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Is Poverty A Binding Constraint On Growth In Sub-Saharan Africa?

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1 Introduction

The literature on pro-poor growth studies the links from national growth strategies and patterns to poverty outcomes. The purpose of this chapter is to look at the other direction of the nexus: the links from poverty to growth.

By poverty we mean a state in which household consumption is below some absolute purchasing power standard. Figure 3.1 uses survey data from the World Bank's PovcalNet online database to compare the prevalence of consumption poverty in sub-Saharan Africa (SSA) in 2011 with that of other developing regions.[1] Africa is by far the poorest region in the world. If there are links from poverty to growth in the development process, then certainly Africa is the main place to worry about them and accommodate them in the formation of growth strategies.

Our central argument is that the most promising directions for country-based research on the links from poverty to growth involve microeconomic investigations of the effects of poverty on productivity. The bulk of the chapter is devoted to reviewing the dominant mechanisms through which these effects may emerge, both from a macro and from a micro perspective.

2 Development Traps: Framing the Issues

At the economy-wide level, a link from poverty to growth is a link from the level of income per capita, y, to the growth rate of income per capita, g. In

[1] <http://iresearch.worldbank.org/PovcalNet/index.htm?0>, last accessed 11 May 2015.

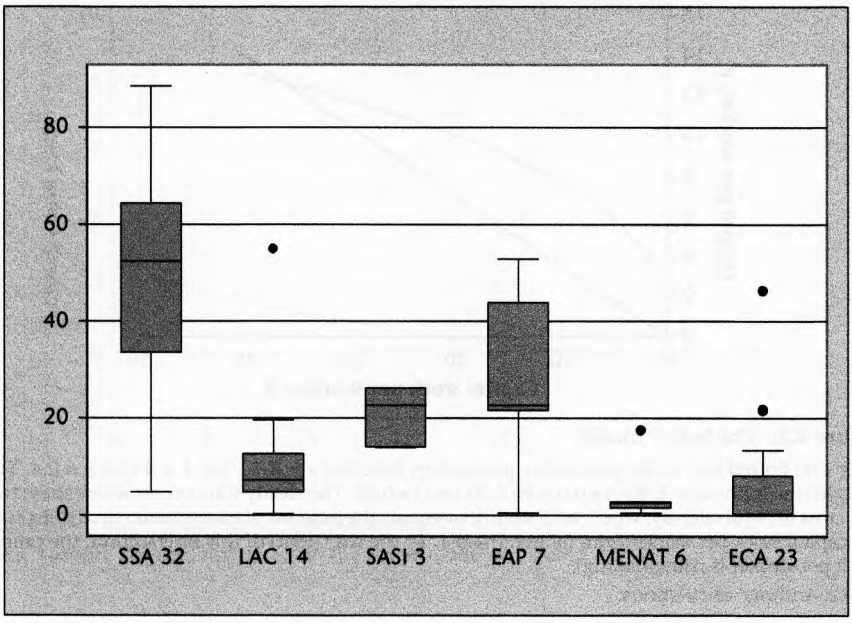

Figure 3.1. Poverty headcount ratios: percentage of population below $1.25 of consumption per day in 2011 (at 2005 PPP), by region

Notes: Headcounts are defined as the percentage of the population with consumption below $1.25 per day (at 2005 PPP).

The boxes enclose the central half of the distribution of headcounts for each region; the horizontal line within the box is at the regional median. The 'whiskers' extend to the maximum and minimum values for the region, excluding outliers which are shown as dots.

SSA = sub-Saharan Africa; LAC = Latin America and Caribbean; SASI = South Asia; EAP = East Asia and Pacific; MENA = Middle East and North Africa; ECA: Europe and Central Asia. Industrial economies are excluded.

PPP = purchasing power parity.

Source: World Bank, PovcalNet online database.

functional notation, $g = f(y; z)$, where z is a vector of underlying growth determinants or *fundamentals*. The Solow (1956) growth model provides a familiar example and we use it here as a point of departure.

2.1 *A growth-theory perspective*

Figure 3.2 shows a neoclassical production function $y = A\,k^{\alpha}$ where k is the capital stock per worker, $A > 0$ is the level of total factor productivity (TFP), which we treat here as a constant, and $\alpha \in (0,1)$ is the share of capital in national income. For given rates of saving, depreciation, and population growth (s, δ, and n), the capital stock per worker is stationary when saving is just sufficient to keep the capital stock per worker from falling—or, equivalently, when output per worker is a multiple $(n + \delta)/s$ of the capital stock per worker.

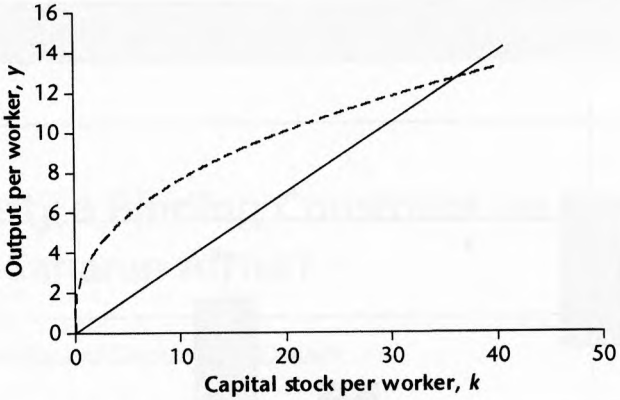

Figure 3.2. The Solow model

Note: The dotted line is the per-worker production function $y = A \cdot k^{\alpha}$, for $A = 3$ and $\alpha = 0.4$. The straight line is $[(n+\delta)/s] \cdot k$, for $n = 0.03$, $\delta = 0.04$ and $s = 0.20$. The steady state occurs where these two loci cross or, equivalently, where total saving $s \cdot y$ equals the amount of investment required to keep the capital stock per worker from falling, $(n+\delta) \cdot k$. To the left (right) of this intersection, the capital stock per worker is rising (falling).

Source: Authors' calculations.

Steady states therefore occur at all intersections of $A \cdot k^{\alpha}$ with $[(n + \delta)/s] \cdot k$. Given diminishing returns to capital, there is only one such intersection with a positive capital stock. At this steady state, the value of income per worker, $y^* = [A \cdot s/(n + \delta)]^{\alpha/1-\alpha}$, is a continuous function of the vector of fundamentals $z = [A, s, n, \delta, \alpha]$.

The phase diagram for the Solow model shows a monotonically decreasing relationship between growth and income, holding z constant (Figure 3.3). This configuration implies that, for a given set of fundamentals, the poorer a country is, the faster it grows. This property, known as *conditional convergence*, is widely viewed as the central implication of the neoclassical growth model (Mankiw, Romer, and Weil, 1992). A stronger version—*absolute convergence*—applies if cross-country differences in the fundamentals are small: in this case all countries approach the same steady state, and along the transition path the proportional difference between any two incomes shrinks over time. These convergence properties continue to hold if TFP grows at an exogenous rate common across all countries; in this case economies approach a steady-state growth path rather than a constant income level.

The Solow model therefore offers a simple account of the link between income and growth: holding the fundamentals constant, poor countries grow faster than rich ones, because low income indicates a scarcity of capital and therefore a high return on investment. The force of this link is greater if international capital mobility is stronger, but it holds even in a financially closed global economy.

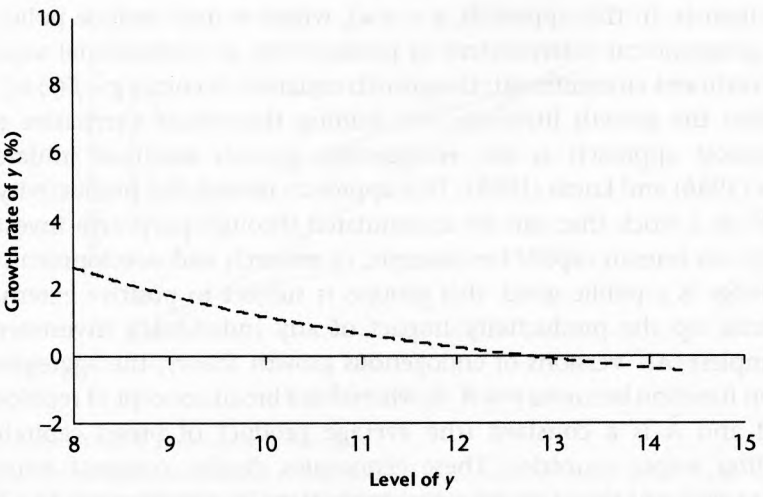

Figure 3.3. Phase diagram for the Solow model
Source: Authors' calculations, based on the Solow model in Figure 3.2.

As Pritchett (2004) puts it, absolute convergence fails 'big time', both over centuries and in data from the post-WWII period. Quah (1993; 1996; 2001) and others study the empirical distribution of cross-country incomes per capita after 1960 and argue that the way in which absolute convergence fails is not random. By contrast with a situation in which some countries are endowed with low-income fundamentals, others with medium-income, and others with high-income, the empirical distribution shows a tendency to develop twin peaks over time. Two *convergence clubs* can be distinguished, one of which has gone through a largely irreversible historical process of industrialization and development and the other of which—comprising the UN's least-developed countries, Collier's (2007) bottom billion, or larger groups below some development threshold—has not. The lagging growth performance of sub-Saharan Africa has played a major role in global divergence since 1960, and most of the continent continues to fall within the low-development group (Berthélémy, 2007; Ndulu and O'Connell, 2007; Sachs et al., 2004).

Not surprisingly, the Solow model does considerably better empirically once the fundamentals are allowed to differ across countries. The standard approach in the growth literature is to estimate a linearized version of $g = f(y; z)$ using cross-country panel data. When this is done, the parameter that captures $\partial f/\partial y$ is robustly negative and statistically significant (Mankiw, Romer, and Weil, 1992; Hoeffler, 2002). Barro (1991), Sachs and Warner (1997), and others go further, retaining the conditional convergence term but implicitly modeling the Solow fundamentals as functions of deeper

determinants. In this approach, $z = z(w)$, where w may include policy variables, geographical determinants of productivity, or institutional aspects of the investment environment; the growth equation becomes $g = f(y; w)$.

Within the growth literature, the leading theoretical alternative to the neoclassical approach is the endogenous growth tradition initiated by Romer (1986) and Lucas (1988). This approach models the productivity term in $A \cdot k^{\alpha}$ as a stock that can be accumulated through purposive investment activity—in human capital for example, or research and development. Since knowledge is a public good, this process is subject to positive externalities that scale up the productivity impact of any individual's investment. In the simplest '*AK*' versions of endogenous growth theory, the aggregate production function becomes $y = \tilde{A} \cdot \tilde{k}$, where $\tilde{k}$ is a broad concept of reproducible capital and $\tilde{A}$ is a constant (the average product of broad capital) that can differ across countries. These economies display constant returns to broad capital and therefore have no steady-state level of income. The conditional convergence term is absent in the growth equation, which now becomes $g = f(z)$ or $g = f(w)$.

2.2 *Development traps*

The twin peaks phenomenon identifies a set of countries that remained poor after 1960. But did these countries fail to grow *because they were poor*? Equivalently: is low income self-perpetuating at the national level? So far our answer is no. Within the neoclassical and AK traditions, persistently low income is driven by weak fundamentals and not by low income per se. Low income may be persistent but it is not self-perpetuating, unless the fundamentals themselves are functions of income.

If $z = z(y; w)$ or $w = w(y)$, then of course things are more complicated. Holding constant any fundamentals that do not depend on income (call these x), we now have $g = f(y; x)$, where the impact of income includes any indirect effect operating through the fundamentals. The net impact of income on growth, $\partial f/\partial y$, can now easily be non-monotonic. Figure 3.4 shows an example studied by Solow (1956) himself, in which TFP follows a logistic curve, rising smoothly from $A = 1$ to $A = 3$ as a country traverses a middle range of capital stocks per worker. Here $A = A(k)$ or, implicitly, $A = A(y)$.[2] The phase diagram is now non-monotonic (see Figure 3.5), implying that poor countries may grow more slowly than otherwise identical rich countries.

[2] Here $y = A \cdot k^{\alpha}$, so $k = k(A,y)$. Substituting $A = A(k)$ yields the implicit function $A(y)$. In Figures 3.4 and 3.5, we use $\alpha = 0.4$ and $A = 1 + [2/(1 + \exp(a-k))]$, $A = 1 + [2/(1 + \exp(a - k))]$ with $a = 15$ for the multiple equilibrium case and $a = 8$ for the persistence case.

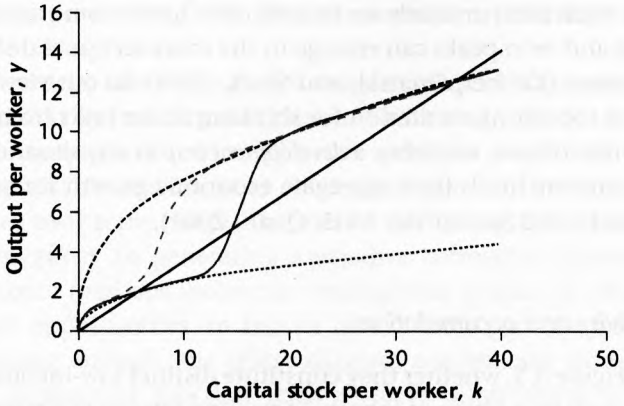

Figure 3.4. Variable productivity models

Notes: The upper and lower concave production functions take the form $y = A \cdot k^{0.4}$, with $A = 1$ and $A = 3$. The production functions drawn with heavy solid or dashed lines use $A = 1 + [2/(1 + \exp(a–k)]$, with $a = 15$ for the multiple equilibrium (solid) case and $a = 8$ for the persistence (dashed) case.

If $\partial f/\partial y$ is sufficiently non-monotonic, the growth equation $g = f(y; x)$ crosses the horizontal axis more than once. Crossings with $\partial f/\partial y > 0$ define *thresholds* below which income falls and above which it rises, while crossings with $\partial f/\partial y < 0$ are locally stable steady states.

The development economics literature is full of theoretical models in which the aggregate economy has two locally stable steady states. Recent overviews include Hoff and Stiglitz (2001) and Azariadis and Stachurski (2005); Sachs et al. (2004) develop three examples in the context of sub-Saharan Africa. While the lower of these two equilibria is commonly called a *poverty trap*, the reference to poverty is potentially misleading. Income is lower in the bad equilibrium than in the good equilibrium, but the relationship of the low-income equilibrium to any absolute income standard is unclear. Moreover, if productivity grows at a common global rate it is the cross-country ratios of income, not the levels, that approach a steady state. We therefore follow Berthélémy (2007) in referring to these low-income equilibria as *development traps*.

There are good reasons, moreover, to discount the tendency of theoretical treatments to focus on multiplicity per se. In terms of policy significance, there is little distinction between a world in which low income is one of a number of long-term equilibria and one in which low income is associated with very slow growth. In either case a large enough temporary boost to the capital stock can produce a long-lasting improvement in the growth path, in sharp contrast with the decline in growth that would occur in a conditional convergence world with fixed fundamentals. Observationally too, the two

cases may be equivalent or nearly so: in both cases low income can persist over a long period and twin peaks can emerge in the cross-sectional distribution of national incomes (Kremer, Onatski, and Stock, 2001). In our view, therefore, multiplicity is too strong a criterion for thinking about links from income to growth. In what follows, we define a *development trap* as any situation in which low average income holds back aggregate economic growth for an extended period (Azariadis and Stachurski, 2005; Quah, 2001).

2.3 *Productivity and accumulation*

The traps in Figure 3.5, whether they constitute distinct low-income equilibria or not, are driven by a phase of sharply increasing returns to aggregate investment. Azariadis and Stachurski (2005) associate this phase with diffuse externalities to household- and firm-level investments in human capital or industrial technology. Other mechanisms may of course be relevant as well, since at this high level of aggregation A comprises *any* influence on the relationship between output per worker and the concave function k^{α} of

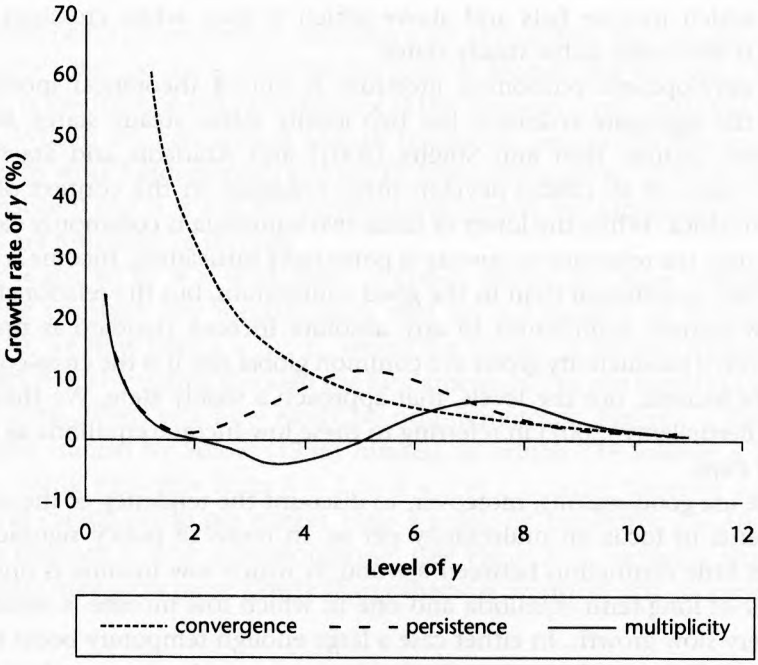

Figure 3.5. Phase diagrams for variable productivity models

Notes: The phase diagrams correspond to the uppermost concave production function in Figure 3.4 ($A = 3$) and to the two production functions with convex portions.

physical capital per worker.[3] We discuss a variety of potential mechanisms throughout this chapter.

Early trap models, however, often focused on capital accumulation rather than on productivity (references appear in Sachs et al., 2004). A subsistence floor for consumption, for example, can generate a positive correlation between saving rates and income, so that the $[(n + \delta)/s] \cdot k$ locus becomes strictly convex over some range. Theories of the demographic transition can have a similar effect, by generating a negative correlation between fertility rates and income (perhaps indirectly, through the impact of education and labour-market opportunities on female labour force participation). If these effects are strong enough, the phase diagram can become non-monotonic even if the production function itself displays diminishing returns. Low income can then persist over long periods and, as in the $A(k)$ case, this possibility is present even if the long-term equilibrium is unique and identical across countries.

While saving and fertility-based traps may have some relevance for sub-Saharan Africa, the global growth evidence is more decisive on the importance of persistent differences in productivity. Figure 3.6 illustrates this point using a celebrated argument from Lucas (1990). Using data from 1990, Lucas pointed out that if the USA and India occupied the same diminishing-returns production function, the roughly 11:1 ratio of observed real GDPs per capita would require a ratio of physical capital per worker of about 400:1 ($= 11^{1/\alpha}$, where α is the share of capital in GDP, assumed to be 0.4). The actual ratio was an order of magnitude lower, at less than 20:1. Moreover, if the ratio of capital stocks per worker were really 400:1, the marginal return to capital would be $400^{1-\alpha} \cong 36$ times larger in India than in the USA. No conceivable tax differential or difference in country risk could then prevent capital from flowing from New York to Delhi. But the reverse was true: capital flowed from Delhi to New York. There was no way, Lucas argued, that the USA and India could occupy the same neoclassical production function. If the USA was at a point like 2 in Figure 3.6, India had to be at a point like 4, on a different and strictly inferior production function.

Mankiw, Romer, and Weil (1992) responded to Lucas by introducing human capital as a third factor of production. They specify a neoclassical production function of the form $Y = \bar{A} \cdot K^{\alpha} H^{\beta} L^{1-\alpha-\beta}$ where H is the stock of human capital and $\alpha + \beta < 1$ implies diminishing returns to broad capital. When squeezed into the form $y = AK^{\alpha}$, this function can generate

[3] One of the most obvious—which we will not pursue here—is that physical or human capital may be systematically overestimated in poor countries. Prichett (2000) and Hsieh and Klenow (2007) argue that this is the case for physical capital, and Manuelli and Seshadri (2007) argue that it is the case for human capital.

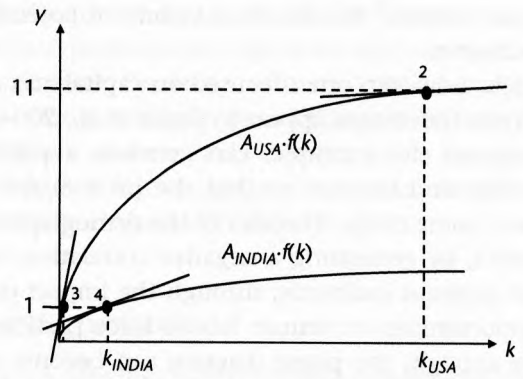

Figure 3.6. The growth facts imply large productivity differences: USA–India example
Notes: The tangents at points 2, 3, and 4 show the marginal product of capital.

cross-country differences in *measured* total factor productivity, A, even if actual TFP, $\bar{A}$, is the same across countries: $A = \bar{A} \cdot h^{\beta}$, where h is human capital per worker. Low levels of human capital can then help explain the coexistence of low incomes with low marginal returns to investment.

Incorporating human capital goes some way towards resolving Lucas's puzzle, but country income differences remain too large to be accounted for by differences even in broad (physical plus human) capital per worker, in the absence of some phase of strongly increasing returns.[4] Hall and Jones (1999) document this point in detail, showing that TFP differences account for the bulk of international differences in income even after controlling for measured human capital. A similar point emerges in conventional growth-accounting exercises. Comparing growth in Africa with growth in other developing regions, Ndulu and O'Connell (2007) find that differences in conventionally measured physical and human capital per worker account for only about half of Africa's shortfall between 1960 and 2000.

Income-dependent saving and fertility behaviours are therefore unlikely, on their own, to explain Africa's failure to industrialize. The reason is that these mechanisms work through capital scarcity, and in a world of diminishing returns this means high returns to investment, not low returns. Irrevocably hostile fundamentals can, of course, explain a confluence of low income and low returns to investment (as in a conventional conditional convergence world), but in such cases poverty is an effect rather than a cause of slow

[4] Lucas estimated a 5:1 ratio of human capital per worker and showed that an 11:1 ratio of incomes then implied a ratio of capital stocks per worker of just over 70:1 (USA:India) and a ratio of marginal products of capital of about 13:1 (India:USA). These are still far too large; see Banerjee and Duflo (2005) for further discussion.

growth. If development traps are empirically important, therefore, other mechanisms must be at work to keep the productivity of capital low when income itself is low.

2.4 *Poverty in the binding constraints approach*

We point out in what follows that the theory of development traps is well ahead of empirical evidence. For that reason it is also well ahead of policy, at least in the area of growth strategy where traps suggest potentially large payoffs to policy intervention but the literature provides little guidance on where and how to intervene.[5] To develop this point we briefly consider the role of poverty in the *binding constraints* framework of Hausmann, Velasco, and Rodrik (2005).

Hausmann, Velasco, and Rodrik (2005) motivate a flexible and country-focused approach to growth-oriented policy reform by appealing to a variant of our one-sector growth equation $g = f(z)$. In their framework the steady-state growth of output per worker is given by $g = \sigma[(1 - \tau)\, r - \rho]$, where σ is the intertemporal elasticity of substitution between consumption in successive periods; $r = r(a, \theta, \vartheta)$ is the social rate of return on capital; τ is the tax rate on capital (so that $(1 - \tau) \cdot r$ is the private return on capital); and ρ is the interest rate at which the country's residents can borrow in world markets. The social rate of return depends on firm-level TFP, given in their notation by a, on an index θ of the externalities to private investment, and on an indicator ϑ of the availability of complementary factors of production, including public infrastructure capital or human capital. The tax rate τ is to be interpreted broadly; it can refer to either actual or expected taxes and to formal or informal levies on private returns.

Hausmann et al. (2005) develop a diagnostic algorithm of sorts by translating their growth equation into a hierarchical analysis of potential growth constraints (see Table 3.1). Rodrik (2007) describes the growth diagnostics approach as follows:

> These two equations [for g and r] summarize the possible factors that can affect growth performance. An exercise of *growth diagnostics* simply consists of reviewing and analyzing these factors to ascertain which of these factors is the most binding constraint on growth. As the analysis above reveals, all factors (including market distortions and policy wedges) are likely to matter for growth and welfare. The challenge is to identify the one that provides the largest positive direct effect, so

[5] 'The new literature on poverty traps has yet to focus on issues of policy design.' (Bowles, Durlauf, and Hoff, 2006, p. 11).

Table 3.1. Growth diagnostics à la Hausmann et al. (2005)

Low return to economic activity	**Low social returns**	**Poor geography**	
		Low human capital	
		Bad infrastructure	
	Low appropriability	**Government failures**	**Micro risks: property rights, corruption, taxes**
			Macro risks: financial, monetary, fiscal instability
		Market failures	**Information externalities: 'self-discovery'**
			Coordination externalities
High cost of finance	**Bad international finance**		
	Bad local finance	**Low domestic saving**	
		Poor intermediation	

Source: Rodrik (2007), Figure 2.1, p. 66. The table classifies potential constraints on private investment and entrepreneurship. 'Social' returns here refer to economy-wide returns; i.e., impacts on GDP. The references to 'low returns' and 'low appropriability' refer to low private returns and low ability of private agents to appropriate the social returns to their own activity.

> that even after taking into account second-best interactions and indirect effects, the net impact of a policy change is beneficial (and hopefully sizeable).
>
> [Rodrik 2007, p. 64, italics in original[6]]

Notice that in contrast to the neoclassical model the level of income does not appear directly in the Hausmann et al. (2005) growth equation. The reason for this is that the underlying production function has an endogenous growth structure with constant returns to capital (an 'AK' model[7]). Low income can nonetheless affect growth indirectly, as we have been emphasizing, via the vector of fundamentals $z = [\sigma, a, \theta, \nu, \tau, \rho]$; or, equivalently, via the ten channels identified in Table 3.1. Thus while poverty plays no explicit role in the Hausmann et al. analysis, it can in principle act as a binding constraint on growth, by activating other constraints. Examples might include credit market failures that rule out collateral-free borrowing (poor intermediation); a low opportunity cost of violence leading to a high risk of armed conflict (insecure property rights); a low fiscal capability to address constraints of geography and infrastructure (low social returns); and predatory taxation of capital in order to redistribute resources to a poor majority (micro risks). We discuss some of these further in section 3.

The growth diagnostics framework makes an important distinction between growth constraints associated with high social returns to investment and constraints associated with low social returns ('social' here simply means

[6] See Rodrik's web page for links to country studies that use the growth diagnostics approach to identify binding constraints.

[7] The per-worker production function is $y = r \cdot k$, so r corresponds to A in the production function $Y = A \cdot K$.

'economy-wide': the concept refers to impacts on discounted aggregate output). The former category implies some combination of market and/or government failures, and therefore has the enticing feature of potentially invalidating the classical trade-off between equity and efficiency. Hoff and Stiglitz (2001) and Banerjee and Duflo (2005) argue that the absence of this trade-off is an empirically important feature of the economic environment in low-income countries. The argument these authors are making is two-fold: first, that resources are allocated inefficiently because of incomplete markets and/or misguided policies, and second, that these inefficiencies are biased against the poor (an argument prominently associated with the World Development Report (World Bank, 2005)). We return to these themes shortly, in our discussion of microeconomic poverty traps. But two key points must follow immediately. First, when the equity/efficiency trade-off is absent, poverty-alleviation policies may acquire what Ray (1998) calls a *functional* justification: they improve overall economic performance. Growth strategies that miss this point may fail to produce growth. Second, however, the precise form of such policies is unclear. The binding constraints approach relies heavily on the principle of policy targeting, which states that effective interventions tend to be those that most closely target the sources rather than the symptoms of distortions (Rodrik, 2007, p. 90). Even in the presence of a microeconomic poverty trap, direct redistribution to the poor may or may not qualify, depending on the ancillary costs of such a policy and the returns to alternative reforms. China's agricultural reforms of the 1980s, for example, are generally regarded as having been massively progressive and growth promoting. But these focused more on changing production incentives at the margin than on redistributing existing resources (a distinction emphasized by Chenery et al., 1974; see Qian, 2003 on China's reforms).

Some of the constraints that Hausmann et al. place in the second category, of reducing the social returns to investment in physical capital and entrepreneurship, are associated with low levels of human and/or public infrastructure capital. These forms of capital may themselves carry high social returns, in which case their scarcity again points to market and/or government failures that may invalidate the equity/efficiency trade-off. Credit market imperfections that prevent the poor from making high-yielding investments in human capital provide one example; the under-provision of productivity-enhancing public goods in poor areas provides another. But other constraints that keep social returns low can raise more difficult—and conventional—trade-offs. Geographical constraints, for example, may reduce the returns to a wide range of public and private investments, as argued by Faye et al. (2004) and Collier and O'Connell (2007) for landlocked and resource-poor countries in Africa. In such cases growth may in effect be prohibitively expensive, in the sense that for known technologies an investment programme capable of

overcoming natural constraints reduces appropriately discounted consumption. In such cases the appropriate locus for redistribution would be primarily international rather than national. As is traditional in public economics, such intervention would appeal to intrinsic rather than functional justifications, drawing on inequality aversion, universal rights, or other ethical frameworks. It might also be motivated by cross-border externalities from low income, for example operating through conflict.

2.5 *Empirical work on economy-wide development traps*

Given our discussion, it should not be surprising that the growth literature remains indecisive about the empirical relevance of development traps. Cross-country growth regressions do not tend to be directly informative. At issue is the shape of the phase diagram relating the level of income to its growth rate, perhaps conditional on some exogenous fundamentals—the relationship we have called $f(y; x)$ above. The growth literature, instead, estimates structural models of the form $g = f(y; z)$ where some or all of the z may be functions of y as well as of x.

Research on development traps per se has focused almost exclusively on whether conditions are such as to favour multiple equilibria. Support comes from Quah (1993; 1996), who studied the evolution over time of the empirical distribution of national incomes and documented the emergence of a bimodal (twin peaks) pattern comprising distinct and largely stable groups of high- and low-income countries. Bloom, Canning, and Sevilla (2003) also find that the data favour two groups over one; and they show that the level of steady-state income and the probability of exiting the low-income group depend on rainfall and other aspects of tropical geography. The latter variables play the role of deep fundamentals or 'x' variables in our terminology, suggesting the presence of a geographically based development trap. The mechanisms through which this trap operates, however, remain unclear.

Berthélémy and Varoudakis (1996) find some evidence in cross-country data of threshold effects associated with financial development. Berthélémy (2007) studies country-by-country growth trajectories over time, looking for the 'inverted U' configurations suggested by Figure 3.5. He argues that while institutional factors, investment rates, and demographic features were broadly similar between low-income countries that experienced take-offs after 1950 and those that did not, the former group had achieved significantly higher rates of primary education before growth accelerated.

Elsewhere in the growth literature the empirical support for development traps has tended to be weaker. Kraay and Raddatz (2007) find that saving rates vary with aggregate income, but not in a manner capable of generating development traps. Easterly (2006) and Johnson, Ostry, and Subramanian

(2007) conclude that the saving rates of poor countries are not low enough to generate an accumulation-based trap. Kraay and Raddatz (2007) look for evidence of increasing returns to capital that are strong enough in the aggregate to generate a trap; they fail to find such evidence, either in the developing-country literature or in their own cross-country estimates for Africa.

3 Microeconomic Poverty Traps

We have defined a development trap as a situation in which income increases can become self-perpetuating: $\partial g/\partial y > 0$ over some interval of y. A poverty trap, from this perspective, is a development trap that is activated when income is near or below some standard of absolute deprivation. This approach to poverty traps accommodates cross-country heterogeneity in incomes, but it ignores the important role played by within-country inequality and poverty, both in the growth literature and in the formulation of country-level growth strategies. A transparent way to bring these considerations on board is to define an economy-wide poverty trap as a situation in which aggregate growth is constrained by the low incomes *of the poor.*

It is not obvious, of course, that accommodating intra-national inequality strengthens the theoretical case for economy-wide poverty traps. The classical economists, for example, viewed inequality as good for growth. Workers were consumers rather than savers, and comprised the bulk of the population; international financial markets were closed. Investment had to come from saving by the wealth-owning classes, and this meant that growth required a high income share for capitalists (see Galor and Moav, 2004).[8] But more recent theories deemphasize accumulation, as we have stressed, and feature a variety of mechanisms through which inequality can undermine productivity and growth. The growth evidence, as well, points increasingly to negative impacts of inequality on growth (Bénabou, 1996).

For a given level of mean income or consumption, it turns out to be difficult to distinguish the growth impacts of within-country poverty from those of within-country inequality. The reason is that household survey data tend to produce distributions that are nearly lognormal, a distribution fully characterized by the mean and standard deviation of log consumption. Poverty headcounts are therefore almost exact functions of these two parameters, implying that growth regressions that include a conditional convergence term and a measure of overall inequality will have difficulty distinguishing

[8] Lewis (1954) brought this tradition into development economics. Like Ricardo, Lewis had to struggle with the role of landowners, a wealth-owning class prone in the classical view to consumption rather than saving.

the impact of the poverty headcount. This constraint may recede as better data make it possible to exploit modest deviations from log-normality. Ravallion (2012), for example, finds that poverty rates out-perform inequality in a cross-country regression, suggesting that it is within-country poverty rather than inequality that matters for growth (see also Lopez and Serven, 2009). But Ravallion's finding does not survive the inclusion of country-level fixed effects, and therefore may be driven by unobserved correlates of country-level poverty.

Accommodating the emerging evidence on growth impacts from within-country poverty and inequality focuses attention on what we will call *microeconomic poverty traps*—situations in which low income may be self-perpetuating for households or local communities. To see why, suppose that households below and above the poverty line receive average per-capita incomes y_P and $y_N > y_P$ respectively. The economy's growth rate is a weighted average of income growth within the two groups, so defining h as the poverty headcount ratio and $\lambda \equiv h \cdot y_P/y$ as the share of the poor in overall national income, we have $g = \lambda \cdot g_P + (1 - \lambda) \cdot g_N$. The response of overall growth to a one-time change in the incomes of the poor is therefore

$$\partial g/\partial y_P = \lambda \cdot \partial g_P/\partial y_P + (1 - \lambda) \cdot \partial g_N/\partial y_P$$

An economy-wide poverty trap holds, in our definition, if $\partial g / \partial y_P > 0$ over some empirically relevant range of incomes of the poor. Microeconomic poverty traps ($\partial g_P/\partial y_P$) are neither a necessary nor a sufficient condition for this to occur, because the final term can be of either sign and may be dominant in practice. But as λ rises, an overall trap becomes increasingly less plausible in the absence of mechanisms that make poverty self-perpetuating at the household level.[9] Table 3.2 estimates the consumption share of the poor in various regions, using the lowest poverty line ($1.25 a day) and drawing on consumption surveys conducted since 2000. At 25 per cent of GDP, the consumption share of the poor in SSA is double their share in the East Asia and Pacific region and three times their share in South Asia. A higher poverty line would of course scale this 25 per cent figure up further.

These observations suggest that research on microeconomic poverty traps may have an important role to play in improving the knowledge base for growth strategies in Africa. In the remainder of this section we briefly review

[9] Of course, it is also unlikely that low incomes among the poor could seriously constrain growth opportunities for the rich—so that $\partial g_N / \partial y_P > 0$—if poverty were a temporary phenomenon at the household level. Thus Azam (2007), for example, argues that deprivation among the poor can increase the threat of armed rebellion, an argument that relies not just on low current income, but also on limited prospects for future income (Collier and Hoeffler, 2002). But persistent poverty is not the same thing as self-perpetuating poverty—just as, in the neoclassical model, permanently adverse fundamentals are consistent with conditional convergence, not with development traps.

Table 3.2. Headcount ratios, Gini coefficients, and consumption shares of the poor

Region	number of surveys	Regional averages		
		Headcount ratio, h (%)	Gini coefficient, G	Approximate consumption share of the poor, θ (%)
SSA	38	50	44	25
LAC	2	0	47	0
SASIA	3	21	40	8
EAP	7	29	39	13
MENAT	7	4	39	1
ECA	23	6	33	2

Source: World Bank, PovcalNet online database. The headcount and Gini are calculated from the latest available consumption survey data for 2000 or later, and using $1.25 (PPP) a day as the poverty line. We have calculated the approximate consumption shares of the poor for each country as follows: if the poverty headcount is 43%, the approximate consumption share of the poor is the sum of the shares of the lowest 4 consumption deciles plus 3/10 of the share of the 5th decile. This will be slightly upwardly biased due to inequality of incomes within deciles.

the relevant theory, in light of our earlier discussion. Section 4 then looks at approaches to assessing the empirical relevance of microeconomic traps.

3.1 *Microeconomic trap mechanisms*

To set the stage for our discussion of microeconomic traps, consider three caricatures of how microeconomic heterogeneity might be accommodated within a one-sector growth analysis. The first assumes complete and competitive markets in general equilibrium: its close relationship to the neoclassical growth paradigm will be apparent. The second captures a market failure that undermines aggregate efficiency and is biased against the poor: borrowing requires collateral, and the poor have no collateral. The third creates inefficiency through a political distortion: the rich dominate political institutions and use their power to prevent the poor from setting up firms as entrepreneurs.

In each case we follow the lead of Banerjee and Duflo (2005) and focus on how capital markets allocate available resources among heterogeneous uses. To introduce heterogeneity we assume that individuals are endowed with projects of limited size that only they can implement. These projects use capital to produce a homogeneous output, and their productivity varies across individuals. For simplicity we impose diminishing returns at the individual level by assuming that each project can use up to 1 unit of capital (with constant returns), after which the marginal return goes to zero. This extreme version of diminishing returns is not necessary for our argument provided that each project has an upper limit of the amount of capital it can employ (Banerjee and Duflo, 2005). Again for simplicity, we assume that there are no imperfections in goods or labour markets.

COMPLETE AND COMPETITIVE MARKETS

Suppose that capital markets work perfectly. At a point like 3 in Figure 3.6, the country's very small capital stock would flow into the hands of the small proportion of the population possessing the highest-productivity projects. These entrepreneurs would earn rents on their superior skills or ideas; other households would be workers. Households lacking productive labour or high-yielding investment projects could end up severely disadvantaged, but the initial distribution of capital across households would be irrelevant to the set of projects implemented, and any household capable of saving would receive a return equal to the (high) economy-wide marginal return to capital. If there were diminishing returns at the microeconomic level, moreover, this would provide some impetus for convergence of incomes across households: other things equal, for example, households with low initial education would have an easier time borrowing to finance education than households with initially higher attainment. The standard trade-off between equity and efficiency would prevail; redistributive policies would be costly in terms of efficiency but potentially justifiable on ethical grounds. Poverty traps would be absent, whether economy-wide or at the microeconomic level.

As noted by Banerjee and Duflo (2005), an aggregate production function with diminishing returns exists in this economy, despite the heterogeneity of projects at the microeconomic level. Moreover, in this economy capital markets achieve dynamic efficiency in the sense of maximizing the economy's end-of-period capital stock over any finite horizon, subject to the sequence of aggregate consumption up to that period (Burmeister, 1980).

REGRESSIVE MARKET IMPERFECTIONS

Suppose instead that imperfections of information and enforcement induce lenders to use wealth as collateral. Access to credit is now severely restricted for poor households, and capital markets fail to equalize the returns to capital across projects. The average marginal product of capital across poor households is higher than the average marginal product for the non-poor, because the poor have (some) high-yielding projects that are going unexploited while the non-poor are investing to the point of low marginal returns.

In this setting there is no well-behaved aggregate production function running through point 4 in Figure 3.6, and the one-sector growth model may fail even as a first-order approximation (Banerjee and Duflo, 2005). We know that dynamic efficiency fails, but we cannot analyse the development process without knowing more about how resources are actually allocated in the economy. Elegant models have been developed to this end by Galor and Zeira (1993), Bénabou (1996), and Aghion and Bolton (1997). In these models the level and growth of aggregate output depends on the distribution of income and wealth (see also World Bank, 2005). These models often

emphasize inequality rather than poverty per se, but they generate poverty traps when the relevant market failures are triggered by low absolute income or wealth, as in models of collateral-based lending.

POLITICALLY GENERATED DISTORTIONS

Now suppose that information and enforcement problems are absent but that political power is monopolized by a wealthy elite that is determined to exclude a poor majority from access to resources and political power (Engerman and Sokoloff, 1997; Adam and O'Connell, 1999). Institutions are built over time to reflect the interests of the elite; these institutions influence the size and nature of public expenditures (Alesina and Rodrik, 1994; Persson and Tabellini, 1994) and, in our example, prevent the non-elite from operating as entrepreneurs rather than workers.

To take the most extreme case, suppose that the economy's capital is allocated lexicographically: first to any member of the elite group willing to borrow, and only next, if an excess supply of capital remains at the economy-wide level, to members of the non-elite. Within the two groups, for simplicity, capital is allocated efficiently, so as to equalize marginal products across projects. Figure 3.7 shows an example in which the elite comprise one-third of the population and the productivity of projects is drawn randomly from the

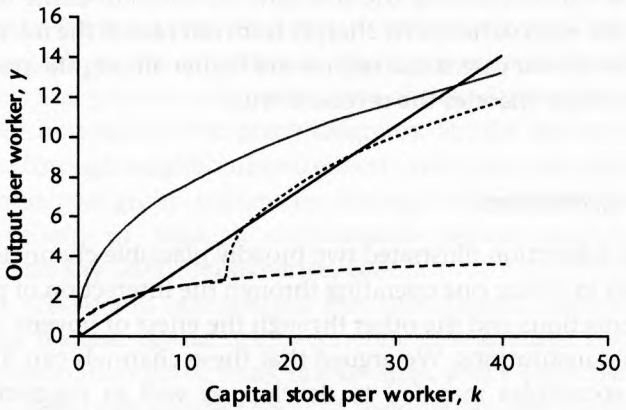

Figure 3.7. Regressive political distortions

Notes: The upper dashed curve shows an aggregate production function along which all feasible projects are ordered from most to least productive. The straight line is the output required to generate saving sufficient to just replace the existing capital stock, as in the Solow model. If all feasible projects are implemented the total required capital is 42. All individuals draw a project randomly from the overall distribution of returns. The political elite comprise one-third of the population, and their projects are implemented (on an efficient basis within the elite, the most productive first) before any project of the non-elite is implemented. At the kink, where $k = 14$ (= 42/3), the elite have run out of projects to implement. Any additional capital is allocated efficiently among projects of the non-elite. In the configuration shown, there are two locally stable equilibria with a threshold of about $k = 16$.

same distribution for each group. The aggregate production function has a sharp nonconvexity at a capital stock sufficient to finance all of the projects of the elite. If we model saving and population growth as in the Solow model, an economy-wide development trap emerges. Unless the aggregate capital stock is well clear of a threshold (in Figure 3.7, at a capital stock of roughly 16), income stays low for an extended period.

This development trap implies a poverty trap in our narrower sense if it is perpetuated by the low incomes of the non-elite. Engerman and Sokoloff (1997) argue that in highly unequal Latin American societies, low levels of income and education have worked to prevent the non-elite from mounting effective legal or institutional counter-attacks against regressive policies.

From a standard public finance perspective, of course, redistribution does not have to be regressive to undermine growth,[10] or to generate a link from poverty to growth. Some prominent alternative theories argue that poverty undermines the investment environment for the wealthy. In an unequal but otherwise well-functioning democracy, for example, the median voter holds little capital and may therefore support a growth-reducing platform of high capital taxation and aggressive redistribution (Bénabou, 1996). In a similar vein but focusing on armed conflict, Azam (2007) and Bates (2007) develop theories of civil war and rebel activity in which poverty undermines investment by the rich—and drives existing assets abroad—by reducing the opportunity cost of violence among the non-elite. Theories of crime may operate similarly. These approaches differ sharply from our case at the microeconomic level, however: in our case social returns are higher among the poor than the rich, while in these theories the reverse is true.

3.2 *Further mechanisms*

The previous subsection illustrated two broadly plausible channels from poverty to growth in Africa: one operating through the interaction of poverty and market imperfections and the other through the effect of poverty on political and economic institutions. We argued that these channels can help explain why entire economies may fail to develop, as well as suggesting specific mechanisms through which subgroups remain poor. Here we take a brief look at some additional mechanisms operating under these headings.

Additional growth-reducing interactions may occur between poverty and financial market imperfections, by requiring poor households to engage in

[10] When markets are complete and competitive, any intervention to redistribute resources produces a deadweight loss, unless the government has access to non-distortionary instruments (Atkinson and Stiglitz, 1980). The equity/efficiency trade-off, from this perspective, is an implication of a more general 'redistribution/efficiency' trade-off.

asset-building strategies that are difficult to sustain in the face of urgent consumption needs and insecure vehicles for saving. Thus if discrete, complementary or 'lumpy' investments in physical or human capital are needed to increase productivity above a minimum threshold, households unable either to borrow or to build assets sustainably may be stuck in a low-productivity state.[11] The absence of credit and insurance markets may also leave households that are too poor to build asset buffers exposed to potentially catastrophic short-term declines in consumption. This exposure may in turn lead to inadequate investments in high-yielding but risky activities including education, fertility control, and the adoption of new seed varieties or agricultural techniques (Dercon, 2002; 2005).

Another plausible example of a micro development trap is nutritional. Dasgupta and Ray (1986) assume that production requires a caloric intake that exceeds the body's resting requirement (the basic metabolic rate). Work effort is then subject to a threshold effect, whereby small increases in nutritional intake, once basic requirements are met, generate disproportionate increases in productivity. Redistribution in favour of poor households that are unable to borrow can enhance both equity and economy-wide productivity (Dasgupta and Ray, 1987).

Carter and Barrett (2006) emphasize an analogy between household-level income dynamics and our development trap analysis in the presence of market imperfections. In this setting, households may have characteristics (skills and/or preferences) that tie down their ultimate equilibrium welfare level, but the path to this equilibrium displays nonlinearities and varying returns to scale that give rise to the same kind of state-dependence we emphasized with our non-monotonic phase diagrams. Similar interactions can in principle arise through neighbourhood effects involving corruption and other conformity and peer-group influences, through self-reinforcing individual and social beliefs, or through coordination failures and externalities (Mookherjee and Ray, 2001; Mookherjee, 2006).

Sachs et al. (2004) and others argue that sub-Saharan Africa's geographic and economic features favour microeconomic development traps. Features like high transportation costs, small market sizes, and a high disease burden (Bloom et al., 2003) can generate local or regional poverty traps if the communities they affect are too poor to generate sufficiently large-scale investments to overcome them.

[11] Deaton (1992) emphasizes the role of impatience in limiting precautionary saving by households shut out from credit markets. Mullinaithan and Shafir (2013) argue that excessive impatience and limited self-control may in part be behavioural offshoots of living with a chronic scarcity of resources.

As a final observation we note that trap-like mechanisms can readily interact at a sectorial or general-equilibrium level. As in big-push theories of development, complementarities may exist between the inputs needed to foster development, including for example road infrastructure, electricity, and an educated labour force. Increasing capital in any one of these dimensions might produce little effect in the absence of investment in the others. Mwabu and Thorbecke (2004) argue that market failures and institutional failures may reinforce each other in rural areas of Africa. Thus, difficulties in enforcing contracts and poorly functioning financial, land, and labour markets may interact to encourage subsistence activities, illiquid investments, and growth-reducing behaviour. These micro traps may then be compounded by problems of insecurity, poor levels of public goods and services, disproportionate taxation of agricultural output, and poor infrastructure; arguably caused by institutions that do not take sufficiently into account the interests of rural dwellers.

4 Microeconomic Poverty Traps: Evidence

There are serious empirical difficulties in establishing the existence and nature of microeonomic poverty traps. The productivity impact of better health and education, for example, may be subject to long delays. Individual and community-level investment may be complementary to macro investments in larger-scale infrastructure and social services, and these economy-wide variables may be difficult to control adequately in environments where they change very little. Finally, empirical work on microeconomic development traps will typically have to handle endogeneity of the behavioural variables of interest, as well as unobserved heterogeneity in the determinants of output and productivity. Fertility-based traps, for example, rely on the joint determination of income and fertility behaviour. Spatial poverty traps may be correlated with locational variables, to take another example, but if there are unobserved variables that determine both location and income, it would be misleading to interpret location effects in an income regression as evidence of poverty traps. Despite these caveats, however, there are several ways in which the existence of microeconomic development traps can be suggested. By direct analogy with the economy-wide case, these are situations in which the expected growth rate of income for poor households is not merely low in absolute terms, but lower than it is at higher income levels, although such households may not face an outright poverty trap. We briefly describe a few of them and provide suggestive evidence that these can matter particularly in Africa.

4.1 *Poverty and inequality in Africa*

By absolute standards, income poverty in Africa is both widespread and greater than in any other region of the world. Unlike in most other developing-country regions, it has also failed to decrease significantly in recent decades. Table 3.3 shows that the proportion of individuals living below 1.25 dollars per day has fallen considerably over the last three decades in Asia and in the Pacific. In sub-Saharan Africa, the proportion has finally begun to fall after rising through the mid 1990s. Table 3.4 shows that Africa will probably soon contain the largest absolute number of poor people on earth, larger than in East Asia or in South Asia, where absolute population sizes are larger. Table 3.4 also shows that the total number of the poor in developing countries fell by nearly 950 million between 1981 and 2011; in Africa, it increased by over 200 million. This suggests that Africa is lagging not only in relative but also in absolute terms.

In section 3 we characterized a poverty trap as a situation in which $\partial f / \partial y_P > 0$, i.e., in which higher incomes for the poor mean faster overall growth. In such a situation, a process of distribution-neutral growth—in which all

Table 3.3. Percentages of the developing-country population living below $1.25 a day, by region, 1981–2011

Regions	1981	1996	2011
East Asia and Pacific	78.0	38.3	7.9
Europe and Central Asia	2.9	4.3	0.5
Latin America and Caribbean	11.7	10.6	4.6
Middle East and North Africa	8.9	4.8	1.7
South Asia	61.4	48.6	24.5
Sub-Saharan Africa	52.8	59.8	46.9
All developing countries	52.7	35.9	17.0

Source: World Bank, PovcalNet online database.

Table 3.4. Numbers of people (in millions) living below $1.25 a day, by developing-country region, 1981–2011

Regions	1981	1996	2011
East Asia and Pacific	1,107.5	681.9	160.8
Eastern Europe and Central Asia	12.6	20.1	2.4
Latin America and Caribbean	42.5	51.1	27.6
Middle East and North Africa	15.3	12.3	5.6
South Asia	570.3	630.0	399.0
Sub-Saharan Africa	210.4	359.2	415.8
Total	1,958.3	1,754.4	1,011.4

Source: World Bank, PovcalNet online database.

incomes rise at roughly equal rates, so that measures of inequality remain unchanged—tends to be self-reinforcing, through its impact on the incomes of the poor. In the growth model of Galor and Moav (2004), for example, low levels of economy-wide human capital form a binding constraint on investment in physical capital. The scarcity of human capital, in turn, is concentrated among the poor, who cannot borrow to finance their children's education. Inequality is bad for growth in the sense that for a given average income, greater inequality generates a lower level of human capital investment. But any general improvement in living standards—even one accompanied by a mild increase in inequality—reduces the share of the population with incomes low enough to activate the credit market constraint. Ultimately it is poverty, rather than inequality, that constrains growth in this model.

We suggested in section 3.1 that it may be inequality rather than poverty per se that constrains growth, for example by sustaining political institutions that impair long-term development (World Bank, 2005). 'Inequality' here can of course refer as much to inequality of opportunity (e.g., access to markets and public services) as to inequality of earnings or consumption. But distribution-neutral growth is unlikely to overcome constraints that are grounded in either type of inequality. Such concerns are potentially relevant for Africa, where inequality is high by comparison with other regions (and comparable to Latin America; see Table 3.2). Within Africa, of course, their relevance may vary considerably (Figure 3.8): inequality in parts of southern Africa is among the highest in the world, while Mauritius has low inequality even by the standards of OECD countries.

4.2 *Correlates of poverty in Africa*

The poor in Africa are heterogeneous in nature and can be found in all social classes. But there are characteristics that tend to be systematically correlated with poverty both across countries and over time. The nature of these characteristics is suggestive of the factors that can induce development traps.

Household poverty is positively correlated with household size, the absence of adults of working age, and the presence of children and elderly people. These are structural socio-demographic characteristics that evolve slowly and can be difficult to change by one's own will. Family formation, fertility decisions, and productive arrangements are examples of factors that affect structural demographic characteristics and that depend on what can be long-lasting cultural norms. These characteristics naturally tend to perpetuate themselves across generations. They are also subject to neighbourhood effects.

The poor usually lack physical and financial assets as well as income. Poverty is also highly correlated with being landless. When the poor do own land,

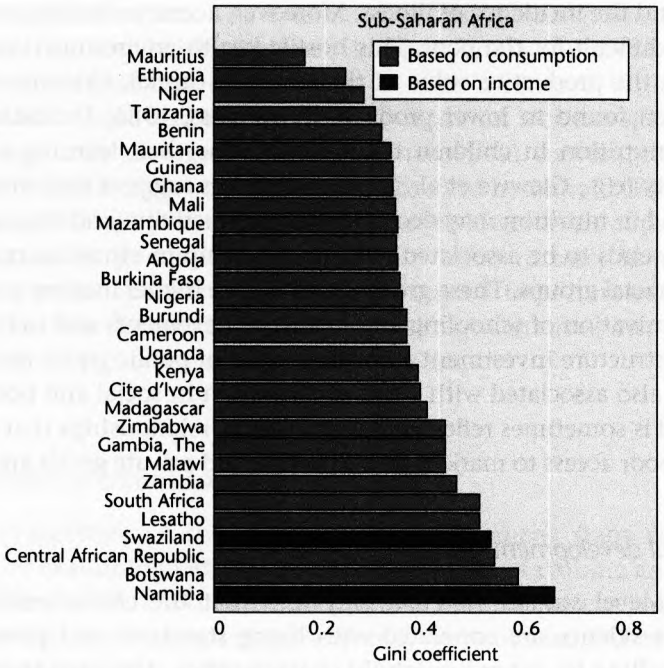

Figure 3.8. Within-country inequality
Source: World Bank (2005).

that land is often relatively unproductive, difficult to access, and/or difficult to irrigate. It is also difficult to improve and exchange in formal land markets.

Subsistence agriculture is nevertheless the main source of income for many of the poor in Africa. Agricultural output also tends to be one of the most volatile sources of income and one in which it is the most difficult to invest in economies with weakly functioning credit and land markets. Again, this may be difficult to change if the factors involved extend well beyond the reach of individuals.

The poor also have a relatively low level of human capital and educational achievement. Poverty is further strongly associated with occupational and employment status. For instance, in South Africa, of the 18 million below a semi-official poverty line in 2004, 14 million lived in workerless households; most of these households contained working-age but unemployed people (Meth 2007). Hence, in addition to having lower levels of human capital and skills, the poor are often unable to sell their labour in a reasonably free and competitive labour market.

The poor frequently suffer from hunger, malnutrition, and illness. Non-monetary measures of well-being therefore tend to be worse for the income-poor, as reflected in such indicators such as child mortality rates, stunting,

wasting, and the incidence of illness. Moreover, access to health care is typically more difficult for the poor. This hostile health environment can further deteriorate the productive value of their human capital. Undernutrition has indeed been found to lower productivity (Strauss, 1986; Deolalikar, 1988), while malnutrition in children tends to decrease their learning and future productivity (e.g., Glewwe et al., 2001). All of this suggests that inequality in income and in nutrition may decrease total productivity (and its growth).

Poverty tends to be associated with membership in ethnic minorities and particular racial groups. These groups tend to face higher income poverty and greater deprivation of schooling and health achievements and to benefit less from infrastructure investment and other types of public goods and services. Poverty is also associated with weak participation in social and political processes, and is sometimes reflected in exploitative relationships that can again deny the poor access to markets and to public and private goods and services.

4.3 *Spatial development traps*

Household-level studies systematically find that the characteristics of the region of residence are correlated with living standards and poverty, even after controlling for other household characteristics. Although there are several ways in which location can influence poverty through purely geographic effects, the association between geography and infrastructure, access to public services, and market quality is also usually very strong. Poorer areas are often geographically distant from formal input and output markets. Such distance implies limited work opportunities or exclusion from areas and enclaves in which growth is concentrated. Markets that are geographically close to poor areas, in turn, tend to be relatively less developed. Non-farm employment, for instance, can be scarce and seasonal. Poorer areas also tend to have lower access to public services, such as education and health. Ayadi et al. (2005) argue that in Tunisia rural roads have played an important role in helping the rural poor connect to urban markets and services, and that this has improved their living conditions. Although no estimates of the returns to this infrastructure are presented, such estimates could be implicitly taken as evidence for the existence of development traps, especially if they differ significantly across areas.

A disproportionate number of the poor are also located in areas where arable land is scarce or is of relatively bad quality, or where droughts, floods, and other environmental shocks generate relatively high levels of community-level risk. This generates lower agricultural productivity and/or greater vulnerability. Both of these tend to decrease investment in physical (and often in human) capital.

Whether spatial externalities create a development trap is certainly of interest. This would be the case for instance if living in a poor area meant a lower return on one's investment, and if one could not invest elsewhere because of

imperfect capital markets. The evidence for such effects, however, is easily confounded by correlations between location and unobserved household characteristics. Panel data can be useful in such a context. With such data for rural China, Jalan and Ravallion (2002) find that location-specific capital has geographically divergent impacts on household consumption growth, after controlling for both observed and unobserved household characteristics. They argue that since poorer areas have access to lower levels of productivity-enhancing public goods like transportation infrastructure, households in those areas are hampered by lower productivity on their human and capital investments. This discourages them from making such investments and thus makes them subject to a spatial development trap.

4.4 *Correlates of chronic and temporary poverty*

Evidence suggestive of the existence of development traps can also be obtained by examining patterns in the distribution of chronic and transient poverty. The idea here is that the correlates of chronic poverty, or those that reduce the likelihood of exiting poverty, may be associated with the presence of development traps.

As in the case of poverty at a point in time, the distribution of chronic and transitory spells of poverty is strongly correlated both with location and with household characteristics (Okidi and McKay, 2003). The characteristics that matter differ somewhat across space, but some—such as asset holdings—often play a consistently key role. Exits out of and entries into poverty are usually explained by demographic and employment changes. This suggests that structural household shifts, such as household composition changes (death of a household member, dissolution, marriage, migration) or shifts in environmental parameters (e.g., an increased incidence of involuntary unemployment in the local area) can cause important changes in well-being (Woolard and Klasen, 2005).

Some household characteristics, such as household size, educational levels, unskilled labour power, and low levels of asset holding, also tend to influence the probability of moving into and out of poverty, regardless of initial poverty status (Bokosi, 2007; Barrett et al., 2006).

The determinants of chronic poverty and vulnerability are often similar. One reason for this might be that the characteristics that increase vulnerability to a spell of poverty also impede the household's ability to exit such a spell. The chronically poor are indeed often found in less secure environments, and are those whose assets are too low to cope adequately with shocks. As we have emphasized, coping strategies may involve sacrificing long-term investments in order to address shorter-term needs.

4.5 *Imperfect markets and subsistence traps*

Market failures are pervasive in low-income countries and in some cases even the rudimentary institutional underpinnings of market activity are absent (Hoff and Stiglitz, 2001). Banerjee and Duflo (2005) cite extensive evidence that the returns on capital are not equalized across firms or households. Hsieh and Klenow (2008) compare marginal products of capital at the factory level and show that if the capital stock were allocated as efficiently within narrowly defined industries in China and India as it is in the USA, TFP would be 30–50 per cent higher in China and 40–60 per cent higher in India. As noted earlier, Banerjee and Duflo (2005) take this argument further by citing evidence that market failures affect poor households disproportionately (see also World Bank, 2005).

One observation potentially consistent with imperfect-market traps is that farm yields (output per acre) in poor countries tend to be lower the larger the landholding (Binswanger et al., 1995). A possible explanation is the existence of factor and credit market failures that hinder the reallocation of land sizes. If this were the case, then redistributing land from large landholders to smaller ones would raise total output. The existence of credit market failures also leads individual incomes to be an increasing concave function of their past value, implying that an equalizing redistribution would raise average income (Ravallion, 2004). Evidence of this is reported in Lokshin and Ravallion (2000) for Russia, and in Jalan and Ravallion (2001) for rural China.

4.6 *Gender- and power-based traps*

The existence of gender-associated differences in well-being and poverty is also suggestive of development traps, this time generated within the household. These traps can exist for the same reason that development traps may exist at the household and macroeconomic levels: due to market imperfections and/or to power-protecting institutions that sustain growth-reducing and discriminatory environments.

An increasingly important strand of the microeconomic literature examines the intra-household allocation of resources. This is difficult to study because many indicators of well-being are reliably observable only at the household level. One of the systematic correlates of individual well-being, however—based on indicators such as educational achievements or health status—is gender. Women and girls indeed tend to have lower educational achievements in Africa. They are also often more vulnerable to health shocks, including those associated with pregnancy and birth-giving. They also tend to wield less power in family and community-level decision-making.

Power differentials that that sustain and are sustained by economic inequality may also operate powerfully against the poor, and in ways that may or may not be mediated through gender. Bates (1981) argued that a policy bias against agriculture in Africa reflected the ease with which urban and rural elites could disarm collective action in poor rural communities. The incentives for power capture may also interact with and sustain any pre-existing ethno-social polarization of communities. Power and inequality dynamics may reach down to a very local level, particularly where mobility is limited: Galasso and Ravallion (2005), for example, find that those villages in Bangladesh where the distribution of land is more unequal are also less good at targeting the poor, possibly because this is also where the poor are less influential in village decision-making.

4.7 *Mobility and time dependency*

State dependence arises when the household's probability of exiting its current state depends not just on the household's characteristics, but also on its history of being in or out of poverty. In such cases, two households with identical characteristics may display different probabilities of entering or exiting poverty if they differ in their distributions of previous poverty status. There is some evidence of state dependence in poverty dynamics, and a suggestion that this may be stronger in certain environments (such as in urban areas; Islam and Shimeles, 2007). State dependence is difficult to infer formally, however, since the household's initial poverty status may be correlated with its unobserved characteristics.

Woolard and Klasen (2005) find that most of the income mobility observed in South Africa is related to demographic and employment changes. They view this as evidence in favour of four types of development trap, associated in turn with large initial household size, poor initial education, poor initial asset endowment, and poor initial employment. Care must be taken here, because demographic and employment variables are subject to household choice and may therefore be endogenous to levels and future expected changes in living standards. But some of the demographic or employment changes may indeed be determined by purely exogenous external shocks (such as deaths, or changes in employment in an environment of high involuntary unemployment such as exists in South Africa) that are difficult to reverse by the mere will of households. In this case, the fact that changes in characteristics are correlated with subsequent poverty dynamics can indeed be taken as suggestive evidence of household-level development traps.

A related approach assesses the extent of intergenerational mobility as well as indicators of inequality of opportunity. Cogneau et al. (2006), for example, find that two countries with relatively low cross-sectional income inequality,

Ghana and Uganda, also display relatively high intergenerational mobility and low inequality of opportunity (estimated by comparing the achievements of individuals conditional on the social origins and characteristics of parents). This can be done without panel data, so long as information on more than one generation is available. As always the implications in terms of the existence of development traps must be treated with care because of possible problems of correlation of unobserved characteristics across generations.

4.8 *Asset traps*

An interesting approach to testing for development traps uses dynamic household-level data on consumption and assets. The approach considers the evolution of assets in comparison to the assets expected to be needed to exit poverty. Mobility in living standards may be of little use if periods of relative prosperity are not used to accumulate assets. A failure to accumulate assets during good times may indeed mean that a household will eventually be pushed back to subsistence levels when worse times come. An important issue is therefore whether chronically poor households use temporary exits from poverty to move onto a trajectory of asset accumulation, in such a way that they would at some point exit the risk of chronic poverty.

One procedure that has been used to investigate this is to compute the consumption value that assets provide, and to estimate the asset stock required to support consumption above a poverty threshold. Assets vary in size and in nature, and it is therefore important to incorporate both the quality and the quantity of the assets households employ to generate consumption. Adato et al. (2006), for example, use three types of asset to build an asset index for South African households: human capital (education), natural and productive capital (such as land, livestock, and equipment), and unearned/transfer income. To allow for development-trap dynamics, Adato et al. hypothesize that temporary shocks to income and consumption can have permanents effects on living standards. To see this, it is useful to consider Figure 3.9, drawn from their paper. This shows the asset index at some later period, $A(A_t)$—written as a function of the vector A_t of individual assets—as a function of its value in some earlier period, $A(A_0)$. A 45-degree line shows when initial and later assets are equal. The solid line shows one possible configuration of the dynamics. In this case, a household that starts with assets between $A(A_p^*)$ and $A(A_m)$ will decumulate assets over time, ending with an asset index in period t that is below the initial level. Given the shape of the $A(A_t)$ line, $A(A_p^*)$ is a locally stable development-trap equilibrium. The household can only escape this trap by experiencing a large enough jump in assets to place it above the 'Micawber threshold' $A(A_m)$. Above this threshold, assets converge to $A(A_c^*)$. Note that even if the assets of a household are above $A(A_m)$

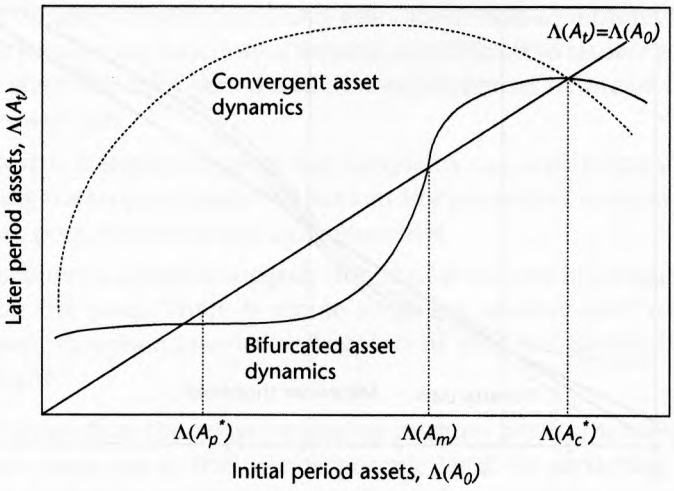

Figure 3.9. Asset dynamics with a Micawber threshold
Source: Adato et al. (2006).

for some time, a shock that pushes assets below $\Lambda(A_m)$ will force the household towards the low-level trap at $\Lambda(A_p^*)$. The dashed curve in Figure 3.9 shows an alternative configuration that implies a unique equilibrium with convergent dynamics.

Figure 3.10 shows the shape of South African asset dynamics between 1993 and 1998, as estimated from survey data by Adato et al. (2006). Taking into account the confidence bands, there does seem to be evidence of a Micawber threshold at an asset index of roughly twice the poverty line. The range of vulnerability, moreover, is wide: a household with asset index of more than three times the poverty line could be pushed to a locally stable low-level equilibrium if an asset shock moved it below the Micawber threshold. The estimated pattern of asset dynamics would predict that such a household could experience a drop in expected longer-term assets from more than three times the poverty line to a lower equilibrium of less than the poverty line. This would imply a severe change in the living standards, both in the short and in the longer term.

Suggestive evidence of the existence of development traps can also be obtained by examining the correlates of the evolution of assets across time. Assets can be less volatile and easier to measure than consumption and income. The evolution of assets is usually linked to the educational level of the household head, the availability of employment, land ownership, family composition, and geographical isolation (Burke et al., 2007).

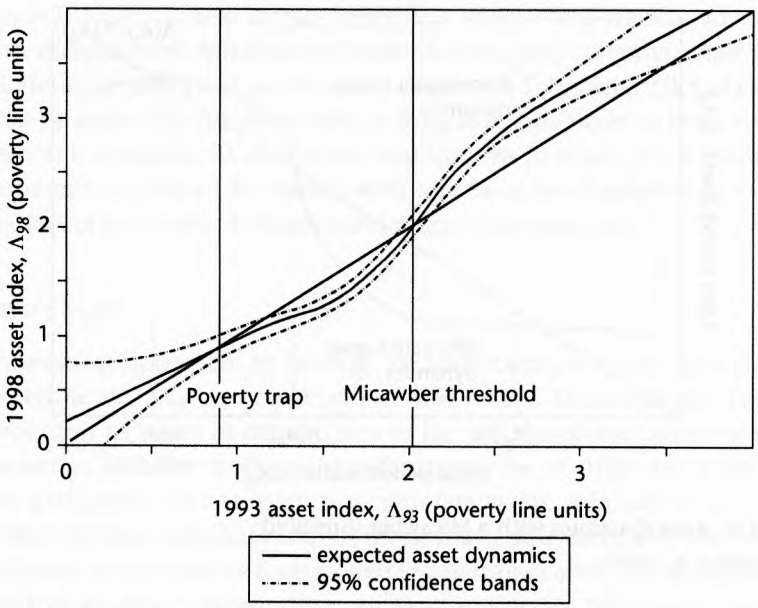

Figure 3.10. Estimated asset dynamics in South Africa
Source: Adato et al. (2006).

5 Conclusions

Is poverty a binding constraint on growth in sub-Saharan Africa? At the aggregate level, we have taken an indirect approach to this question, asking instead whether poverty is what activates one or more of the constraints on productivity that are widely viewed as potentially relevant in low-income countries. Our discussion in this chapter suggests the following set of observations.

- Low income has coexisted with slow growth for a large number of countries since 1960, most of them in sub-Saharan Africa. This is consistent with development traps but does not imply them.
- The theoretical literature suggests a wide range of mechanisms through which low income can be self-perpetuating. While the literature focuses primarily on extreme cases that generate thresholds and multiple equilibria, we favour a broader definition of development traps that relies on non-monotonicity of the phase diagram relating growth to income.
- More than one development trap mechanism may be operative in any country or time period. The growth evidence nonetheless broadly favours mechanisms that operate through measured productivity rather than through factor accumulation.

- Questions about multiplicity, and even about non-monotonicity of the growth process as a function of income, are difficult to resolve econometrically given the brief period and non-experimental nature of the aggregate growth data.
- The growth literature suggests that inequality can undermine growth by widening the scope of market failures and/or generating resource conflicts between poor majorities and rich minorities.
- Microeconomic research suggests that market failures disproportionately penalize the poor. There is ample scope for country-level research to document this phenomenon and explore its links to household incomes and wealth.

We have argued that the most promising avenues for further research on development traps are at the microeconomic level. In particular, country-based research that assesses the empirical relevance of microeconomic links from poverty to productivity, in specific contexts, should help redress the present imbalance between theory and evidence and ultimately strengthen the basis for policy.

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