets and states.

Second, regardless of how state power is acquired, it is ultimately exercised by private individuals. What prevents the use of coercive power for private or community ends, rather than national ones? A rational-choice tradition dating at least from the *Federalist Papers* views the problem of institutional design in government as one of aligning the incentives of government officials with the general interest in economic progress. A misalignment of incentives, from this perspective, leaves policy prey to the parochial interests of incumbent political elites and may convert the public sector into an arena for costly distributional struggle. Chapters 6, 7, 10 and 11 study this problem in the African context, drawing extensively on evidence from the country studies.

In contrast to slowly-moving geographical variables, the governance environment has been in flux in many of the countries of SSA over the period since 1960. We emphasize two key dimensions before turning briefly to the treatment of governance in growth econometrics.

First, the novelty of sovereignty itself is often overlooked. It came later and much more rapidly to SSA than to other developing regions, with nearly three-quarters of the region securing independence between 1956 and 1966 (Table 2).³³

³³ Only 3 countries – Ethiopia (ancient), Liberia (1947), and South Africa (1910) – existed as independent states in 1955, and in South Africa, black majority rule would not come until 1994.

Anti-colonialist movements had begun to acquire weight within the European colonial empires during the 1930s and 1940s, but in Africa the end of colonialism was more powerfully driven more by the realignment of global power in World War II than by the mobilization of national collective action against colonialism (Oliver and Atmore 1994). In retrospect, the transfer of sovereignty *per se* had unclear implications for growth. In their own interests, the colonial powers had developed a physical and institutional infrastructure for the efficient exploitation of resource-based exports, mainly in agriculture but also, particularly in Southern Africa, in minerals. The transfer of sovereignty would therefore allow a fundamental redirection of development strategy – ‘Seek ye first the political kingdom,’ said Ghana’s Kwame Nkrumah, ‘and all the rest shall be added unto ye.’ But it would also transfer the ‘rents to sovereignty’³⁴ and the responsibility for core functions – peace, policy, property rights, and infrastructure – to such local political elites as would acquire the instruments of state power. Growth could falter if these functions were subordinated to other agendas or undermined by the collapse of state authority.

A second and more widely remarked phenomenon is the evolving nature of executive power in independent Africa. The politically plural constitutions adopted at independence gave way during the 1960s and 1970s to one-party states and military dictatorships through much of the region (R. Collier 1962, Bratton and van de Walle 1997). Meanwhile currency boards, customs unions, and other colonial-era “agencies of restraint” were replaced by national institutions that were rapidly subordinated to

³⁴ This term is due to Nkurunziza and Ngaruko, who use it to powerful effect in their country study of Burundi (Volume 2).

executive authority (P. Collier 1991).³⁵ Using the polity 4 democracy/autocracy scale, Figure 8 documents the repudiation by African political elites of institutional constraints on their power in the first decade or so after independence – and then the restoration of these constraints, after a lag of two decades, in the process of democratization that swept the continent between 1988 and 1994.³⁶

As with the transfer of sovereignty, the consolidation of executive authority *per se* had unclear implications for economic growth. On a global basis, the average growth performance of authoritarian governments after 1960 was little different from that of democracies, and in East and Southeast Asia, authoritarian rule often delivered very high growth (Alesina and Perotti 1994). The opposite proved true in Africa, however. The continent's long detour into authoritarian rule corresponds roughly to the U-shaped evolution of its growth performance. Its highest performers – Botswana and Mauritius – are among its few consistently democratic regimes (Ndulu and O'Connell 1999; Bratton and van de Walle 1997). Chapters 10 and 11 provide a theory of political institutions that grounds this correlation in Africa's economic and political geography.

³⁵ The CFA countries retained their colonial-era monetary integration with France, but transferred its governance into African hands in the mid-1970s (O'Connell 1997). Masson and Pattillo (2005) provide a thorough institutional history of monetary policy in independent Africa.

³⁶ The Polity 4 measure of political regimes varies between -10 for high autocracy to +10 for high democracy, with 0 representing a regime that is neutral between the two extremes. Higher values correspond to deeper and more effective political constraints on executive tenure and autonomy. The data represent the judgments of a panel of experts and emphasize the *de facto* situation when this departs from the impression given by formal institutions (e.g., a democratically-elected leader actively violating constitutional constraints gets a low score). The polity 4 civil liberties scale shows a very similar evolution.

***Figure 8: Democracy/autocracy and civil liberties.

With this background we turn to the treatment of governance in growth econometrics, focusing on the core functions discussed above. We then turn to political polarization as a potentially deep determinant of the quality of governance.

3.4.1 Peace

Civil wars represent the most dramatic failure of a state to command a monopoly of coercion over its own territory. Their incidence trended upwards within the developing world through most of the period, but Africa's experience diverged sharply from that of other developing regions in the early 1990s. Figure 9 dates the relative deterioration in Africa's security situation to the democratization period of 1988-94 and suggests a lingering effect of this deterioration through the 1990s. In the global data, civil war costs over two percentage points of growth on an annual basis, while increasing the risk of subsequent conflict (Collier and Hoeffler 2002, 2004). Low incomes and primary commodity exports substantially increase the risk of civil war and imply a relatively high underlying exposure in SSA.

***Figure 9: Incidence of civil war.

In Chapter 7, Bates expands the analysis of state failure to include situations in which political leaders turn the instruments of state power to predatory purposes and

private groups arm themselves in order to defend and pursue their own interests. A failure of political order, in this analysis, undermines economic growth even before the situation degenerates (if it does) into civil war. Leaders impose confiscatory taxes and stop securing private property; private groups devote productive resources to a zero-sum deterrence game. Mirroring the civil war literature, Bates finds that the prevalence of political conflict is a decreasing function of per-capita income and an increasing function of natural resource rents. He also finds that private military groups emerge more frequently in the presence of competitive political systems than under military dictatorships or one-party states, consistent with the shorter expected tenure of leaders under contested elections. The latter result suggests that the rapid re-introduction of multi-party elections between 1988 and 1994 may have contributed, in the short run, to an increase in political violence and a deterioration in the growth environment.

3.4.2 Policy

Functioning states affect the economic environment for growth by intervening in markets, producing or distributing goods and services, providing social overhead capital, and defining and/or enforcing property rights. The first two categories comprise what is conventionally treated as “economic policy” in the growth econometrics literature.³⁷

Policy failures are at the heart of a critique of African governance that began with Bates (1981) and the World Bank’s Berg Report (1980) and gathered force in the early 1980s with the emergence of structural adjustment lending throughout Africa and Latin America. In our framework paper for the Growth Project, we documented the strong

³⁷ We treat the final two categories (in reverse order) in sections 3.4.3 and 3.4.4 below.

association of growth with a wide range of policy variables including inflation, fiscal deficits, government consumption, the black market premium, and exchange rate overvaluation, as well as with a variety of policy-sensitive variables including the size of the financial sector (O'Connell and Ndulu 2001). Controlling for initial conditions and exogenous shocks, policy measures were strongly correlated with growth, both in unrestricted global samples (using 5-year non-overlapping averages) and in regressions that controlled for unobserved country heterogeneity by including country fixed effects.³⁸ We found little evidence that policy variables operated differently in SSA than elsewhere, with the exception of trade openness, which had a stronger impact on predicted growth within SSA than outside.

Regression-based growth decompositions

Table 8 shows a set of regressions based on the pooled conditional specification we developed in our framework paper. The model describes growth outcomes conditional on alternative sets of policy variables, after controlling for initial conditions, demographic changes, geography, and external shocks. Country teams used the 'fits and residuals' from this model (and from a version of the augmented Solow model estimated by Hoeffler 2002) to place their country's experience in comparative perspective.

Column 1 shows the original pooled conditional model, updated to 2004. The model is robust to the extension of the sample. All coefficients retain their magnitudes

³⁸ In the latter case, correlations derive only from within-country variation in policy and growth. Any (spurious) growth effects that are driven by cross-country correlations between policy performance and unobserved country attributes are eliminated, because the regression implicitly uses only the deviations of all variables from country-specific means.

and expected signs, and the income effect of the terms of trade is nearly significant at the 10% level while all other variables are significant at better than 5% with the exception of landlocked status, which has a very similar point estimate to its original one. An SSA dummy variable is both economically and statistically insignificant when added to the specification (coefficient -0.21, $p = 0.75$).

In columns 2-4 we replace the Barro-Lee (1994) 'unproductive government consumption' variable – which measures government consumption at international prices, net of spending on education and defense – with the overall government consumption ratio, which is much more widely available, particularly after the mid-1980s. We also include measures of real exchange rate misalignment and monetary depth, two variables often implicated in discussions of the sectoral bias of policy in Africa. Overvalued exchange rates impose an anti-export bias while also indicating macroeconomic unsustainability; monetary depth reflects the influence of financial repression on intermediation by the banking sector.

***Table 8 Pooled conditional growth regressions.

Consistent with our earlier discussion, demographic variables – which vary mainly across countries rather than over time – play a very powerful role in differentiating Africa's predicted growth from that of other regions. Across all four regressions, differences in the demographic variables consistently predict two thirds of the observed difference between average growth in SSA and in other developing regions (Table 9). The landlockedness variable, by contrast, is puzzling at first: its coefficient is

unstable and fails to reach statistical significance. The declining premium on coastal location in regressions 2-4 is driven in part by the inclusion of a much broader post-1985 sample: As Collier and O'Connell show in Chapter 2, African coastal economies very strongly under-performed their global counterparts after 1980. Within the set of included variables, however, landlockedness consistently exerts a strong indirect effect on predicted growth, via the initial conditions and demographic variables.³⁹

The policy coefficients in Table 9 are estimated reasonably precisely and display reasonable stability across 40 years of dramatic change in the global policy environment. To verify the latter, we constructed regression-weighted policy aggregates by summing up the policy variables in regressions 1-4, multiplied by their estimated coefficients. By construction, these aggregates have a coefficient of 1 when entered in place of the individual policy variables. We interacted these variables with the period-by-period dummy variables in order to allow policy impacts to vary over time, and then tested for equality of these coefficients across periods. We were not able to reject equality at conventional significance levels, except in regression 2 where an *F*-test produces a *p*-value of .073 and the point estimates suggest (Figure 10) a modest increase in policy coefficients late in the period.

***Figure 10 Policy coefficients by half-decade.

³⁹ For example: in regressions 2-4, if we sum up the regression-weighted contributions of initial conditions and demographic variables and regress this variable on landlocked status, we get a coefficient that is positive and large and has a *p*-value below 1%. The sum of this coefficient and the coefficient on landlockedness, as a measure of the net (direct plus indirect) impact of landlockedness on predicted growth, is 0.68, 0.35 and 0.17, respectively, in the three regressions.

But does policy *matter* in the sense of substantially affecting predicted growth, holding other determinants constant? If we look at regional growth differentials, the answer is yes, though with varying strength across specifications. Regression 1 implies a very strong impact: holding other determinants constant, well over half ($0.66/1.18 = 0.56$) of Africa's total growth shortfall relative to other developing regions ($1.09 + 0.09 = 1.18$) is predicted on the basis of differences in the policy variables.⁴⁰ The impact is more modest in specifications that replace the Barro/Lee government spending variable and draw more heavily from the period after 1985, but it remains considerable in specifications 3 and 4 at 16 and 28 percent, respectively.

***Table 9 Regression-based growth decompositions.

⁴⁰ In Table 9 we use the regressions in columns 2 and 3 to decompose the deviation of period t growth from the sample mean ($g_{it} - \bar{g}$), into the sum of a country/period residual and the regression-weighted sum of country/period deviations in the growth determinants. Using a hat (^) to denote an OLS estimate, the table reports a version of

$$g_{it} - \bar{g} = -\hat{\gamma}(\ln y_{i,t-k} - \overline{\ln y}) + \sum_j \hat{\phi}^j (x_{it}^j - \bar{x}) + \sum_l \hat{\lambda}^l (z_i^l - \bar{z}) + \hat{\varepsilon}_{it}$$

with the variables re-grouped by analytical category (see Table 8) and the country/period observations aggregated over time. Since the average OLS residual is zero by construction, the decomposition is exact. The orthogonality of fit and residual also affords a clean attribution of the relative contributions of observed and unobserved determinants of growth to the overall conditional mean. The latter property does not hold for individual determinants, however, because they are mutually correlated

Policy variables over time

Given the overall importance of policy in these regressions, does the time profile of policy variables display the U shape we have seen in the growth outcomes? Figure 10 tracks the policy variables one by one, in each case using the largest sample with continuously available data (a sample considerably larger than the regression sample). The broad answer is yes: policy variables tend to deteriorate in the 1970s and 1980s before improving, both absolutely and relative to other developing regions, starting in the mid-1980s.

Panel 3 reflects what is probably the single most dramatic macroeconomic policy development of the post-independence period: the emergence of strongly overvalued exchange rates throughout SSA in the 1970s, and their gradual resolution through real depreciation starting in the early 1980s. A sharp distinction is apparent here between the countries of the CFA zone, comprising a pair of monetary unions with currencies pegged to the French franc, and countries outside the zone operating independent monetary policies.⁴¹ Outside of the CFA zone, real depreciation got underway by the mid-1980s, driven by nominal depreciation and the loosening of exchange controls that in many cases had been extended to the current account during the turbulent 1970s. Panel 2 shows the associated reductions in the black market premium outside of the zone: the process of exchange rate unification was interrupted only briefly by the period of political instability

⁴¹ Not all non-CFA countries operate independent monetary policies; the South African rand circulates in Lesotho, Swaziland and Namibia, who together with South Africa form the Rand Monetary Area. Monetary policy in the RMA is set by the Reserve Bank of South Africa. Botswana left the RMA in the mid-1970s.

in the early 1990s. By the mid-1990s virtually all of SSA had formally abjured exchange controls on the current account by adopting 'Article VIII' status in the IMF.

In contrast with the countries operating independent monetary policies, exchange controls were effectively absent in the CFA countries by virtue of a convertibility guarantee extended by the French government. While balance of payments pressures were in many cases similar to those faced outside the zone – particularly in the net-oil-importing West African monetary union, which included Cote d'Ivoire, one of SSA's few commercial borrowers – exchange rate adjustment was delayed within the zone until 1994. In the meantime overvaluation persisted, and the adjustment to balance of payments pressure took place via monetary and fiscal contraction. The resulting divergent trends in inflation are apparent in panel 1; adjustment was deflationary in the CFA zone during the 1980s and early 1990s. The inflation spike in CFA countries in 1994 was driven by a 50 percent devaluation of the CFA franc, widely viewed as long overdue.

Government consumption ratios (panel 4) show a sharp divergence for SSA as a whole starting in the late 1970s, with Africa's ratios continuing to climb as the debt crisis enforces fiscal austerity in other regions. A delayed and rapid adjustment takes place in the early 1990s, coinciding roughly with a decline of similar magnitude in foreign aid following the collapse of the Soviet Union (O'Connell and Soludo 2001).

***Figure 11: Policy variables over time.

Assessing the policy environment

As we emphasized in our framework paper, the 'contributions' in Table 9 reflect sample correlations rather than clean policy counterfactuals. In large part this reflects the inherent difficulty of measuring the aspects of policy that matter for growth and are plausibly predetermined. The challenges here are well known:

- *Reverse causality*: Policy variables often reflect policy outcomes rather than policy settings. An increase in the black market premium or the fiscal deficit, for example, may be driven by a collapse in export performance, inducing a correlation with growth even if neither the exchange control regime nor the structure of fiscal policy have changed.
- *Dimensionality*: the range of potentially important policy instruments is wide enough that the same policy orientation – e.g., export promotion or state-led industrialization – may be expressed in a wide variety of intercorrelated policy settings, some of which are unobserved and no single one of which has a robust impact on growth in any limited sample of data.
- *Expectations*: the same policy intervention, expected to be sustained in one country and reversed in another, may have extremely different impacts on resource allocation.⁴²

⁴² Oyejide *et al.* (1999) emphasize the reversibility of African trade reforms as a major cause of their failure.

These problems make case study analysis indispensable. For cross-country empirical work, however, policy *rules* are more likely to be predetermined with respect to growth than are policy outcomes; *groups* of policy variables are more likely to be robust to the detailed institutional differences among countries; and *judgmental assessments* can be used to distinguish deep from superficial policy commitments. Sachs and Warner (1995) exploited these points in their analysis of openness and growth, classifying a country as 'closed' over the 1965-90 period if it satisfied any one of a set of measures of inward-looking distortions, ranging from deep policy commitments (socialist government) to particular institutional structures (export marketing monopolies) to standard policy variables (a persistently high black market premium or effective tariff rate). In the policy taxonomy developed in Chapter 2, the Project editors apply a similar but more qualitative logic to a set of policy syndromes that were observed repeatedly in the case-study evidence. By contrast with the Sachs/Warner variable, which covers only 18 African countries and is virtually time-invariant (only 2 of the 18 are classified as open for more than 3 of the 26 years), our syndrome classification covers 47 African countries and captures major shifts in the governance environment *within* the 1960-2000 period.

In Chapter 2, Collier and O'Connell use an instrumental variables approach to handle the potential endogeneity from growth outcomes to policy syndromes. They find that policy impacts are, if anything, stronger once endogeneity is taken into account. This may reflect a tendency of growth-reducing policy regimes to persist as long as other, unobserved variables keep growth from collapsing.

3.4.3 *The institutional environment*

The mid-1990s witnessed an explosion of interest within the growth econometrics literature in what institutional economists call the “rules of the game,” the basic institutional environment within which economic activity is organized (Williamson 1998). A burgeoning literature documents the correlation of public sector corruption (Mauro 1995), the rule of law (Knack and Keefer 1995), and the quality of the government bureaucracy with investment and growth, and particularly with the *level* of real GDP per capita. Like the indexes of political institutions we examined earlier, measures of the institutional environment typically reflect expert judgments about actual practice, rather than compilations of formal rules. They therefore reflect the interplay between formal rules – legal and regulatory structures, formal administrative practices – and the informal norms and expectations that guide the conduct of public officials. None of the most widely-used institutional variables are available before the mid-1980s, and like geographical variables, measures of institutional performance tend to change only slowly over time. Their role in growth regressions has generally been limited to explaining cross-sectional rather than intertemporal variation in growth.

In contrast to measures of policy and political institutions, measures of the institutional environment show little broad tendency to improve in SSA during the 1990s. Figure 12 tracks annual averages of monthly ICRG indexes of government corruption, the rule of law, and the quality of the government bureaucracy from 1984 (the earliest year) to 2000; if anything, these variables suggest a deterioration in SSA during the 1990s, both in absolute terms and relative to other developing regions. This is consistent

with the persistence of clientelist norms in the face of economic and political reforms (van de Walle 2001) and perhaps with the impact of political liberalization on public awareness of malfeasance by public officials. Bates' Chapter 10 suggests a more powerful adverse link between political liberalization and institutional performance, based on the shortening horizons of political leaders.

***Figure 12: ICRG institutional performance measures, 1985-2000

3.4.4 Infrastructure

A final core function of growth-promoting government is the provision of social overhead capital – public investments in transport and communications infrastructure, agricultural productivity, and primary education and health. The evidence we reviewed earlier (Section 3.3) provides both direct and indirect support for the importance of such infrastructure. A great deal remains to be understood, however, about the role of such investment in Africa's growth performance. We return to this issue in Section 5 below.

3.4.5 Polarization

Why might governments fail to provide an enabling environment for private investment and economic growth? In Chapter 9 Ndulu documents the influence of global development paradigms and external patrons, through at least the early 1980s, in creating an environment favorable to heavy state intervention. But the efficacy of such intervention and the extent of policy distortions varied across countries, and the average quality of policy in SSA, as we have seen, fell short of that in other regions. To *explain*

this variation – our regressions *conditioned* on it – our country studies repeatedly appeal to the predominance of sectional over national interests, both as a source of policy failures and as a source of violent conflict and state breakdown. In doing so they develop themes rooted both in the African political economy literature and in recent growth econometrics.

In an influential early contribution, Bates (1981) focused on policy towards export agriculture and argued on the basis of case evidence that the punitive taxation of agriculture had less to do with development strategy or political ideology than with the systematic advantages of urban-based interest groups in exerting pressure on political elites (see also Ake 1996, McMillan 2001, and Chapter 4). At the heart of this argument is a conflict of interest that leads narrowly-based political elites to prefer local or regional collective goods to national ones (Olson 1965). While Bates focused on the rural/urban divide, the insight is a general one: Adam and O'Connell (1999) show that in the absence of effective institutional restraints, the policy choices of a government captured by *any* sufficiently narrow group will tend to trade off growth for inefficient redistribution, with greater distortions and slower growth the more narrow the favored group and the higher the discount rate of political elites.

While experience varies, the political geography that emerges from our country studies is more often defined on ethno-regional lines than by economic sector or urban/rural location. The salience of ethno-regional interests may have deep roots in the region's physical geography and colonial history. Collier (2002) notes that the predominance of subsistence risks and low population density in SSA favored the historical emergence of strong and localized identities based on kinship. From early on,

however, the colonial powers re-posed issues of economic and political management on larger spatial scale, encouraging the reorganization of collective action around the more fluid and socially-determined categories of tribe and ethnicity. By late in the colonial period, these “imagined identities” had acquired a powerful salience, often underpinned by a common language and/or religion. When issues of political self-determination came to the fore, ethno-regional political parties were the dominant basis for political competition in many countries.

While ‘nation-building’ was a staple of the early post-independence political science literature (e.g., Carter 1962, 1963, 1966), Easterly and Levine (1997) were the first in the growth econometrics literature to systematically explore the implications of internal political polarization for growth. They noted that the degree of ethno-linguistic fractionalization – measured by the probability that two randomly chosen individuals from the same country spoke the same language – was much higher in most African countries than it was in non-African countries. They interpreted this (time-invariant) variable as a measure of latent political conflicts and showed that it predicted growth-reducing policy distortions in global samples. Rodrik (1999), in a similar vein, found that external shocks undermined growth by more where ethnolinguistic fractionalization was high than where it was low.

Measures of ethnic fractionalization are both economically and statistically insignificant when added to the conditional regression models in Table 9, suggesting that effects on predicted growth, if any, must be indirect. In Table 10 we investigate this by running a set of auxiliary regressions relating the contributions of included determinants

to the measure of ethnic fractionalization developed by Fearon (2003).⁴³ Fractionalization has a statistically significant indirect impact not only via policy but also via the initial conditions and demographic variables. The total indirect impact is substantial: an increase in fractionalization equal to the difference between Africa's average (0.77) and that of other developing regions (0.43) reduces predicted growth by between 1/2 and 2/3 of a percentage point of annual growth.

***Table 10 Ethnic fractionalization and growth.

The literature subsequent to Easterly and Levine (1997) has begun to develop a more nuanced picture of the impact of ethnic diversity on growth, by incorporating civil wars, differentiating dominance from fractionalization, and studying the mediating effect of political institutions.

Collier and Hoeffler (2004) focus on civil war. In global data, the risk of civil war is maximized when the single largest ethno-linguistic group comprises between 45 and 90 percent of the population. Situations of ethnic dominance, in which a single large group constitutes a permanent majority of the population (e.g., Rwanda or Burundi) and ethnic polarization, in which two or three large groups coexist (e.g., Nigeria) are distinctly more prone to state breakdown than situations of either homogeneity (e.g., Botswana) or acute fractionalization (e.g., Tanzania). These nonlinearities may help explain the absence of a

⁴³ Fearon's fractionalization measure refers to 'culture' rather than ethnicity *per se*; it measures the probability that two people drawn at random belong to the same culture. Results are very similar using the Easterly and Levine (1997) measure of ethnolinguistic fractionalization. The cross-country correlation between the two measures is 0.77.

linear effect of fractionalization on political instability in Table 10. Within SSA, Collier and Hoeffler find that the level of fractionalization is sufficiently high in most countries to generate a net protective effect, actually reducing the risk of civil war relative to global norms (low incomes and commodity export specialization, as we emphasized earlier, have the opposite effect). They explain this result by appealing to the difficulties of identity-based recruitment by rebel groups in ethnically diverse societies.

Rodrik (1999) and Collier (2000) study the intermediating effect of political institutions. Both find that fractionalization has its most deleterious effects on growth in the absence of democratic institutions, a combination characteristic of much of SSA between the mid-1970s and the early 1990s. Bates and co-authors take up this theme in Chapter 12, providing an empirically-grounded analysis of policy choice under alternative political regimes. The central empirical result – that exposure to anti-growth syndromes is greatest when autocratic regimes are combined with ethnic diversity – runs directly counter to the pronouncements of dictators both in Africa and elsewhere, who routinely justify a monopoly on power by appealing to the social costs of pluralism.

In Chapter 6, Azam brings policy and conflict together by studying the role of regional redistribution in buying off potential conflict. He argues that in a situation of historically-determined regional polarization, the counterfactual to a policy of regional redistribution may be civil war. Economic reforms, in this view, should be geared towards making redistribution transparent, enforceable, and efficient, but should seek to limit its overall scope only where political stability can be secured by other means.

Azam's analysis points to a potentially deep conundrum in ethnically divided societies: a policy of 'buying off' threats to security may enhance growth in the short run

but reduce it in the long run by validating ethno-regional claims as a basis for national politics and policy. Nationally-funded public education has immediate appeal from this perspective – it creates a transfer to lower-income regions while potentially serving also as a solvent of narrowly-defined social capital over time.⁴⁴

3.5 From growth econometrics to case analysis

The growth econometrics literature locates the stylized facts of African growth in a combination of geography and governance. These categories appear in our synthesis taxonomy as the ‘opportunities’ and ‘choices’ that influence growth outcomes across episodes. Growth opportunities, from this perspective, are latent in a country’s physical geography and resource endowment at a point in time, and perhaps in its internal political geography; choices influence the degree to which these opportunities are seized (or not) over the medium run, and modified (or not) over the long run.

The intersection between geography and governance, operating over a much longer historical horizon, is at the heart of recent growth research. In a study of long-run growth in the Americas, for example, Engerman and Sokoloff (2001), argue that landed elites tended to emerge during the colonial period in areas favorable to the development of plantation-based agriculture. These elites subsequently captured political institutions and prevented a redistribution of either political power or economic wealth. Where local

⁴⁴ Miguel (2004) argues that President Nyerere in Tanzania used curricular initiatives and other instruments (notably the enforcement of Swahili as a national language) to break down ethnic cleavages, with the result that by the 1990s, the impact of ethnic fractionalization on local public goods provision was significantly lower in a set of Tanzanian villages near Lake Victoria than it was in a similarly situated set of Kenyan villages across the border.

conditions favored smallholder agriculture, more inclusive political institutions, with greater openness to innovation and growth, were able to take hold and flourish over time. In a parallel vein Acemoglu, Johnson and Robinson (2001) argue that differences in contemporary institutional performance reflect experimental variation induced by the response of European colonial regimes to local geography. In this view, the colonial powers introduced predatory and extractive institutions where local health conditions produced high mortality among European soldiers and missionaries, as in most of Sub-Saharan Africa, and growth-oriented institutions where conditions favored permanent settlement, as in North America. These institutions were then reproduced over time, remaining resistant to fundamental reshaping even with the departure of the colonial regimes.

These contributions take the search for experimental variation deeper, in the hope of unraveling cause from correlation in the cross-country data. In the process, however, much of what we seek to understand – Africa's post-independence growth performance, both across countries and over time – threatens to recede as unexplained variation around a set of slow-moving and predetermined characteristics. The task of country-level research is to get inside this variation. Guided by the cross-country evidence and the episodal structure laid out in Figure 1, our country studies sought to establish how governments perceived the constraints and opportunities facing them, how they shaped the incentive environment facing households and firms, and how these agents responded to the incentive environment while also seeking to influence it.

4. Opportunities and choices: learning from the country evidence

Throughout this volume we emphasize four often interrelated factors that play a powerful role in the global growth evidence and that emerge repeatedly in our country studies:

- Resource endowments that invite a narrow commodity specialization and provide large and volatile rents to political incumbents.
- Policy-driven distortions in the composition of investment and the allocation of labor and capital across sectors or firms.
- Diversion of productive resources into rent-seeking and other forms of distributional struggle, including civil war.
- Remoteness from middle-to-high-income world markets, implying high costs of trade and technology transfer.

The salience of the first three factors varies not just across countries but also within countries, in many cases shaping the periodization chosen by the country author and serving as a central theme in the overall story line. The fourth factor is closer to being time-invariant, and its importance therefore emerges mainly at the synthesis stage.

Resource endowments and geographical location form the basis of our division of countries by growth opportunities, and we return to this theme in section 5 below. Here we focus briefly on policy distortions and distributional struggle, which are at the heart of our analysis of policy syndromes.

Chapter 2 provides the full syndrome classification developed by the editorial team, in the form of a time line indicating the periods during which a clear anti-growth bias can be detected in each country's governance environment. Collier and O'Connell discuss the analytical basis for each of the syndromes and the judgmental criteria employed by the editorial team in identifying its occurrence. In Table 11 we show the incidence of syndromes over time by opportunity category. Regulatory regimes form the largest category by far, and occur most frequently in resource-scarce countries. Their prevalence among *coastal* resource-scarce countries – where they might be expected to be maximally damaging to growth – is greater than that of any other syndrome/category combination. Syndrome-free cases come second: in a challenge to the highly pejorative thrust of the African political economy literature, we find that African governments steered clear of our anti-growth syndromes fully one-third of the time. Only Botswana, The Gambia, Lesotho, Malawi, and Swaziland however, achieved syndrome-free status over the full period since independence. Inefficient ethno-regional redistribution comes next, accounting for nearly 30 percent of country/years. The coastal and resource-scarce economies did best here, though the differences by opportunity category are small. Intertemporal failures and state breakdown come next, each occurring in fewer than 15 percent of country/years. The combined exposure to redistributive and intertemporal regimes – in effect, to redistributive failure, whether across existing interests or over time – is greatest among the resource-rich countries.

***Table 11 Frequency of syndromes by opportunity group.

Figure 13 tracks the occurrence of syndromes over time (see also Chapter 3). Regulatory regimes show a distinct inverted-U pattern: already prevalent in 1960, they increase sharply during the 1970s and reach a peak in the early 1980s. They decline slowly throughout the 1980s and then sharply between the late 1980s and early 1990s. Redistributive regimes show a similar but more muted pattern, with the result that syndrome-free status declines steadily, from over 60 percent of countries in 1960 to below 20 percent by the mid-1970s. The restoration of syndrome-free status comes gradually during the 1980s and then increases sharply in the early 1990s before stabilizing at just under half of the sample. Most aspects of the governance environment therefore display the same broad U pattern we noted in Africa's overall growth shortfall. While causation may run in both directions, Collier and O'Connell argue in Chapter 2, on the basis of instrumental variables estimation, that the causal link from governance to growth is, if anything, somewhat stronger than the raw correlation.

***Figure 13: The policy environment over time.

State breakdown is the only syndrome that shows a monotonic trend over time. The incidence of breakdown rises gradually through much of the period before increasing sharply starting in the late 1980s. By 2000, state breakdown characterizes more than a quarter of the countries in SSA. The governance environment therefore shows a sharp divergence across countries during the 1990s, as regulatory and redistributive regimes are replaced by a combination of syndrome-free status and state breakdown.

Fosu explores the sources of these developments, which are then analyzed in detail in Chapters 4-7 on the individual syndromes. In Chapter 8, Ndulu assesses the influence of the global intellectual environment on the development strategies embraced by African leaders. The implications of the syndromes for growth are investigated empirically by Collier and O'Connell in Chapter 2.

Using an early version of the synthesis classification, Fosu and O'Connell (2006) aggregated the four anti-growth syndromes into a single dichotomous variable indicating whether a country was syndrome-free in a particular year or displayed one or more of the anti-growth syndromes. They identified a *growth collapse* as a year in which a 3-year centered moving average of growth was negative, and a period of *sustained growth* as a year in which a 5-year centered moving average exceeded 3.5 percent (roughly a point above the long-run developing-country median). In Chapter 4, Bates reproduces this calculation using the final syndrome classification, with very similar results.⁴⁵ The probability of sustained growth is below 20 percent in the presence of one or more syndromes; it is 44 percent for syndrome-free countries, and the difference is highly statistically significant. At the same time, the probability of a growth collapse is below 20 percent for syndrome-free countries and nearly 50 percent for countries displaying one or more syndromes. As stressed by Fosu and O'Connell (2006) and underscored by the empirical analysis in Chapter 2, syndrome-free status emerges as (virtually) a necessary condition for sustained growth in SSA and (virtually) a sufficient condition for avoiding the short-run growth collapses that have so often undermined growth over longer periods.

⁴⁵ The editorial committee reviewed the full syndrome classification in October 2005, in a process that produced a number of data revisions.

Our own compressed representation of the country evidence goes as follows. State breakdown disproportionately affected landlocked countries in SSA; but wherever it occurred, growth stopped. For countries that steered clear of breakdown, avoiding the regulatory, redistributive, and intertemporal syndromes constituted a second critical step. Where these syndromes emerged, growth again stopped, with high probability. If a single dominant lesson emerges, it is that in the opening decades of political independence, African governments systematically under-prioritized the core functions of securing peace, husbanding national assets, and creating a minimally supportive environment for trade and private investment. Governments that succeeded in performing these functions avoided growth collapses and created a platform for moderate to rapid growth. The spread in outcomes among syndrome-free countries was wide, however, reflecting the diversity of *ex ante* opportunities and perhaps, at the deepest level, the differential success of countries at identifying and removing binding constraints.

Subsequent chapters explore the reasons for the continent's long detour into growth syndromes and the growth prospects uncovered by the economic and political reforms that swept the continent beginning in the mid-1980s. Strong political leadership is a feature of all sustained high performers in our sample—notably Mauritius among coastal, resource-scarce economies, Malawi among landlocked, resource-scarce economies, and Botswana among resource-rich economies. Institutional legacies feature importantly in some cases (Botswana, Mauritius), but in many others the institutional performance of the public sector has displayed little internal inertia, depending instead on the political dispensation of powerful leaders (Malawi, Uganda since the mid-1980s). In the latter cases, high performance has not often outlasted political succession. Ethno-

regional polarization poses a continuing challenge to effective governance in many of our cases (Azam, Chapter 7 and Bates, Chapter 8) and in concert with low education levels complicates the short-run relationship between democratization and the growth environment (Bates, Chapter 9).

Do growth-promoting governments “merely” perform core functions, or do they intervene at ambitious scale to remove binding constraints on growth? The dichotomy is misleading, because the manifest difficulty of committing to core functions suggests that governments that steered clear of syndromes achieved this as a matter of ambitious and purposive strategy. Two features appear common across our cases of sustained growth success: first, the degree of market intervention was kept in proportion to government capability—remaining a good bit lower, for example, in Botswana and post-conflict Uganda than in Mauritius. Second, successful governments articulated growth strategies that committed government to adequate provision of core functions and accommodated private sector accumulation as a central component of development. Where such a commitment emerged from policy reform—as in most cases—the duration over which policy remained syndrome-free played a key role in establishing credibility.

5. Conclusions

In closing we emphasize three lessons that emerge from our review of the global econometric evidence and our interpretation of growth project findings. The first relates to the critical role of core functions in any growth strategy. Put simply, while remaining syndrome-free is a deeply non-trivial task, it is the single most important choice for

closing the growth gap between Africa and other regions. The second moves from errors of omission to errors of commission related to the under-provision of critical public goods. While African countries face unusually severe natural and locational disadvantages, these are not destiny: they can be offset by appropriate investments and policy choices. The domain of these choices is partly national but also partly regional. The third relates to the shifting human-resource platform for growth. We return to educational thresholds and demographic change, two arenas in which time is beginning to turn in Africa's favor, potentially opening new growth opportunities in the period ahead.

Let us now elaborate these points.

5.1 Avoiding syndromes

We showed in Section 3.4.2 that averaging across forty years of African growth experience and controlling for differences in the composition of opportunities, the impact of poor policy accounts for something between a quarter and half of the difference in predicted growth between African and non-African developing countries. Comparing SSA with East Asia, O'Connell and Ndulu (2001), Elbadawi, Ndulu and Ndung'u (1997), and Easterly and Levine (1997) found similar impacts: differences in policy variables generate between 1 and 3 percentage points of predicted growth differential.

Governments affect the environment for growth in ways that are poorly proxied by conventional policy variables. Building directly on the country evidence, we have constructed a detailed new assessment of governance patterns covering all of SSA since 1960. The empirical leverage of anti-growth syndromes for growth is large. In Chapter 2,

Collier and O'Connell use a counterfactual analysis to estimate the contribution of syndromes to the growth differential with other regions; they find that syndromes robbed African countries of roughly 2 percentage points of growth out of the (population-weighted) 3.5 percentage point overall differential. In dramatic contrast to many of the leading variables in the growth econometrics literature, our syndrome classification plays as powerful a role in differentiating growth outcomes *within* Africa and over time as it does on the cross-regional dimension: in a regression analysis controlling for shocks and opportunity categories, syndrome-free status is worth roughly 2 percentage points of annual growth (Chapter 2). The impact is, if anything, greater after controlling for the potential endogeneity of syndromes. Over the period of study, syndrome-free status emerges as a necessary condition for sustained growth and a sufficient condition for avoiding short term growth collapse.

Throughout this study, Growth project researchers have sought to *explain* observed patterns of governance in terms of the incentives confronting political elites. These incentives are shaped not only by existing patterns of political polarization but also by the institutions that govern political succession and the exercise of power. As emphasized in Chapter 12, successful growth strategies will have to combine two inputs: an opportunity-specific diagnosis of high-return activities for the public sector, and a set of parallel investments in political institutions capable of credibly underpinning these choices.

5.2 Overcoming locational disadvantages

Collier and O'Connell (Chapter 2) find that over a quarter of Africa's long-run growth shortfall can be attributed to the unusually small proportion of its population residing in 'high-opportunity' coastal-and-resource-scarce countries. By the 1990s, 35 percent of the region's population resided in landlocked and resource-scarce countries, as against 1 percent for other developing regions; another 30 percent resided in resource-rich countries, as against 11 percent for other regions.

Geographical endowments condition not only the nature of growth opportunities but also the incentives of policymakers and the costs of error. Thus landlocked countries did poorest in terms of overall syndrome exposure and were particularly prone to state breakdown; resource-rich countries, and particularly those with polarized political geography, were particularly exposed to intertemporal errors and inefficient redistribution. The incidence of debilitating regulatory controls was highest among the coastal-and-resource-scarce group, perhaps a surprising result given the potentially high returns to more market-oriented policies; what is less surprising, given the differential sensitivity of growth to allocative distortions in this group (Chapter 12) is that these countries under-performed their global counterparts by more than did the other opportunity groups.

We have emphasized that maintaining syndrome-free status is necessary but not sufficient for achieving truly rapid growth on a sustained basis. The growth econometrics literature suggests a potentially important role for public investments aimed at reducing the unusually high cost of development in African countries. Among these Ndulu (2004) emphasizes the disease burden associated with tropical location and the high transport

costs associated with low population density, remote location, and multiplicity of national borders. These are two major areas in which the provision of national and regional public goods may play a critical role in unlocking long-run growth.

We have emphasized the high variance of outcomes among the resource-rich countries, but the variance within *each* of our opportunity groups is larger than the differences between groups. Geography is not destiny. Botswana is both landlocked and natural-resource dependent, but it was the fastest-growing economy in Africa between 1960 and 2000 and among the fastest globally. Botswana exemplifies strong economic management; it prospered through the successful management of natural-resource wealth, in turn the result of strong state capacity rooted in a combination of highly participatory indigenous institutions and strong leadership (see Chapter 3 and the country study by Nath and Madhoo in Volume 2). Botswana has also benefited, however – as have landlocked Lesotho, Swaziland, and to a much lesser degree, Malawi – from its integration with the South African economy. The latter has not only underpinned stability and restraint in important aspects of economic policy, but has also meant access to high-quality infrastructure. Improvements in regional transport infrastructure, and in supporting frameworks of cross-border cooperation, may have a high return in other areas of SSA.

5.3 Building human resources

One of our stylized facts is that SSA has done a bit better on human development indicators than it has done on real GDP growth. If initial conditions matter, this suggests that SSA has a more solid starting point for growth now than in the 1960s. For at least

two additional reasons, we believe that the contribution of human resources to Africa's growth is likely to be considerably larger in the region's second 40 years of independence than it was in the first.

The first relates to thresholds in educational attainment. We have cited the evidence of FDI complementarities that may begin to be activated as African countries approach threshold levels of secondary attainment. Other writers have appealed to more general threshold effects of education in the growth process (e.g., Azariadis and Drazen 1990, Berthelemy 2006). If these are present, the steady advance of educational attainment in Africa has brought the region closer to supporting the rapid expansion of new and more education-intensive activities in the manufacturing and service sectors. Large stocks of human and financial flight capital exist outside many African countries and should be in the vanguard of any such development. Their role as catalyst is undoubtedly contingent on the maintenance of economic and political reforms as well as on improved institutional performance of the public sector.

Second, Africa's demographic evolution posed a set of distinctively difficult challenges during the 1960-2000 period. Demographic patterns are slow-moving and largely predetermined. They hardly feature in the country studies and are not often integrated into discussions of growth strategy. Yet the combination of persistently high fertility with falling mortality produced historically unprecedented rates of population growth in the period after independence. The resulting high and rising dependency ratios diluted labor input per capita and may have undermined growth indirectly by reducing the quantity and/or quality of human capital investment and diverting public resources from critical areas of infrastructure development. In the pooled conditional regressions of

section 3.4.1, we found that holding other determinants constant, demographic variables predicted between 3/4 and a full percentage point of average growth differential between SSA and other developing regions – roughly two-thirds of the observed differential.

Late in the period and mainly as a result of the HIV/AIDS epidemic, SSA became the only developing region in the whole post-1960 sample to experience a sustained reverse trend in life expectancy.

Fertility has begun to decline in many African countries, driven by a combination of improved labor market opportunities for women, greater knowledge and availability of contraceptives, public health improvements that enhance the return to investment in children, and changing behavioral norms. Population growth will continue to be rapid even with falling fertility rates, posing continued challenges for capital deepening and in sharpening the local competition for resources. But we have also stressed the long-run costs of low population density. Increasing population densities represent an opportunity for institutional developments and agglomeration effects that are favorable to long-run growth. Meanwhile falling dependency ratios will produce at least a modest growth dividend in much of the region in the decades ahead.

5.4 Final thoughts

Our aim in this Chapter has been to provide a self-contained review of the stylized facts of African growth and the insights offered by the growth econometrics literature. These ingredients shaped the country studies in Volume 2 and provided the basic dimensions of the synthesis taxonomy. If we have whetted the reader's appetite for the contributions that follow, then we will have succeeded. As for the past, our privilege has been to see it

whole, through the eyes of Growth project researchers intimately familiar with their countries' economic histories and personally invested in what comes ahead. May the next 40 years belong to Africa, and to them.

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Box: The endogeneity problem in growth econometrics

OLS regressions uncover a causal relationship only if the determinants under consideration are uncorrelated with the residual. If they are not, then OLS coefficients contain an endogeneity bias that cannot be eliminated even with an arbitrarily large data sample. In the growth context, the two most troubling sources of endogeneity are simultaneity and omitted variables.

The most common approach to endogeneity bias is to purge the regression of endogenous determinants by modeling these variables, at least implicitly, as functions of predetermined variables. The investment rate may be eliminated, for example, in favor of demographic variables that affect investment via national saving and are more plausibly predetermined over the 5-or 10-year span of country/period observations. In the limit, this approach produces an econometric reduced form, in which all explanatory variables are predetermined and causality flows unambiguously from the explanatory variables to growth. A drawback of this approach is that it places an increasing distance between the included determinants and growth outcomes, in the process often suppressing the structural relationships of most interest to the investigator.

If endogeneity arises from the omission of unobserved but time-invariant attributes of countries or regions (e.g. cultural attributes that affect both growth and the included determinants), a second approach is to eliminate all cross-country or cross-region variation from the data. This can be done by estimating the regression model using deviations from country or region averages (the “fixed effects” estimator). The cost here

is that many of the most important growth determinants vary more strongly across countries than within countries; a substantial amount of information is therefore lost.

A final approach relies on uncovering sources of quasi-experimental variation in the potentially endogenous determinants. “Instrumental” variables are predetermined variables that affect the determinants of interest but are not otherwise correlated with growth. If such variables can be identified, their variation can be used to induce predetermined variation in the otherwise endogenous determinants. While this approach represents the state of the art in growth econometrics, its success depends very strongly on the quality of the instruments. In general, when the instruments only weakly predict the endogenous determinants, small-sample bias is known to be severe; when they strongly predict these determinants, it is less likely that they are predetermined. Controversy therefore abounds here, and particularly so in the growth context where good instruments are difficult to find.

See Wooldridge (2003) for a thorough treatment of these issues and Angrist and Krueger (2001) for details on instrumental variables and related approaches.

Table 1: Regional growth comparisons (cross-country averages within regions)

Region	N	Initial values (1960 or earliest year before 1965, or as indicated)				End-to-end annual growth rates (earliest year before 1965 to latest year between 1995 and 2000)					Ending values (latest year between 1995 and 2000)			
		Real GDP per capita (1996 PPP\$)	Gross primary enrollment rate, 1970	Adult illiteracy rate, 1970	Life expectancy at birth	Total	Population	Real GDP per capita			Real GDP per capita (1996 PPP\$)	Gross primary enrollment rate	Adult illiteracy rate	Life expectancy at birth
								Total	Workers per capita	Real GDP per worker				
SSA	35	1278.1 (15.0)	53.8 (52.8)	55.8	41.1 (58.5)	3.20	2.63	0.56	-0.15	0.72	2047.5 (8.4)	90.1 (86.4)	41.2	47.8 (61.1)
OTHER DEV'ING	43	2591.5 (30.5)	90.5 (88.9)	26.5	53.2 (75.8)	4.28	2.16	2.12	0.23	1.90	6409.1 (26.2)	107.4 (103.0)	17.9	69.7 (89.1)
...LAC	22	3338.4 (39.2)	99.1 (97.3)	17.4	56.4 (80.3)	3.52	2.08	1.44	0.42	1.03	6268 (25.6)	113 (108.3)	11.1	70.8 (90.5)
...SASIA	5	934.4 (11.0)	58.6 (57.6)	55.5	45.3 (64.5)	4.34	2.23	2.10	-0.32	2.42	2186.3 (8.9)	100.1 (96.0)	45.2	63.8 (81.6)
...EAP	9	1833.1 (21.5)	94 (92.3)	20.4	50.6 (72.1)	5.48	2.07	3.41	0.16	3.29	8691 (35.5)	101.3 (97.1)	11.4	69.6 (89.0)
...MENAT	7	2402.5 (28.2)	81.9 (80.5)	42.3	51.7 (73.6)	5.09	2.48	2.61	0.13	2.48	6934.7 (28.3)	103 (98.8)	27.8	70.6 (90.3)
INDUST	22	8507.6	101.8	--	70.2	3.45	0.71	2.74	0.34	2.41	24489.2	104.3	--	78.2
Total	100	3433.3	80.4	38.1	52.7	3.72	2.00	1.71	0.12	1.60	8860.2	100.6	27.1	63.9
SSA v SASIA		(136.8)	(91.8)	(100.5)	(90.7)	--	--	--	--	--	(93.7)	(90.0)	(91.2)	(74.9)
SSA v OtherDev		(49.3)	(59.4)	(210.6)	(77.3)	--	--	--	--	--	(31.9)	(83.9)	(230.2)	(68.6)

Source: PWT6.1 and World Development Indicators. Regions: SSA=Sub-Saharan Africa; OTHER DEV'ING=Other Developing (LAC=Latin America and Caribbean, SASIA=South Asia, EAP=East Asia and Pacific, MENAT=Middle East, North Africa and Turkey); INDUST=Industrial countries.

Notes: Except in the final 2 rows, the numbers in parentheses give the relevant developing-country mean as a percentage of the industrial-country mean. The final 2 rows show the SSA mean as a percentage of the SASIA mean and the mean for all non-SSA developing countries.

Table 2: Dates of political independence, developing countries

Region	<i>n</i>	Proportion of countries politically independent				
		<i>10%</i>	<i>25%</i>	<i>50%</i>	<i>75%</i>	<i>all</i>
SSA	46	1957	1960	1961	1966	1993
Other Developing	66	1830	1830	1946	1961	1981
<i>of which:</i>						
LAC	27	1818	1825	1840	1962	1981
ASIA	20	1816	1933	1948	1956	1975
MENAT	19	1816	1932	1948	1962	1971
Total	112	1822	1907	1960	1964	1993

Source: Gleditsch database. LAC refers to Latin America and Caribbean, ASIA to Asia, MENAT to Middle East, North Africa and Turkey.

Table 3: Countries in the Growth project

Country	Average growth in real GDP per capita, 1961-2000	Percentage share in total SSA:		Ratio of GDP per capita to SSA average, 1960	Authors of country study
		Population in 1960	GDP in 1960		
<i>Coastal opportunity group</i>					
Benin	0.63	1.03	0.82	0.74	Antonin. S. Dossou and Jean-Yves Sinzogan with Sylviane Mensah
Cote d'Ivoire	0.57	1.73	2.06	1.10	Marcel Kouadio Benie
Ghana	-0.21	3.11	1.91	0.57	Ernest Aryeetey and Augustin K. Fosu
Kenya	1.23	3.82	2.20	0.53	Francis F. Mwege and Njuguna S. Ndung'u
Mauritius	3.70	0.30	0.69	2.11	Shyam Nath and Yeti Nisha Madhoo
Mozambique	-0.38	3.42	3.96	1.07	Clara Ana de Sousa and José Sulemane
Senegal	-0.24	1.46	1.98	1.25	Mansour Ndiaye and Adama Diaw
Tanzania	1.83	4.68	1.32	0.26	Nkunde Mwase and Benno Ndulu
Togo	0.86	0.70	0.46	0.61	Tchabouré Aimé Gogué and Kodjo Evlo
CO group	0.89*	20.24[†]	15.39[†]	0.92*	
<i>Landlocked opportunity group</i>					
Burkina Faso	1.25	2.12	1.20	0.52	Kimseyinga Savadogo, Siaka Coulibaly, and Coleen McCracken
Burundi	0.20	1.35	0.51	0.35	Janvier Nkurunziza and Floribert Ngaruko
Chad	-0.72	1.40	1.22	0.80	Nadjiounoum Djimtoingar and Jean-Paul Azam
Ethiopia	0.41	10.44	4.05	0.36	Alemayehu Geda
Malawi	1.36	1.62	0.50	0.29	Chinyamata Chipeta and Mjedo Mkandawire
Mali	-0.27	1.99	1.46	0.68	Massaoly Coulibaly and Amadou Diarra
Niger	-1.65	1.46	1.74	1.11	Ousmane Samba Mamadou and Mahaman Sani Yakoubou
Sudan	0.75	5.22	3.89	0.69	Ali Abdel Gadir Ali and Ibrahim A. Elbadawi
Uganda	1.40	3.01	1.24	0.38	Louis A. Kasekende and Michael Atingi-Ego
LL group	0.31*	28.61[†]	15.83[†]	0.58*	
<i>Resource-rich opportunity group</i>					
Botswana	6.33	0.22	0.16	0.67	Gervase S. Maipose and Thalepo C. Matsheka
Cameroon	0.66	2.43	3.03	1.16	Georges Kobou, Dominique Njinkeu and Bruno Powo Fosso
Congo, Rep.	1.33	0.45	0.15	0.31	Célestin Tsassa and Benjamin Yamb
Guinea	0.02	1.44	2.92	1.88	Sékou F. Doumbouya and Fodé Camara
Namibia	0.62	0.28	0.69	2.24	Tekaligne Godana and John E. Odada

Nigeria	0.32	18.71	14.30	0.71	Milton A. Iyoha and Dickson E. Oriakhi
Sierra Leone	-1.36	1.03	0.82	0.74	Victor A. B. Davies
Zambia	-1.25	1.44	1.24	0.80	Inyambo Mwanawina and James Mulungushi
RR group	0.83*	26.00[†]	23.31[†]	1.06*	
Total	0.67*	74.85[†]	54.53[†]	0.84*	

Note: * Average for category; [†]Total for category. The comparisons are vis-à-vis all 42 countries in SSA for which we have data on population and real GDP at international prices. The RR group contains all countries classified in Chapter 2 as resource-rich for more than half of the 1960-2000 period.

Table 4: Long-run growth rates of regional population, GDP, and GDP per capita

	SSA	Other Developing Regions			
		Total	of which:		
			LAC	ASIA	MENAT
<i>Population</i>					
1820-1870	0.3	0.2	1.3	0.1	0.5
1870-1913	0.9	0.6	1.6	0.6	0.3
1913-1950	1.6	1.0	2.0	0.9	1.3
1950-2001	2.6	2.0	2.3	1.9	2.7
Peak year*	1983	1971	1960	1971	1981
Peak rate*	3.00	2.52	2.87	2.52	3.34
<i>Real GDP (PPP-adjusted 1990 dollars)</i>					
1820-1870	0.6	0.1	1.2	0.0	1.0
1870-1913	1.1	1.3	3.5	1.1	1.6
1913-1950	2.7	1.5	3.4	0.9	2.5
1950-2001	3.3	5.0	4.0	5.4	4.9
<i>Real GDP per capita (PPP-adjusted 1990 dollars)</i>					
1820-1870	0.2	-0.1	0.0	-0.1	0.5
1870-1913	0.2	0.7	1.8	0.5	1.2
1913-1950	1.1	0.5	1.4	-0.1	1.1
1950-2001	0.7	3.0	1.7	3.4	2.2
<i># of countries</i>	53	90	27	42	21

Source: Maddison (2001). The table pertains to region-wide totals. SSA comprises Maddison's *Africa* excluding North Africa. LAC comprises *Latin America* and includes the Caribbean. ASIA is Maddison's *East Asia*. MENAT (Middle East, North Africa and Turkey) corresponds to Maddison's *West Asia* plus North Africa. Libya could not be separated out and is therefore included here in SSA rather than in MENAT.

*Peak year and peak rate correspond to the earliest year after which all subsequent population growth rates are lower.

Table 5: Regional growth accounting decompositions (annual growth rates except where noted)

Region	N	Real GDP	Popula- tion	Real GDP per capita	Workers per capita	Real GDP per worker	Contributions of:		
							K per worker	Educ per worker	Resid
SSA	18	3.25	2.70	0.54	-0.07	0.61	0.36	0.25	0.00
Other Developing:									
LAC	21	3.49	2.17	1.32	0.39	0.92	0.41	0.34	0.18
SASIA	4	4.45	2.23	2.22	-0.32	2.54	1.11	0.32	1.11
EAP	7	6.21	2.04	4.17	0.22	3.95	2.11	0.49	1.35
MENAT	9	4.84	2.19	2.65	0.13	2.52	1.19	0.44	0.90
Total	59	4.01	2.32	1.68	0.14	1.54	0.76	0.34	0.43
SSA minus Other Developing		-1.10	0.55	-1.64	-0.31	-1.33	-0.57	-0.13	-0.63

Source: PWT6.1; initial capital stock and educational contribution from Susan Collins. For definition of regions see Table

Table 6: Regional comparisons of volatility

Region	N	Regional averages of country-level standard deviations				Correlation between current and lagged growth	
		Annual data		Non-overlapping 5-year averages			
		Growth of real GDP per capita	Prediction error	Growth of real GDP per capita	Prediction error	5-year periods	Decades
SSA	38	7.31	6.91	3.36	2.56	0.07	0.30
MENAT	8	5.92	5.51	2.71	1.94	0.03	-0.10
Other Developing	37	4.30	4.04	2.31	2.01	0.39	0.42
INDUST	22	2.69	2.43	1.69	1.30	0.31	0.41
Total	105	5.18	4.85	2.59	2.06	0.25	0.41
SSA intercept*		2.147***	2.081***	0.912***	0.399	--	--
Robust standard error		0.600	0.583	0.285	0.277	--	--

Source: PWT6.1. Prediction errors are calculated from country-by-country annual or half-decadal AR(2) processes for the growth rate of real GDP per capita. For definition of regions see Table *Coefficient on an SSA dummy variable in a cross-sectional regression of country-level standard deviations on the log of PPP-adjusted per capita real GDP at PPP\$ ($N=105$; $R^2 = .424$ and $.421$).

*** = significant at the 1% level.

Table 7: External shocks and the volatility of growth
 Dependent variable: standard deviation of growth in real GDP per capita.

Variable	(1)	(2)	(3)	(4)
$\ln(y_{init})$	-1.089 (0.225)***	-0.647 (0.340)*	-0.552 (0.356)	-0.337 (0.447)
$sd[xsh * \ln(tot)]$	--	--	0.424 (0.069)***	0.392 (0.075)***
$sd[ash * \ln(rain)]$	--	--	0.139 (0.082)*	0.118 (0.080)
$sd[\ln(ytp)]$	--	--	1.685 (0.757)**	1.794 (0.754)**
SSA	--	1.483 (0.661)**	--	0.858 (0.591)
Constant	13.361 (1.794)***	9.428 (2.850)***	4.780 (3.902)	2.812 (4.767)
Observations	110	110	110	110
R-squared	0.14	0.20	0.42	0.44
F stat	23.443	19.624	24.333	20.204
Prob>F	0.0000	0.0000	0.0000	0.0000

Robust standard errors in parentheses (*significant at 10%; **5%; ***1%).

Notes: Observations are countries. The notation ‘ \ln ’ refers the change in the log from year to year, and ‘ sd ’ refers to a country-level standard deviation calculated over the 1960-2000 period. y_{init} is initial (= 1960) real GDP per capita at international prices; xsh is the average ratio of merchandise exports to GDP over the full period and tot is the barter terms of trade (price index of merchandise exports divided by price index of merchandise imports); ash is the average ratio of agricultural value added to GDP at current prices over the full period; $rain$ is area-weighted average annual rainfall in millimeters, based on gridded climatology data; ytp is the trade-weighted average growth rate of real GDP per capita among trading partners; and SSA is a dummy variable for Sub-Saharan Africa.

Table 8: Pooled conditional regressions
Dependent variable: Growth of real GDP per capita

<i>Variable</i>	(1)	(2)	(3)	(4)
Initial real GDP per capita	-1.363 (0.000)***	-1.259 (0.000)***	-1.115 (0.000)***	-0.740 (0.015)**
Initial years of life expectancy	0.065 (0.045)**	0.085 (0.001)***	0.064 (0.011)**	0.049 (0.078)*
Age dependency ratio	-0.044 (0.001)***	-0.043 (0.000)***	-0.046 (0.000)***	-0.042 (0.003)***
Growth of potential LF participation	0.655 (0.008)***	0.965 (0.001)***	0.924 (0.004)***	1.009 (0.006)***
Landlocked	-0.469 (0.256)	0.010 (0.979)	0.179 (0.686)	0.662 (0.202)
Trading-partner growth	0.551 (0.001)***	0.378 (0.030)**	0.304 (0.094)*	0.416 (0.059)*
Income effect of TOT improvements	0.032 (0.154)	0.036 (0.012)**	0.043 (0.005)***	0.049 (0.004)***
Political instability	-0.292 (0.000)***	-0.240 (0.001)***	-0.257 (0.001)***	-0.212 (0.009)***
Inflation rate (< 500)	-0.010 (0.015)**	-0.016 (0.011)**	-0.016 (0.010)**	-0.015 (0.011)**
Black market premium (< 500)	-0.014 (0.023)**	-0.013 (0.002)***	-0.012 (0.020)**	-0.014 (0.003)***
Overvaluation index	--	--	-0.007 (0.017)**	-0.009 (0.016)**
Unproductive gov't cons/GDP	-0.099 (0.001)***	--	--	--
Total gov't consumption/GDP	--	-0.031 (0.022)**	-0.024 (0.114)	-0.024 (0.172)
log of M2/GDP ratio	--	--	--	0.173 (0.020)**
Constant	11.575 (0.000)***	9.014 (0.000)***	9.908 (0.000)***	6.601 (0.029)**
Observations	495	676	592	415
R-squared	0.356	0.339	0.357	0.357
F stat	12.441	13.214	14.012	20.268
Prob>F	0.0000	0.0000	0.0000	0.0000

Robust *p* values are in parentheses (*significant at 10%; ** significant at 5%; *** significant at 1%).

Notes: Observations are half-decadal averages or initial half-decadal values (as indicated) from 1960-64 to 2000-04. The sample is unbalanced (not all countries have a full set of observations). The regressions contain a full set of half-decadal dummy variables whose coefficients are not reported here.

Definition of variables: *Initial real GDP per capita* is at international prices. The *age dependency ratio* is the ratio of population below 15 or over 65 to total population. *Growth of potential LF (labor force) participation* is the growth rate of the ratio of population of working age to overall population. *Trading-partner growth* is the trade-weighted average growth of real GDP per capita among trading partners. The *income effect of TOT improvements* is the average income effect of the change in the terms of trade using the final year of the previous half-decade as base: higher values represent more favorable terms of trade movements. *Political instability* is the number of strikes, revolutions or assassinations. The *inflation rate* is calculated as $100 * \ln(1 + \pi)$ where π is the CPI inflation rate. The *black market premium* is the percentage excess of the annual average black market exchange rate over the annual average official exchange rate. For both π and the black market premium, we omit half-decadal observations where these take values above 500 percent. The *overvaluation index* extends the index constructed for 1976-85 by Dollar (1992): we constructed the bilateral real exchange rate against the U.S. dollar as

$e_{it} = CPI_{it} / (E_{it} \cdot CPI_{USA,t})$ where E_{it} is country i 's average nominal official exchange rate in year t (locals per U.S. dollar), and then re-based this series to equal Dollar's overvaluation index on average for 1976-85. Values greater than 100 denote overvaluation. *Unproductive government consumption* is defined as government consumption at international prices excluding spending on defense and education; this variable was introduced by Barro and Lee (1994) and we have extended it past 1984 using IMF data on government spending categories. Both government consumption variables use data at international prices. For data sources and further details on construction of the variables, see O'Connell and Ndulu (2000); all variables are as described there, with the exception of the inflation variable (in O'Connell and Ndulu 2000, we used π itself rather than the log transformation which we have adopted here).

Table 9: Regression-based growth decompositions.

Deviations from sample mean	Regression 1			Regression 2			Regression 3			Regression 4		
	SSA	Other	Indust	SSA	Other	Indust	SSA	Other	Indust	SSA	Other	Indust
Growth	-1.09	0.09	0.60	-1.14	0.24	0.92	-1.20	0.12	0.98	-1.09	0.46	1.22
<i>Contribution of:</i>												
Initial conditions	0.49	0.33	-0.81	0.08	0.27	-0.58	0.25	0.22	-0.63	-0.02	0.06	-0.51
Demography	-0.91	-0.14	0.82	-0.84	0.09	0.84	-0.92	0.02	0.87	-0.70	0.29	0.85
Landlocked status	-0.12	0.04	0.02	0.00	0.00	0.00	0.04	-0.02	-0.01	0.14	-0.06	-0.11
Shocks	-0.01	-0.02	0.03	-0.02	-0.02	0.05	-0.03	-0.02	0.07	-0.04	0.00	0.17
Political instability	0.11	-0.09	0.06	0.07	-0.08	0.06	0.08	-0.09	0.07	0.08	-0.06	0.15
Policy	-0.71	-0.05	0.56	-0.20	-0.14	0.49	-0.29	-0.08	0.43	-0.32	0.11	0.66
Period fixed effects	0.11	-0.01	-0.05	-0.07	-0.01	0.1	-0.22	0.00	0.21	-0.12	0.04	0.25
Residual	-0.06	0.03	-0.01	-0.17	0.13	-0.04	-0.11	0.08	-0.02	-0.11	0.08	-0.24

Source: Regressions in Table 9. Contributions are average regional deviations from the sample mean, multiplied by the relevant regression coefficients. *Initial conditions* include initial income and life expectancy; *Demography* includes age dependency ratio and the growth in the potential LF participation rate; *Shocks* include the income effect of the TOT and the partner-country growth rate, and *Policy* includes the inflation rate and all variables listed below it in Table 9. Note: where the contributions do not add exactly to the growth deviation, this is due to rounding.

Table 10: Ethnic fractionalization and growth.

Dependent variable	Regression from Table 9			
	1	2	3	4
<i>Main regression</i>				
Growth in real GDP per capita	-0.522 (0.500)	-0.236 (0.736)	-0.198 (0.795)	0.252 (0.782)
<i>Auxiliary regressions</i>				
Initial conditions and demography	-0.432* (0.071)	-1.276*** (0.000)	-1.012*** (0.000)	-1.180*** (0.000)
Political instability	-0.048 (0.594)	0.012 (0.846)	0.007 (0.919)	0.070 (0.374)
Policy	-1.146*** (0.000)	-0.652*** (0.000)	-0.528*** (0.001)	-0.539* (0.052)

Robust *p*-values are in parentheses (*=significant at the 10% level; **=5%; ***=1%).

Notes: The entries show estimated coefficients on the Fearon (2002) cultural fractionalization variable. In the main regression, this variable is simply added to the list already present in Table 9. In the auxiliary regressions, the dependent variables are the regression-weighted values of groups of determinants that appear in the relevant main regression. Thus for initial conditions and demography and column 2, the dependent variable is the sum of initial real GDP per capita, the initial life expectancy at birth, the age dependency ratio, and the growth of the potential labor force participation rate, all weighted by their regression coefficients from column 2 of Table 9.

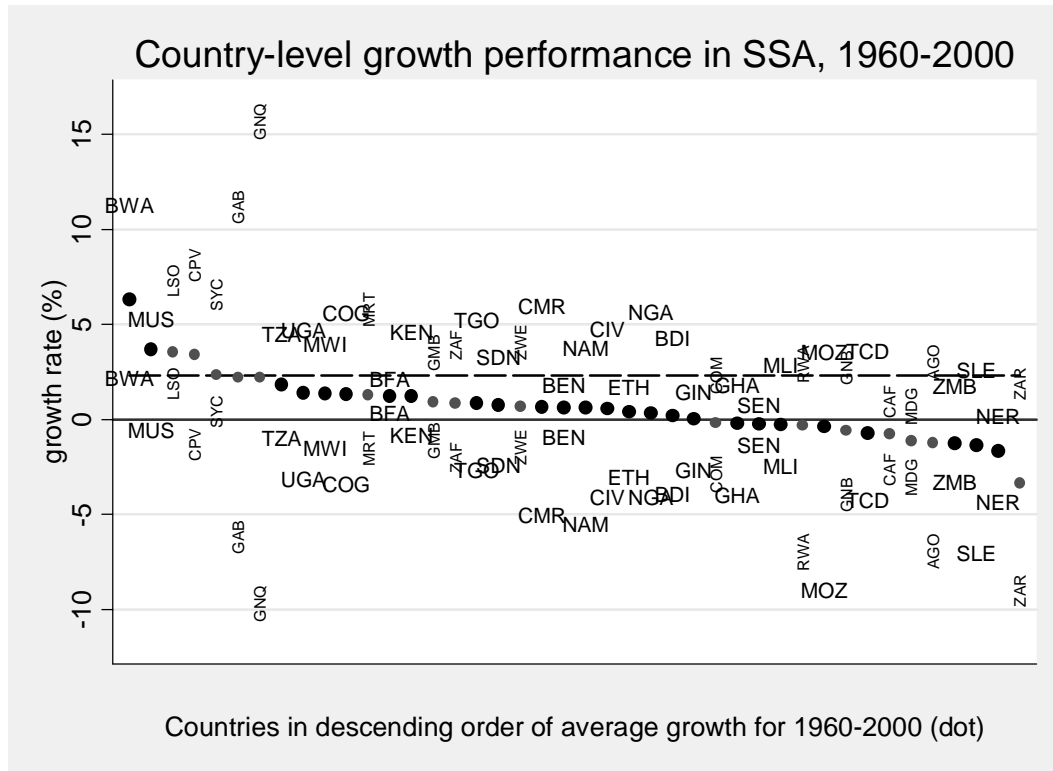
Table 11: Frequency of syndromes by opportunity category.

	Coastal	Landlocked	Resource- Rich	Total
<i>Distribution of post-independence country/years</i>				
Percent	45.4	30.3	24.3	100
<i>Frequency of Syndromes (% of country/years)*</i>				
Regulatory	48.8	46.2	35.1	44.7
Redistributive	24.2	35.4	30.0	29.0
Intertemporal	10.5	8.1	18.2	11.6
State Breakdown	10.3	18.5	13.3	13.5
Syndrome Free	31.7	26.9	45.5	33.6

Notes: The table uses all observations for 48 African countries, from the earlier of 1960 and the year of independence to 2000. For the population-weighted incidence of syndromes see Chapter 2, Table 7.

*Column sums exceed 100% because countries can exhibit multiple syndromes.

Figure 1: Country-level growth performance in SSA, 1960-2000.



Notes: The figure ranks the countries of SSA from left to right, in descending order of the long-run average growth rate of real GDP per capita. Heavy dots indicate the country-specific long-run averages, and the dashed horizontal line shows the global median (2.3 percent). For each country, 3-letter labels indicate the upper and lower extremes of medium-term growth experience, measuring these as the fastest and slowest 10-year moving averages of growth over the course of the sample. Thus for example: Botswana (the left-most country) has the highest long-run growth, at above 6 percent per annum; its fastest 10-year moving average was above 11 percent and its slowest was just below the global mean. Horizontal (vertical) labels and dark (lighter) dots indicate case-study (non-case-study) countries. We exclude Somalia for lack of data and Liberia for scaling purposes (a moving average of its logarithmic growth rate from 1985 to 1995 is -25.7): Liberia's long-run growth is -3.5, slightly below that of the Democratic Republic of Congo (ZAR) at -3.3. Annual growth rates are log differences of real GDP per capita in local currency units from the World Bank, supplemented in a few cases of unavailable World Bank data, by log differences of real GDP per capita in constant international dollars from the Penn World Tables, v. 6.1. For Tanzania, we use the PWT6.1 series, but treat 1988 as a missing observation because the series shows an erroneous massive downward adjustment in that year. The resulting long-run average, with this observation excluded, is close to the average calculated using the Penn World Tables v. 5.6.

Figure 2: Episodal growth analysis.

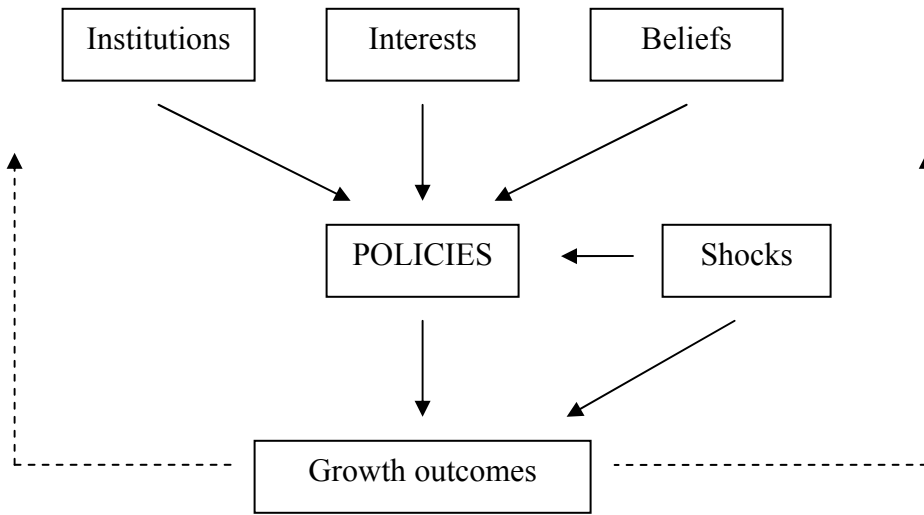
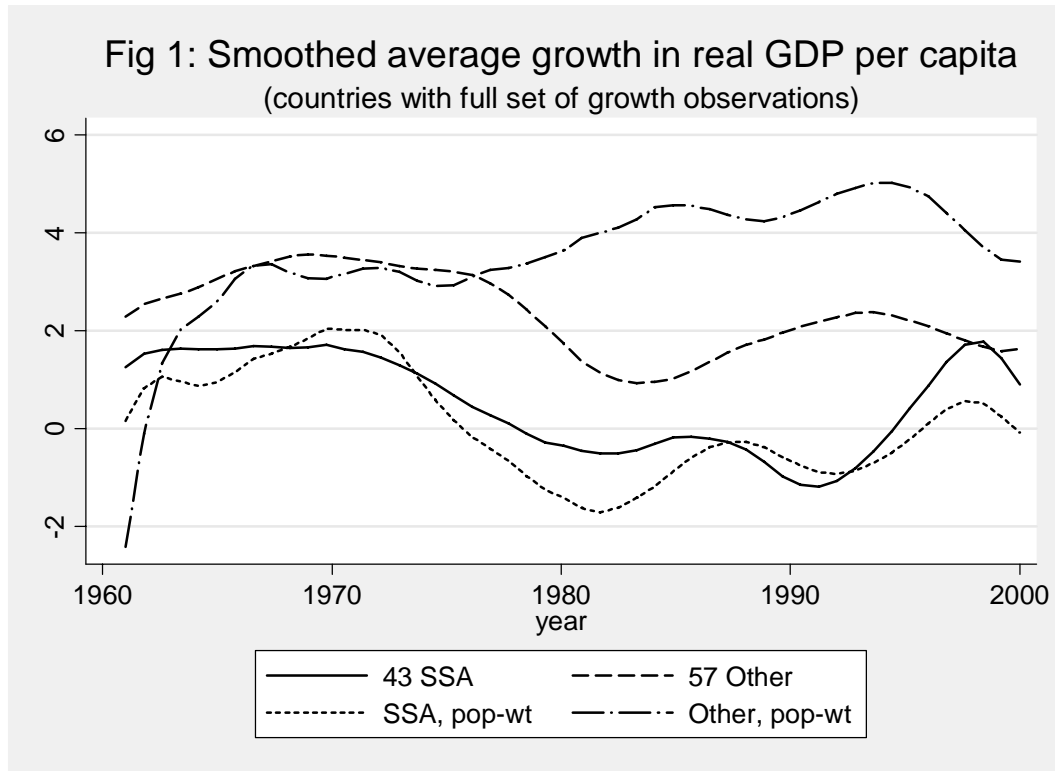
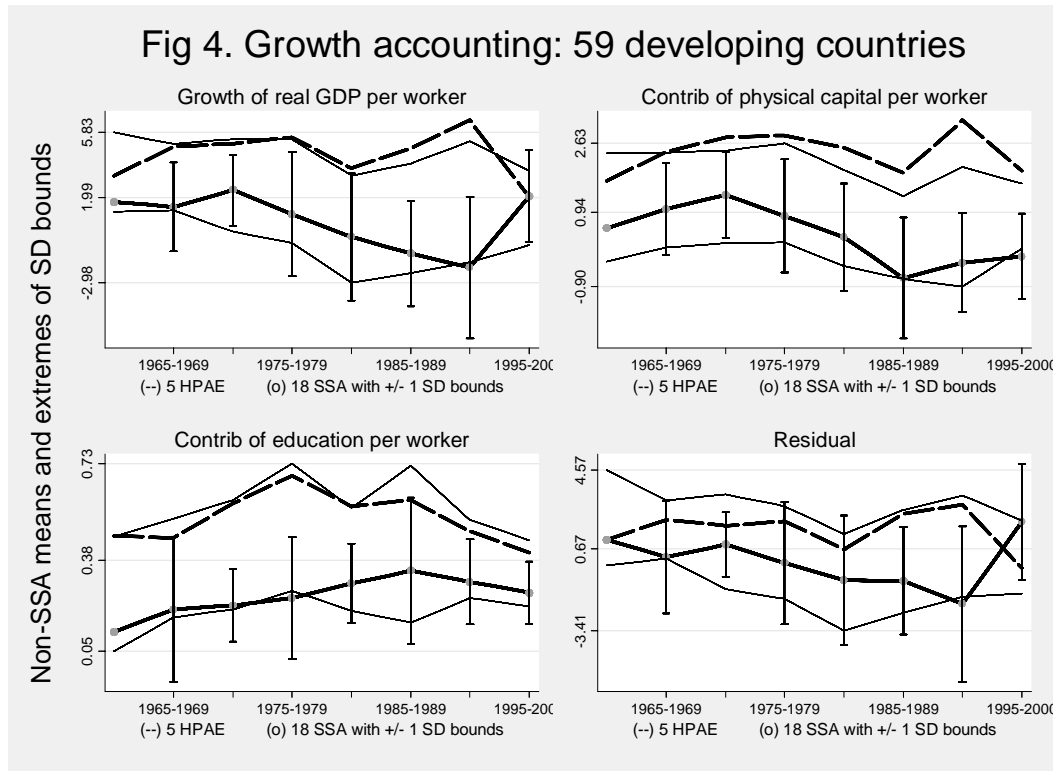


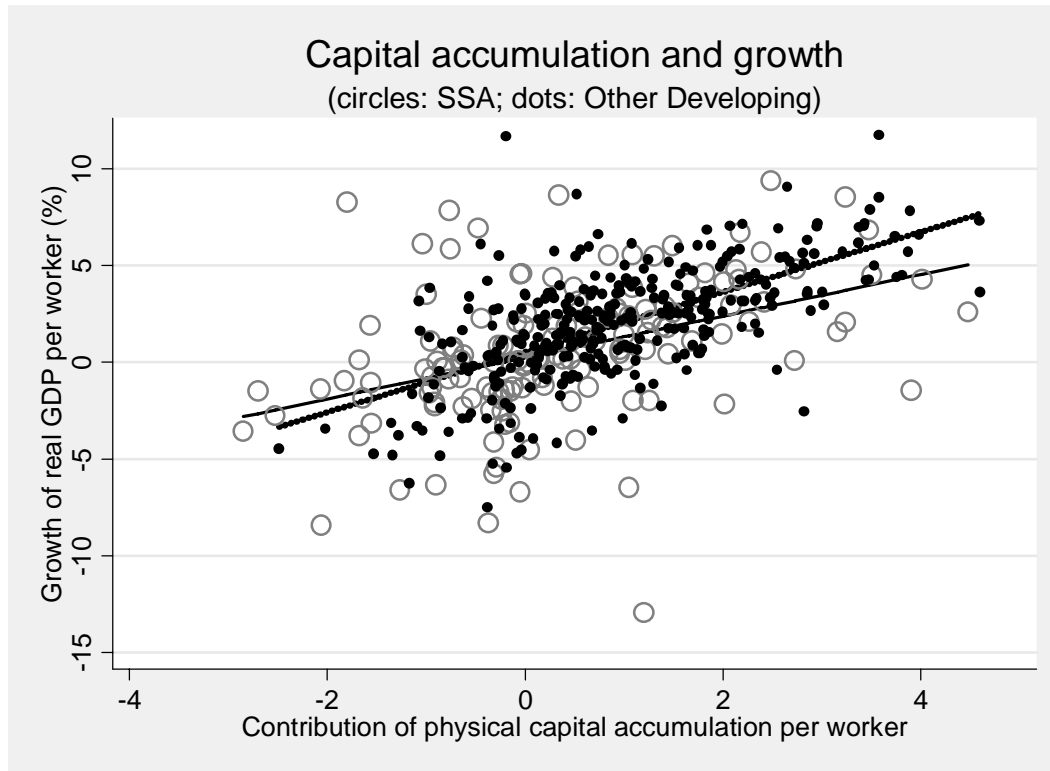
Figure 3: Smoothed average growth in real GDP per capita.

Notes: We smoothed the data using a kernel-weighted polynomial smoother of degree 1 (with an Epanechnikov kernel). Alternative approaches yield similar results.

Figure 4: Growth accounting over time.

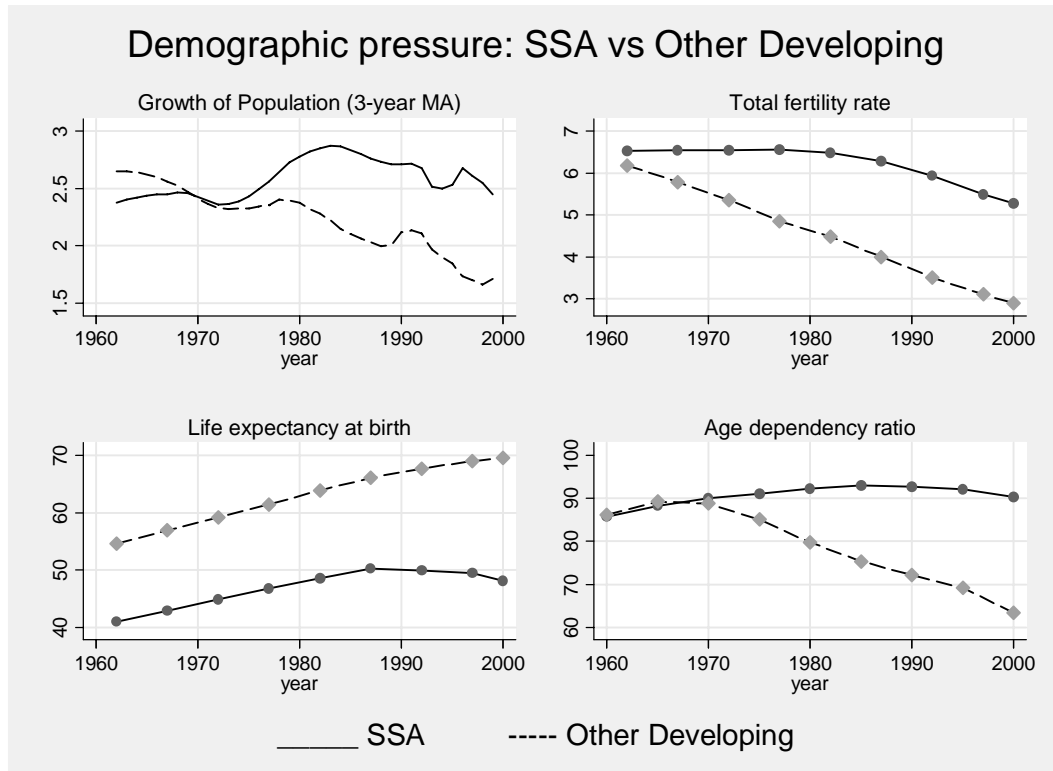


Notes: For each indicator, the heavy line shows the SSA mean calculated at non-overlapping 5-year intervals (dotted heavy lines show the high-performing Asian economies). Vertical bars show bounds of plus and minus one “within-SSA, within period” standard deviation around these means. Thin lines show +/- 1 standard deviation bounds around the half-decadal means for all other developing countries. The y-axis scale shows the long-run non-SSA mean and, for purposes of scaling, the range of the non-SSA +/- 1 standard deviation bounds

Figure 5: Capital accumulation and growth.

Notes: Observations are non-overlapping half-decadal averages between 1960-64 and 1995-2000 (144 observations from SSA, 328 from non-SSA developing countries). The slope coefficients from a pooled regression with separate slopes and intercepts are 1.55 ($t = 14.11$) for non-SSA and 1.07 ($t = 5.47$) for SSA. An F -test rejects equality of slope coefficients ($p = 0.033$).

Figure 6: Demographic pressures, developing regions.



Source: World Bank, World Development Indicators 2005. The figures show simple averages of country observations, for all countries with continuously available observations.

Figure 7: Life expectancy and adult illiteracy: SSA/year interactions.

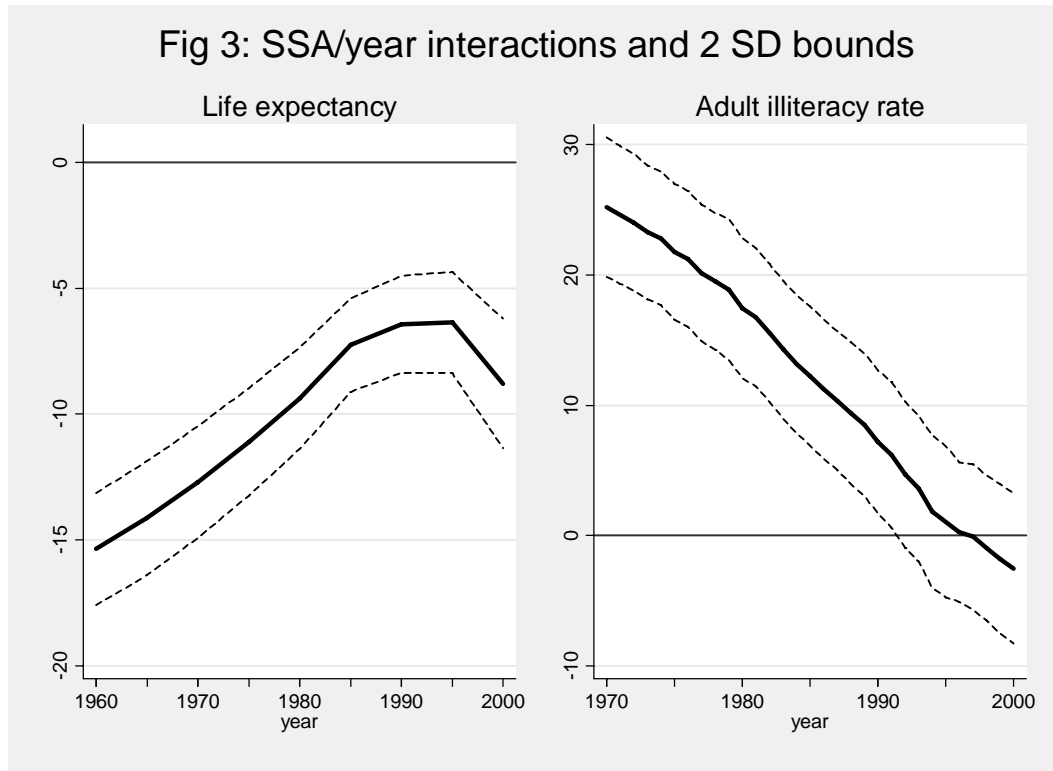


Figure 8: Democracy/autocracy and civil liberties.

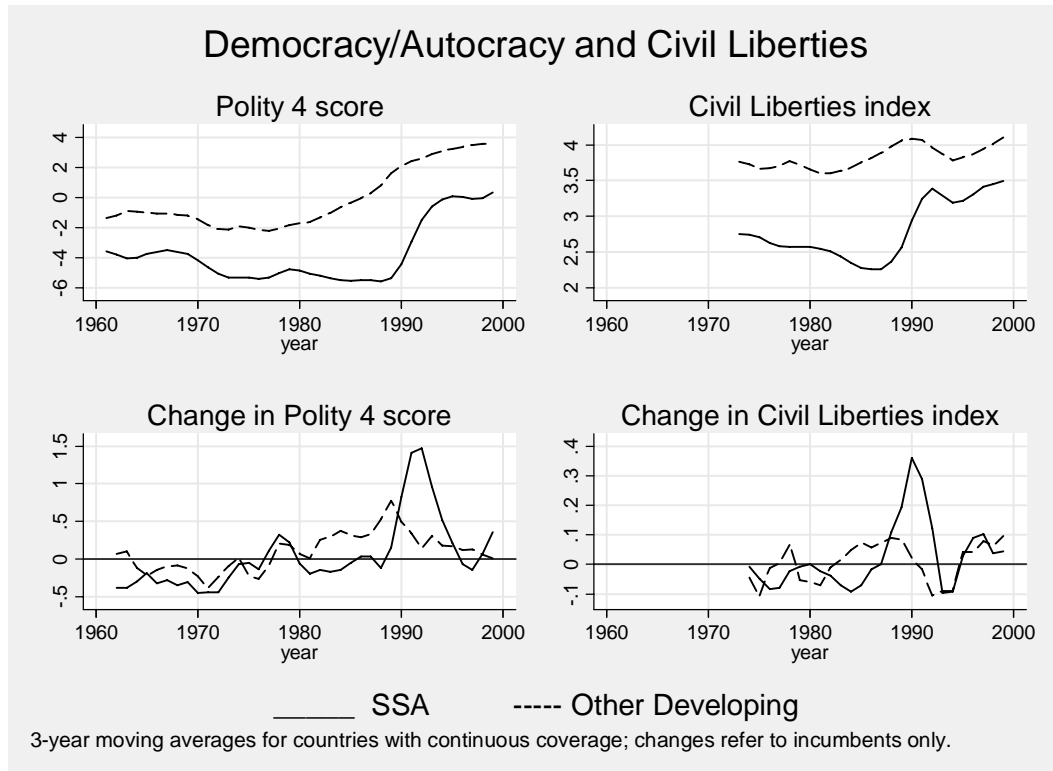
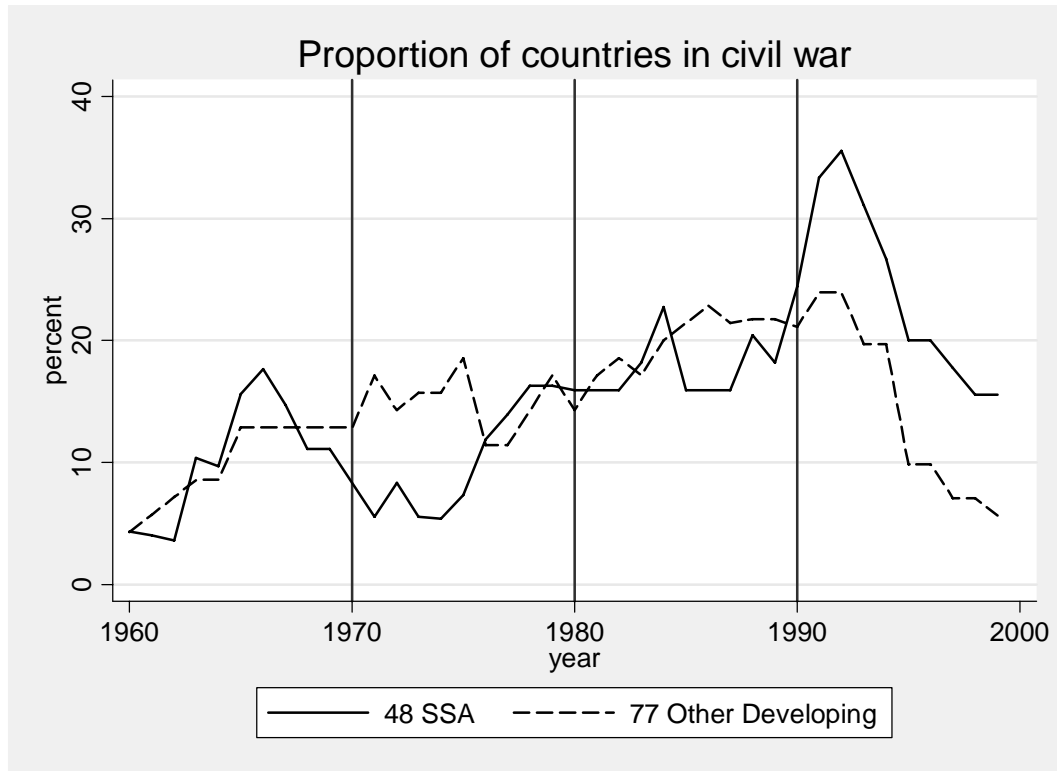


Figure 9: Proportion of countries in civil war.



Source: Civil war dummy variable constructed by N. Sambanis.

Figure 10: Policy coefficients by half-decade.

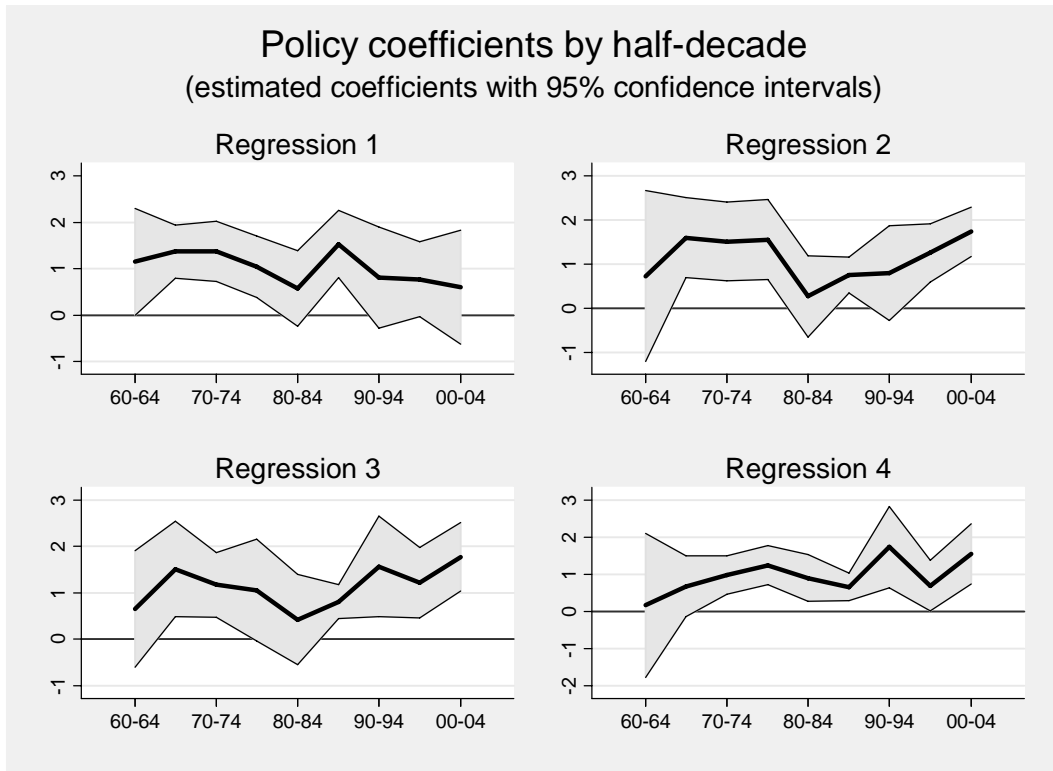


Figure 11: Policy variables over time.

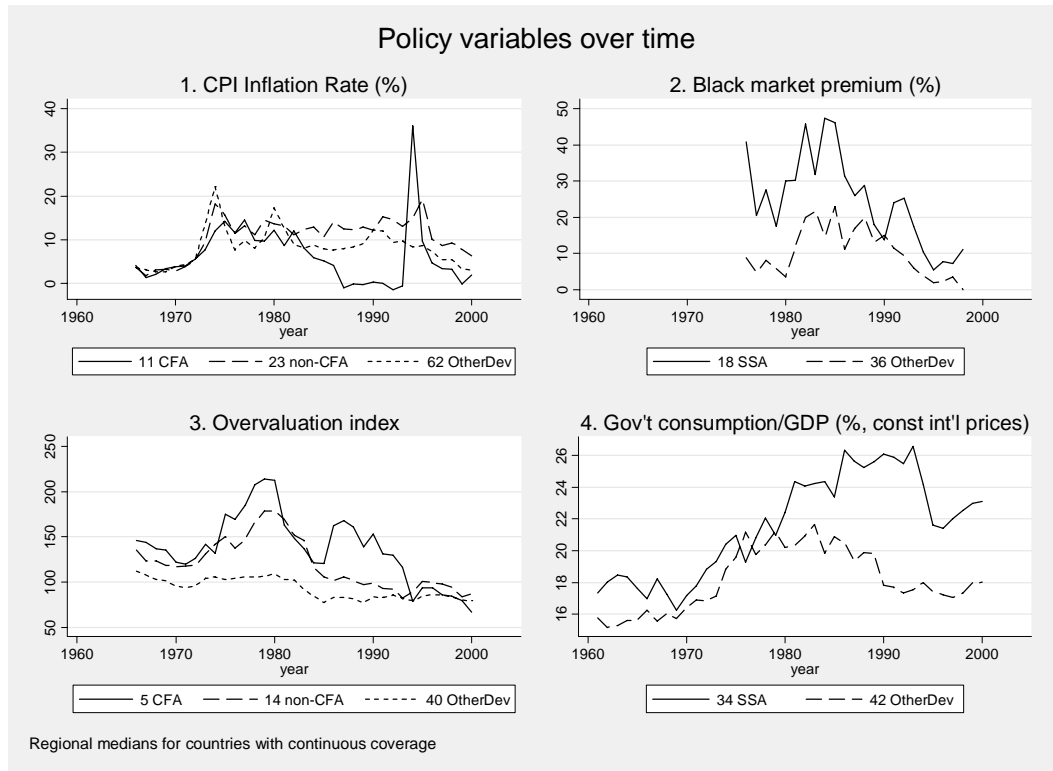
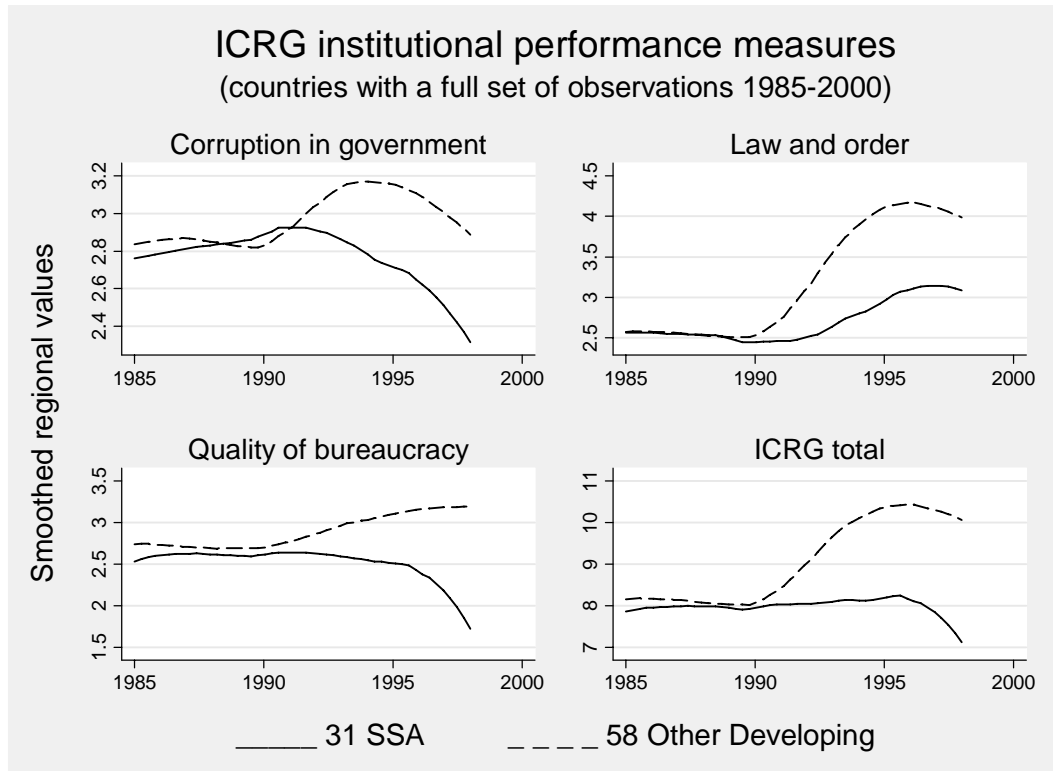
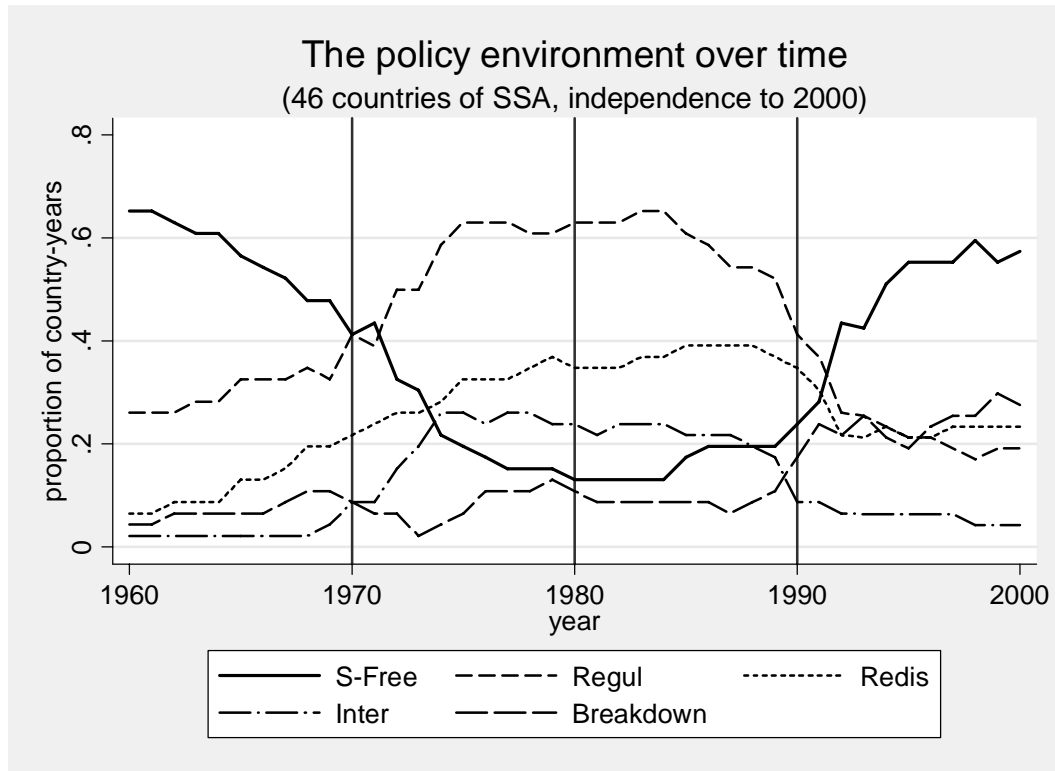


Figure 12: ICRG institutional performance measures, 1985-2000



Note: ICRG total is the sum of the other three measures.

Figure 13: The policy environment over time.

Source: Judgmental classification by editorial committee based on the country studies in Volume 2 and the broader literature. The syndromes are analyzed in detail in chapter 2. The sample includes Eritrea (a 47th country) starting in 1994.

Key: *S-Free* = Syndrome-free; *Regul* = Excessive regulatory controls; *Redis* = Inefficient redistribution; *Inter* = Unsustainable intertemporal redistribution; *Break* = State Breakdown.