

Do Poverty Traps Exist?

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Abstract

This paper reviews the empirical evidence on the existence of poverty traps, understood as self-reinforcing mechanisms through which poor individuals or countries remain poor. Poverty traps have captured the interest of many development policy makers, because poverty traps provide a theoretically coherent explanation for persistent poverty. They also suggest that temporary policy

interventions may have long-term effects on poverty. However, a review of the reduced-form empirical evidence suggests that truly stagnant incomes of the sort predicted by standard models of poverty traps are in fact quite rare. Moreover, the empirical evidence regarding several canonical mechanisms underlying models of poverty traps is mixed.

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1. Introduction

In 1960, per capita incomes in Burundi, Haiti, and Nicaragua were \$347, \$1512, and \$2491, respectively. Despite the seven-fold difference in incomes between Nicaragua and Burundi, all three countries were unquestionably poor by developed-country standards. Nicaragua's per capita income was just 16 percent of the level enjoyed by citizens of the United States at the time, while Burundi's income was a paltry 2 percent of US levels. Fifty years later in 2010, per capita incomes in these three countries were basically unchanged, at \$396, \$1411, and \$2289, respectively, reflecting negligible growth in per capita income over this period. Likewise, if one looks within developing countries, poverty appears to be persistent for some households over many years, and even generations.

There are (at least) three competing views of why poverty can be so persistent. The first, which Maitreesh Ghatak et al. (2001) term the "American Dream effect", is that anybody can make it through hard work and thrift. This implies that households and countries should be able to gradually work their way out of poverty, and failure to do so represents lack of effort. The second view is that poverty is the result of poor fundamentals – be they poor institutions and endowments at the country level, or low skills and abilities at the individual level. As a result, policy efforts need to change the underlying fundamentals that determine the steady state, which may be difficult and slow to do. The third view is that poverty begets poverty, so that current poverty is itself a direct cause of poverty in the future. This notion is called a poverty trap, understood as self-reinforcing mechanisms whereby poor individuals or countries remain poor¹, whereas other countries or individuals with the same fundamentals but also the good fortune of starting out rich will stay that way.

The idea of a poverty trap is the most compelling of the three explanations in terms of motivating policy, because it suggests that people and countries may not only be unable to climb out of poverty on their own, but also that much poverty is needless in the sense that a different equilibrium is possible, and that one-time policy efforts may have lasting effects. It lies behind calls for a Marshall Plan for Africa which argue for a massive increase in aid to act as "a "big push" designed to instigate a virtuous circle of higher rates of savings, investment and economic growth" (UNCTAD, 2006, p.3); for industrial policies designed to overcome coordination failures; for the Millennium Villages project which plans to spend

¹ This is the definition of poverty traps offered by Costas Azariadis and John Stachurski (2005) in their extensive survey of the literature on poverty traps. Others (e.g. Chris Barrett and Michael Carter, 2013, Felix Naschold, 2013) also refer to a single poor dynamic equilibria as a structural poverty trap, but we do not use this definition in our paper.

\$6000 per household to implement a complex package of interventions designed to lift selected African households out of extreme poverty (Michael Clemens, 2012); and helps provide justification for support for microfinance loans designed to allow households to lift themselves out of poverty by buying some fixed asset necessary to operate a business. As well as being compelling from a policy perspective, economic theory has long offered a number of different models that can give rise to such traps at both the macro and micro levels.

But do poverty traps exist in practice, and if so, how common are they? To answer this question, we begin by outlining a simple model of a poverty trap at the country level that was a staple of many macro views of development in the 1950s and 1960s, and use it to clarify what is meant by a poverty trap. We next examine reduced form evidence on the persistence of poverty at the country and household level to show that the stagnant incomes of countries like Burundi, Haiti and Nicaragua over long periods is rare in practice, with the typical poor country growing at least as fast as the global average over the last sixty years.

We then turn to examining what we consider to be the main macro and micro mechanisms that are hypothesized to give rise to poverty traps² – S-shaped savings functions at the country level; “big-push” theories of development based on coordination failures; hunger-based traps which rely on physical work capacity rising nonlinearly with food intake at low levels; and occupational poverty traps whereby the combination of borrowing constraints and lumpy production technologies means that poor individuals who start businesses which are too small will be trapped earning subsistence returns. We conclude that these types of poverty traps are rare and largely limited to remote or otherwise disadvantaged areas. We discuss behavioral poverty traps as a recent area of research for which the evidence is just starting to accumulate, and geographic poverty traps as the most likely form of a trap. The resulting policy prescriptions are then quite different from the calls for a big push in aid or expansion of microfinance to allow people to overcome credit constraints. Rather, they call for action in less traditional policy areas such as promoting more migration.

² We deliberately restrict the scope to focus on the potential for poverty traps to account for the post World War II growth experience of developing countries, and for the persistence of poverty within households over years rather than generations. As a result we do not take a view on the importance of poverty traps for understanding very long-run development over hundreds or even thousands of years (as for example in the work of Oded Galor and David Weil (2000)) emphasizing demographic transitions, or that of Acemoglu and Zilibotti (1997) who emphasize how fixed costs of production limited the ability of countries to adopt diversified portfolios of risky but high-return technologies in the pre-industrial revolution period). Nor do we discuss poverty traps based on political economy mechanisms, given they are less directly tied to calls for immediate policy action.

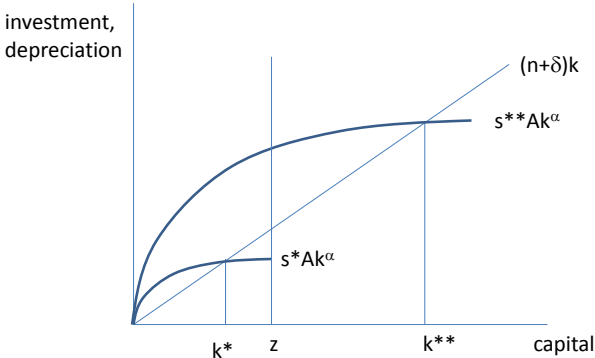
2. A Simple Model of a Poverty Trap at the Country Level

Economists have long turned to theories of poverty traps to account for the persistence of poverty over extended periods of time. An early example is Nelson (1956) who develops a growth model with low saving and investment rates at low income levels.³ The implication of this assumption is that a country that starts out with a low investment rate because it is poor will remain poor because it cannot accumulate sufficient capital per capita to become rich. This basic mechanism is easily captured in the standard Solow diagram that adorns many textbook discussions of poverty traps, shown in the first panel of Figure 1:

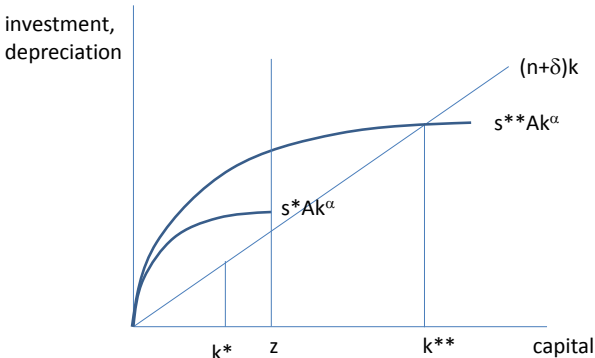
³ Even 50 years ago, the idea of poverty traps was so well-established in the thinking of the profession that Nelson felt obliged to acknowledge in his introduction *“Although the notion of low-level stagnation is scarcely new or different, it is hoped that this paper does more than express the common knowledge of economists in a complicated manner.”*

Figure 1: Growth Models With and Without Poverty Traps

Panel A: Poverty Trap



Panel B: No Poverty Trap



Countries have access to an aggregate per capita production function $y=Ak^\alpha$ in which output (y) depends on capital per capita (k) and the level of technology (A), and investment is financed by saving a fraction s of income. At low levels of development countries have a low saving rate, s^* , which results in a stable low-level equilibrium at k^* , and an associated low level of per capita income. However, if a country manages to accumulate capital greater than some threshold z , the country is assumed to have a high saving rate $s^{**}>s^*$. This results in a high steady-state capital stock at $k^{**}>k^*$ and a higher level of per capita income. This simple framework encapsulates the basic idea that self-perpetuating mechanisms, such as low saving at low levels of development, can keep countries trapped in poverty.⁴

⁴ In fact, this very simple framework can also easily be used to illustrate a variety of other mechanisms for poverty traps. Any set of assumptions that generates a positive relationship between growth fundamentals, such as higher productivity levels (A), higher saving rates (s) or lower population growth rates and/or depreciation ($n+\delta$), can in principle generate a diagram similar to Figure 1, with multiple steady states and a low-level poverty trap. For

The appeal of such simple models of poverty traps is difficult to overstate. At a conceptual level, it is eminently plausible that good growth fundamentals supporting high saving rates and productivity are hard to come by in poor countries. From a policy perspective, poverty trap models are no less than a call to action, laying out a clear case for interventions to spring countries free from poverty traps. For example, if investment rates and capital accumulation are low because countries are poor and cannot afford to save, foreign aid can help to finance investment until countries develop to a point to the right of the threshold z where their saving rates are high enough to place them on a trajectory to the high steady state at k^{**} .

The key ingredient here is that some fundamental (such as the saving rate) is itself affected by how poor the country is. However, this is a necessary, but not sufficient, condition for a trap to arise. For example, the second panel of Figure 1 is identical to the first, except that the threshold z at which saving rates increase from s^* to s^{**} is shifted slightly to the left. Although saving rates rise with the level of development, there is no poverty trap. A country that starts out poor gradually accumulates capital until it reaches the threshold value of z . At this point, its saving rates increase, and over time it reaches the new high steady state at k^{**} .

Finally, note that poverty can be persistent without there being a trap. For example, in the second panel of Figure 1, the unique steady state at k^{**} may still be at a very low level of income, due to low productivity A . However, in such a case, there is not the scope for a short-term policy action to jumpstart the economy out of poverty, unless that policy is able to change the fundamentals of the economy (such as by changing A) – simply investing in more capital will not have any long-term impact.

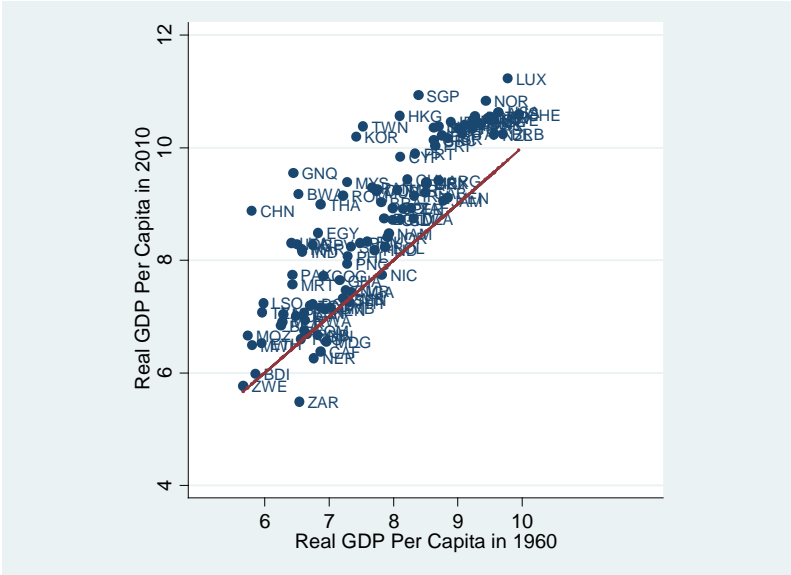
3. Reduced-Form Evidence on the Persistence of Poverty

Models of poverty traps imply that individuals and/or countries will suffer from stagnant income levels over long periods of time. However, the reduced-form cross-country evidence on the persistence of poverty, which many models of poverty traps aim to explain, is not particularly compelling. The reason is that truly stagnant income levels predicted by standard models of poverty traps are in fact quite rare in the cross-country aggregate data. Figure 2 puts the experience of Haiti, Nicaragua, and Burundi noted in the introduction into a broader cross-country context. It plots the log level of real GDP per capita in 2010 (on the vertical axis) against the log level of real GDP per capita in 1960 (on the horizontal axis), for

example, replace s^* with A^* and s^{**} with A^{**} in Figure 1 generates a poverty trap story where countries remain poor because they do not have access to high-productivity technologies.

a set of 110 countries for which data are available. While it is true that a few initially poor countries cluster along the 45-degree line, and even a few such as the Democratic Republic of Congo (ZAR) have experienced negative growth over this period, the vast majority of countries at all initial income levels have experienced positive growth over the past 50 years, as reflected in their position well above the 45-degree line.

Figure 2: Absolute Income Stagnation is Rare, Most Countries Grew between 1960 and 2010



This observation can be seen even more clearly in Table 1, which reports summary statistics on average growth performance in 1960-2010 for 110 countries, grouped by quintiles of the initial income distribution in 1960, updating calculations by William Easterly (2006). Across all countries, average annual growth was 1.9 percent per year. The key point however is that significantly positive growth performance can be found across all quintiles of the initial income distribution, including the poorest. Among the poorest 20 percent of countries, average per capita income growth was 2.2 percent per year, slightly higher than the global average, and also slightly higher than the average of the initially richest 20 percent of countries. Even if we further disaggregate the poorest quintile of countries, average growth among those in the poorest decile was 1.8 percent per year, while those in the second decile grew at 2.6 percent per year.

Table 1: Real GDP Per Capita Growth 1960-2010, by Quintiles of Initial Income Distribution, Percent Per Year			
	<i>Mean</i>	<i>Standard Deviation</i>	<i>Number of Countries</i>
Poorest Quintile	2.2	2.0	22
Second Quintile	0.9	1.5	22
Third Quintile	2.0	1.6	22
Fourth Quintile	2.4	1.2	22
Richest Quintile	2.1	0.6	22

Soure: Penn World Tables Version 7.0

The fact that even the initially-poorest 10 percent of countries has grown at a rate similar to the historical growth rate of the United States over the past 200 years is difficult to square with models of poverty traps, for two main reasons. First and most obviously, poverty trap models imply stagnant incomes at low levels of development, while the post-war growth experience suggests that stagnant incomes are both rare and not systematically associated with initial levels of development. Second and more subtly, poverty trap models typically feature some sort of threshold that, once crossed, leads to an exit from the poverty trap and an acceleration of growth. The fact that even the poorest countries have on average shown positive growth means that it is plausible that at least some of them should have crossed the relevant threshold for the poverty trap that might otherwise have constrained their development. As an illustration, log per capita GDP of the median country in the poorest quintile in 1960 was 6.3, and suppose we take as the relevant threshold log per capita income of the richest country in the second quintile, which was 7.3. At a growth rate of 2.2 percent per year, it would take just 45 years for the median country in the poorest quintile to reach this hypothetical threshold. More generally, unless the thresholds below which countries are trapped are very high indeed, in due course most countries should simply grow their way out of any poverty trap.⁵

⁵ A further piece of reduced-form evidence comes from looking directly at accelerations in growth rates, which poverty trap models predict should occur as countries cross the relevant threshold. Ricardo Hausmann, Lant Pritchett and Dani Rodrik (2005) study episodes of substantial accelerations in real GDP growth rates. While their emphasis is not on poverty traps in particular, they document that there is no stable relationship over time between countries' income levels and the likelihood of a growth acceleration, while models of poverty traps suggest these should occur in poor countries as they emerge from traps. Yet another type of reduced-form cross-country evidence comes from a literature stimulated by Danny Quah (1997), who documents an emerging "twin peaks" pattern in the distribution of per capita incomes across countries, with some countries clustering at a low

A number of studies have also attempted to search for evidence of poverty-traps by examining whether there is an S-shaped relationship in income or asset dynamics at the individual or household level. For example, Jyotsna Jalan and Martin Ravallion (2004) find no evidence for a poverty trap using 6 years of income in China and Michael Lokshin and Martin Ravallion (2004) find no evidence of poverty traps over 4 to 6 year intervals in Hungary and Russia. Felix Naschold likewise finds no evidence of multiple equilibria poverty traps over 3 to 5 year periods using panel data from rural Pakistan and Ethiopia. In contrast, Barrett et al. (2006) do find evidence of multiple equilibria in asset dynamics in some of their more remote sites in small samples from rural Kenya and Madagascar, as do Michelle Adato et al. (2006) with asset dynamics over a five year period in South Africa.

However, a general lack of long-term panels in most developing countries, coupled with concerns about how successful empirical efforts to deal with measurement error are limit the persuasiveness of this evidence. One potential solution has been to track cohorts over time using pseudo-panel methods, with Francisca Antman and David McKenzie (2007) finding no evidence for a poverty trap using 58 quarters of repeated cross-sections from Mexico. Ideally administrative data would enable one to track the incomes of individuals and their children over long periods of time with little measurement error, as has been possible in several developed country studies (e.g. Robert Lucas and Sari Pekkala Kerr, 2013), but the fact that most of the poor in developing countries work outside the formal system negates this possibility. Instead, a more promising approach is to investigate the empirical evidence for specific mechanisms through which traps are theorized to occur. We turn to this evidence in the next section.

4. Inspecting the Mechanisms

The reduced form evidence suggests that poverty traps are not widespread at either the country or individual level, with most countries experiencing some growth and poor individuals not appearing to have dramatically different income dynamics from those who earn more. However, Martin Ravallion (1997) notes that certain types of non-linearities in these dynamics may only appear in situations of crisis or famine, when markets and institutions break down. Christopher Barrett and Michael Carter

level of income and others at a higher income level. While this can be interpreted as evidence of a poverty trap (as for example does Dan Ben-David (1998) who presents a model of subsistence consumption which generates this pattern), another interpretation is simply that there are two groups of countries with some countries converging to a lower steady state and others to a higher one, but with no non-convexities in either group of countries. Another piece of reduced-form evidence can be found in Lopez and Serven (2009) who use cross-country growth regressions to document that countries with higher headcount poverty rates grow more slowly.

(2013) offer a number of other reasons why direct testing of income or asset dynamics may struggle to find poverty traps even in cases where they exist. In particular, there are a number of theoretical reasons why poverty traps might apply for certain country circumstances or particular individuals, but not others, and failing to account for this heterogeneity can lead to incorrect estimation of dynamics. Therefore, next we examine the empirical evidence behind some of the main theoretical mechanisms thought to give rise to poverty traps. We begin with perhaps the most two well-known macro mechanisms (savings and coordination failure), then discuss two of the most well-known micro mechanisms (nutrition and lumpy investments), before turning to behavioral and geographic poverty traps.

4.1 Saving-Based Poverty Traps

Saving-based poverty traps occupy a special place in the literature on poverty traps because they are among the first to be developed into formally articulated models. As discussed in Section 2, the basic idea is simple: if countries (or individuals) are too poor to save, they cannot accumulate capital and thus their incomes can only grow at the rate of total factor productivity growth. If this is low or zero, then incomes will be stagnant. While the basic theoretical mechanism has been understood for a long time, empirical evidence on the quantitative relevance of this mechanism is much more recent. Aart Kraay and Claudio Raddatz (2007) calibrate a standard Solow growth model with saving as an exogenous function of the level of development, as well as a Ramsey economy with subsistence consumption, to match key features of Sub-Saharan African countries.

In the case of the Solow economy, a necessary condition for the existence of a poverty trap is that saving rates are an S-shaped function of the level of development, starting out flat when countries are poor, increasing sharply over some intermediate range, and then leveling off again. Kraay and Raddatz (2007) estimate a non-linear empirical relationship between saving rates and incomes observed in the cross-country data, and use this to calibrate the exogenous saving function in the Solow economy. While it is true that saving rates increase with the level of development, it turns out in the data that they increase sharply at quite low levels of development, so that a stable low-level equilibrium corresponding to a poverty trap does not emerge. In short, in the data the world looks more like Panel B of Figure 1 than Panel A.

Kraay and Raddatz (2007) also study a Ramsey economy with subsistence consumption. At low levels of development, growth in this economy reflects the balance of two forces. On the one hand, at low levels

of development the marginal utility of consumption is very high because countries are close to their subsistence constraint, and this lowers optimal saving rates, slowing growth. On the other hand, thanks to diminishing returns the marginal product of capital is very high, which encourages saving, investment, and growth. For plausible calibrations of the key parameters the latter force dominates the former, and countries very quickly grow out of the subsistence constraint, at which point the familiar dynamics of the Ramsey economy with subsistence consumption take over. The key observation here is that countries need to be very close to subsistence levels in order for growth to stagnate for extended periods of time. But this poses a challenge to the view that poverty traps are a widespread phenomenon, given that income levels vary considerably among poor countries. Returning to the countries noted in the introduction, in order to argue that stagnant incomes in Burundi and Nicaragua are due to a subsistence consumption-type poverty trap, it is necessary to provide a rationale for why the relevant subsistence level of consumption is seven times higher in Nicaragua than it is in Burundi. Otherwise, for the reasons given above, theory predicts that Nicaragua would long since have outgrown subsistence constraints.

4.2 Big-Push Models of Poverty Traps

A second distinguished theoretical argument for poverty traps comes from the view that there are increasing returns to scale in the “modern” sector of the economy (usually thought of as manufacturing), and constant returns in the traditional sector (usually thought of as agriculture). The economics of this mechanism are also straightforward. If the economy devotes most of its resources to production in the traditional sector, wages will be equalized at a low level across sectors. If on the other hand the economy makes a “big push” to allocate most of its resources to the modern sector, it can realize the benefits of increasing returns and enjoy high wages in both sectors, and a high income level.

Two sets of calibration evidence provide somewhat conflicting evidence on the quantitative importance of this mechanism. On the one hand, Bryan Graham and Jonathan Temple (2006) develop an innovative calibration strategy that allows them to infer from observable data whether a second potential equilibrium exists, and whether it implies a higher or lower income level than the one actually observed. Applying this methodology to 127 countries, they find that for many of them, the existence of a second equilibrium is compatible with the data. Moreover, about a quarter of countries, predominantly poor ones, are in the lower of the two equilibria. For the typical country in the low-level equilibrium, the corresponding high-level equilibrium involves an income level two to three times higher than the actual one. Such income differences resulting from countries finding themselves in a “bad” equilibrium

certainly are non-trivial, although they are only a small fraction of the observed income differences between poor and even middle-income countries.

On the other hand, Elizabeth Caucutt and Krishna Kumar (2008) also study a “big push” type model with a coordination failure arising from the fact that agents find it optimal to invest in labor-saving technologies only if other agents also do so. This coordination failure naturally delivers a poverty trap when all agents fail to invest in the better technology. However, Caucutt and Kumar (2008) argue that the existence of the low-level equilibrium is not particularly robust to small changes in parameter values, and particularly for more empirically plausible parameters of the model. Moreover, they find that even when a trap does exist, the one-time subsidy required to induce agents to invest and switch to the high equilibrium is only about five percent of income. If the “cure” to poverty is such a small intervention, this begs the question of why the much larger volumes of aid to poor countries have not succeeded in springing countries free from this particular trap.

4.3 Nutritional Poverty Traps

One of the earliest examples of an S-shaped poverty trap at the individual level is that of a nutritional poverty trap, which can be traced back to at least Dipak Mazumdar (1959), and was formalized by Partha Dasgupta and Debraj Ray (1986). The basic idea is that the link between food intake and physical work capacity is non-linear, with increasing returns when one starts from a low consumption level. In this model poverty can be self-reinforcing since poor individuals are too malnourished to physically be able to do productive work, thereby not earning enough or producing enough food to alleviate this malnourishment.

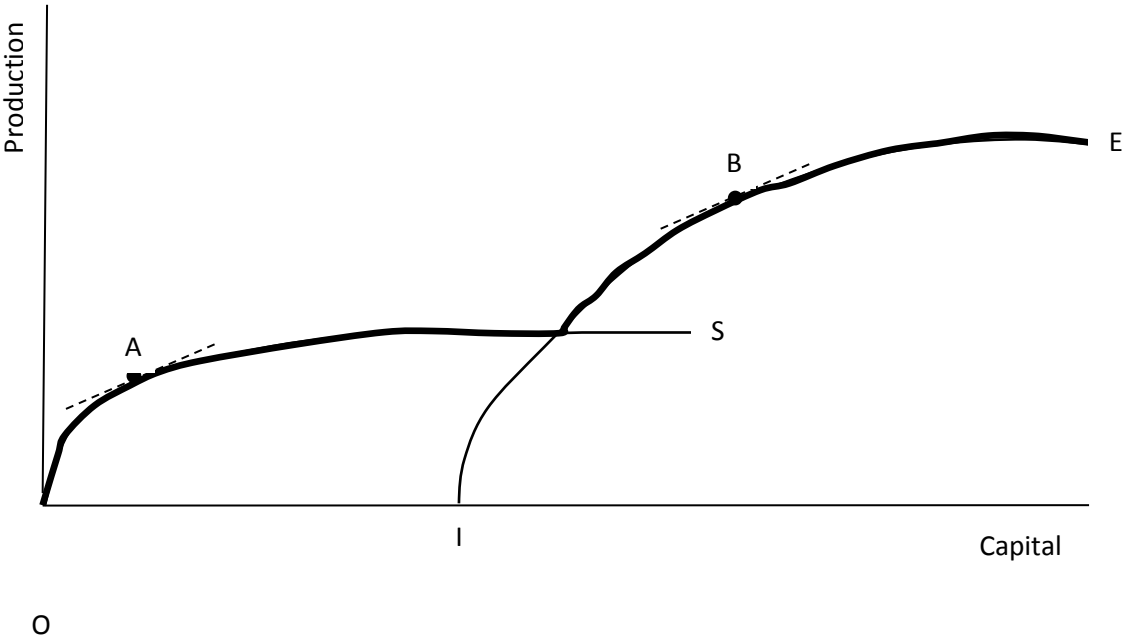
However, empirically such traps appear unlikely for most people for two key reasons. The first is that calories are too cheap in most of the world for many of the poor to be in a nutritional poverty trap. For example, Shankar Subramanian and Angus Deaton (1996) calculated that the cost of the calories needed for a day’s activity in rural Maharashtra were less than 5 percent of the daily wage, while more recently Abhijit Banerjee and Esther Duflo (2011) calculate that 2,400 daily calories can be obtained in the Philippines for as little as 21 cents in PPP terms. An exception can be during famines, where markets break down and prices rise (Ravallion, 1997), and in cases of constant fecal-oral contamination in which the body is unable to absorb many nutrients, effectively raising the price per absorbed calorie (Ravallion, 2013). Second, while both calories and micronutrients do have impacts on productivity, a variety of studies summarized by John Strauss and Duncan Thomas (1998) suggest that the shape of this

relationship tends not to be increasing enough to generate poverty trap dynamics. These points do not mean there is no scope for policy efforts to ease malnutrition – indeed there is a large literature showing lasting impacts of nutritional deficiencies in early childhood, and long-term benefits of early interventions to overcome these deficiencies (e.g. Jere Behrman et al, 2004) - just that the rationale for doing so should not rest on pushing people over some critical threshold in a poverty trap.

4.4 Lumpy Investments Coupled with Borrowing Constraints

A number of models of poverty traps are based on an interaction between capital market imperfections, which restrict the amount individuals can borrow, and the idea that the production technology is non-convex – i.e. there is a range where investing a little has low returns and investing a lot more has much higher returns. For example, as in the models of Banerjee and Andrew Newman (1993), and Philippe Aghion and Patrick Bolton (1997), individuals may choose between a subsistence activity that requires no fixed capital investment, and an entrepreneurial activity which requires a minimum outlay of capital, I. Following Banerjee and Duflo (2011), Figure 3 then shows the subsistence production technology (curve OS) and entrepreneurial activity (curve IE), and the combined non-convex production set OE (the darkened curve).

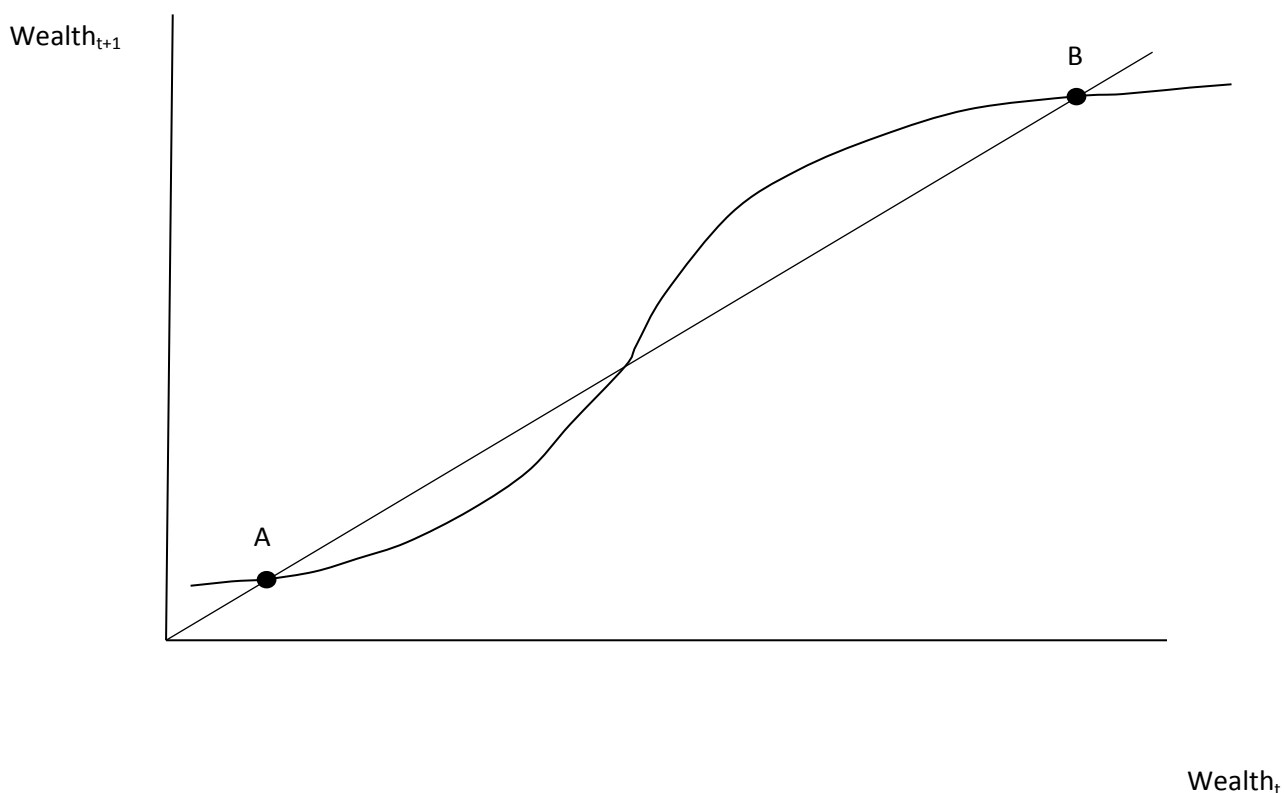
Figure 3: Production non-convexity arising from choice between two technologies



Individuals with low initial wealth who cannot borrow then begin in the subsistence production activity, while individuals with high initial wealth become entrepreneurs. In the absence of borrowing,

individuals choosing between consumption and investment in their business will choose a production level such that the marginal return on investment equals the marginal rate of substitution between consumption today and consumption in the future. This gives rise to two steady-state production points given by A and B above, and to the S-shaped wealth dynamics in Figure 4 below. Individuals who begin with too little wealth will be stuck in the poverty trap at A – returns to capital are too low for them to bootstrap their way out of poverty, while borrowing constraints prevent them reaching the scale needed for the entrepreneurial activity.

Figure 4: Poverty trap corresponding to dual technology choice



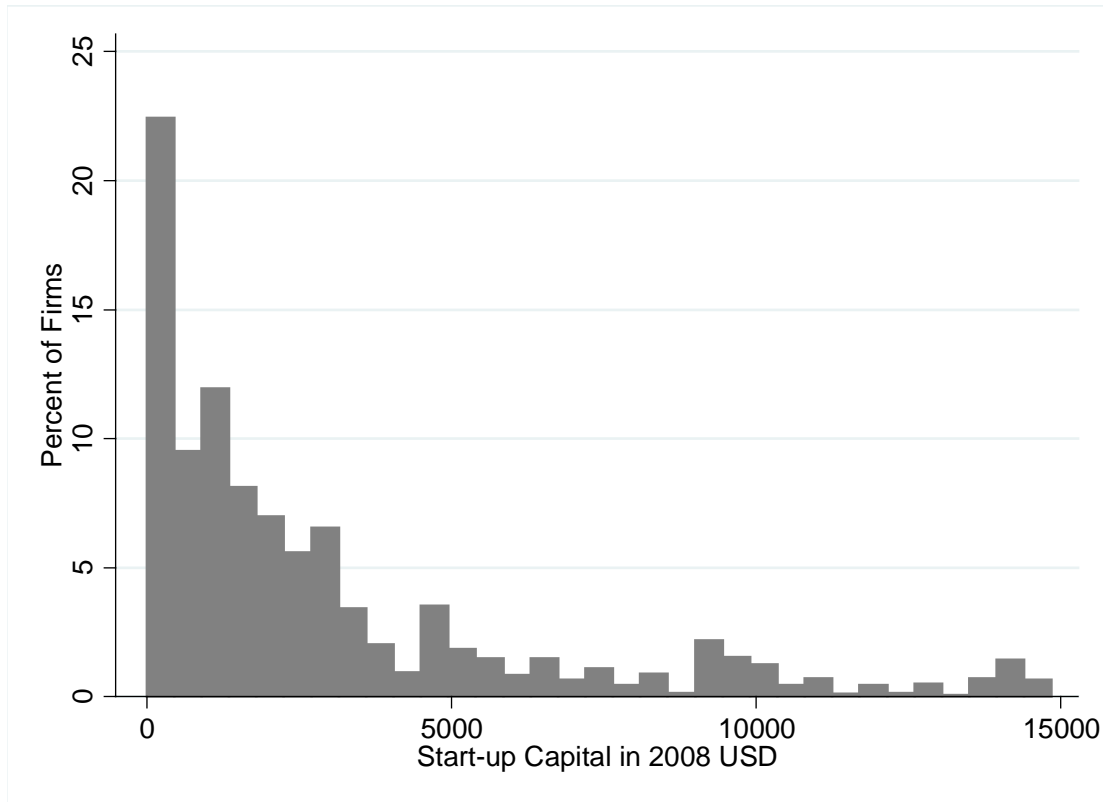
So how realistic is this model? The closest practical analog to this theoretical case can be found in studies of pastoralists in rural Ethiopia conducted by Travis Lybbert et al. (2004) and Paulo Santos and Christopher Barrett (2011), and by Barrett et al. (2006) among rural pastoralists in Kenya. Raising cattle is the only production activity for these individuals, and looking at cattle herd size dynamics, these studies find evidence for a process like that in Figure 4, whereby individuals who start with a small herd size appear trapped around a very low level (A in the figure), whereas there is also a much higher level equilibrium (B). They suggest that a minimum herd size is required in order to be able to undertake the

migratory herding necessary to deal with variation in water availability and forage, and those with smaller herds than this size must stay near their base camps, where land degradation means only a small herd size can be supported. Moreover, Santos and Barrett (2011) show that these asset dynamics are known to the farmers, and that those too close to the low-level steady state are excluded from informal credit markets. So in this remote location, with only a single non-convex production technology, and no access to credit, some pastoralists appear trapped in poverty as theory would suggest. The key question, to which we will return, is then why more people do not leave such areas.

In contrast, in most of the world, individuals face multiple production technologies. Individuals have a choice over many different types of sectors (e.g. make clothing, sell food, sell other goods), and within a sector, a choice over which items to make and sell. Empirically this gives rise to several facts that are difficult to reconcile with models of poverty-traps like that in Figures 3 and 4.

The first two facts relate to the capital needed to start a business. In practice, it seems individuals do not need a lot of capital to start a business; many business owners start with very low levels of capital, and some start with zero capital. Second, the amount of capital needed to start a business appears relatively continuous – it does not seem that business owners only have a small number of production technologies they can choose among. As an example, Figure 5 plots the distribution of start-up costs of 2,200 urban Sri Lankan microenterprises in the baseline of the Sri Lanka Longitudinal Survey of Enterprises (SLLSE), described in Suresh de Mel et al. (2009). Start-up capital includes land, buildings, machinery, and working capital. We see a wide range of initial start-up levels of capital, with 10 percent of firms starting with US\$100 or less, and 23 percent with \$500 or less. David McKenzie and Christopher Woodruff (2006) show similarly that there is a range of different starting capital levels for Mexican microenterprises, with many starting with low amounts.

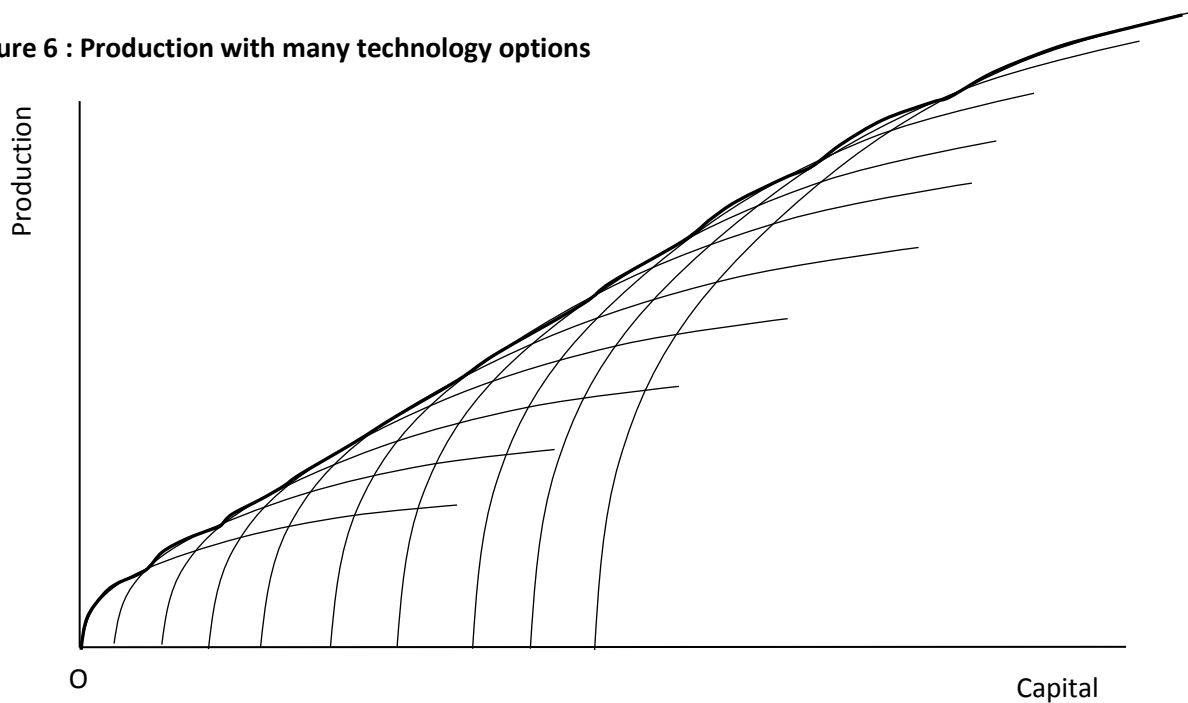
Figure 5: The empirical distribution of start-up capital shows there are many production choices



Source: Sri Lankan Longitudinal Survey of Enterprises, Baseline data. Graph is restricted to the bottom 90% of firms in terms of start-up capital.

Once we allow for many different production technologies, each with a different initial starting cost, then the overall production technology convexifies relatively rapidly. For example, Figure 6 shows the analog of Figure 3, but with 10 rather than 2 production technologies. While the outer curve, shown in bold, still has areas of locally increasing returns, these have flattened out and the curve is much smoother than with 2 technologies. As one moves from 10 to 100 or 1000 different production choices, the overall production choice set will then become more and more convex.

Figure 6 : Production with many technology options



The result is that if individuals face many different production technologies and can move across them (e.g. by adding another product line to their retail store, or selling off one business and using the proceeds to start another), then there should be no multiple equilibrium-based poverty trap. Even if individuals are unable to borrow, they should be able to start small, re-invest some of their earnings, and slowly bootstrap their way towards a single steady-state production level. Moreover, to the extent that individuals are liquidity-constrained and far from their optimal production levels, additional small capital investments should have high returns. This is in sharp contrast to the dual technology poverty traps model in which individuals who start small will have very low returns on capital unless they make a very big investment.

A third fact that casts doubt on technology-based poverty trap models is that many small-scale businesses have very high returns to capital – it is not automatically the case that starting small means very low returns. Several studies, including randomized experiments which give one-time grants of \$100 or \$200 to microenterprise owners, show that the average microenterprise owner in several countries appear to have high returns to capital when starting at a relatively low level of capital stock. In Sri Lanka, de Mel et al. (2008, 2012) find a return to capital of 5 percent per month on average, although returns are higher for men and near zero for female owners. In Mexico, using non-experimental methods, McKenzie and Woodruff (2006) find marginal returns to capital averaging 15 percent per month for male

business owners with less than \$200 in capital, with a follow-up experiment finding returns of 20 percent per month or more. Finally, in Ghana, Marcel Fafchamps et al. (2013) also find returns averaging 20 percent per month, but also evidence of no returns for women running very small businesses, and evidence that the impact is higher when capital is given in-kind than as an unrestricted cash grant.

Finally, if all that was holding individuals back from moving from a low-level steady-state like A in Figure 4 to operating at a much higher level out of poverty like B was access to finance, then one would expect microfinance loans to have large impacts on poverty if individuals could borrow enough to finance the lumpy production technology needed to move them out of a trap. However, there are now a number of randomized experiments that randomly offer microfinance to individuals or communities, and none of them have found strong evidence of impacts on business growth or poverty (see Banerjee et al, 2013 for an example, and their last section for an overview of several recent studies).

As a result, in most of the world it seems unlikely that the combination of a limited number of lumpy productive investments, coupled with constraints on borrowing, are causing poverty traps. However, individuals may remain persistently in poverty because their underlying characteristics may be such that their single steady-state level of production is just extremely low (Barrett and Carter, 2013). Regardless of the amount of financing available, individuals with poor skills and facing other constraints may be unable to produce at more than a subsistence level. This has led to a number of policy interventions which provide assets coupled with intensive skills training, and savings promotion. Examples include the BRAC ultra-poor program evaluated by Oriana Bandiera et al. (2013) among rural women in Bangladesh; the Bardhan hard-core program evaluated by Banerjee et al. (2011) in rural West Bengal, India; and the SKS ultra-poor program evaluated by Jonathan Morduch et al. (2012) in rural Andhra Pradesh, India.

These programs were aimed at extremely poor households, with eligibility requiring households to have no male workers, not own productive assets, have limited land, and not being microfinance clients. The Bandiera et al. (2013) study finds this combination intervention has lasting impacts over a four year horizon, with an increase in earnings that is large in relative terms, but small in absolute value (approximately US\$0.07 per day higher). Banerjee et al. (2011) find similar results over a 18 month horizon, with program households receiving an approximate US\$0.06 per day increase in per capita earnings. In contrast Morduch et al. (2012) find no overall impact on income growth, which they attribute to the presence of opportunities for wage labor that opened up at the same time as the ultra-poor program and enabled the control group to grow at the same rate.

These programs demonstrate that the combination of asset support, training, and other assistance can take some individuals from being extremely poor to being just poor. To the extent that the skills training and behavior change components work, this may come from changing the underlying steady-state rather than just speeding up convergence towards it. But in either case the individuals remain quite poor. More time since the interventions is needed to know whether any new steady-states are at dramatically different production and income levels from the old steady states.

4.5 Behavioral Poverty Traps

In order for individuals to be able to grow out of poverty from a low initial level of capital, they need to continually save and re-invest. However, recent work in behavioral economics suggests that poverty may be self-reinforcing because of the way it affects decision-making. Banerjee and Sendhil Mullainathan (2010) provide one theoretical example of a poverty trap, in which individuals allocate spending between temptation and non-temptation goods, with declining temptation so that the fraction of the marginal dollar spent on temptation goods declines with total amount spent. In their model this then leads to poor individuals being present-biased, and unwilling to take small high return investments, keeping them poor. Anju Shah et al. (2012) provide another potential explanation, in which scarcity causes individuals in poverty to devote far more mental effort to meeting daily needs, leaving less attentional resources for other problems- such as perhaps thinking about how to grow their firm. A consequence of these theories may then be that poor business owners will lack the self-control to reinvest cash in their business, preventing them from taking investments which would slowly allow them to grow out of poverty.

The evidence to support this form of a trap is somewhat suggestive to date. In Ghana, Fafchamps et al. (2013) find that a one-time grant given as cash had much lower effects on business profitability than the same size grant given in kind among female microenterprise owners, with some evidence to suggest this is driven by self-control. Simone Schaner (2013) finds persistent effects on non-farm business growth of short-term incentives to save among Kenyan households, which she attributes to them setting up mental accounts geared towards the business. The control group of firms in the Sri Lankan grant experiment of de Mel et al. (2012) still have not caught up to the treatment group over five years later, despite the treatment group largely making divisible investments of working capital. Hence small business owners do not appear to be taking on some investments that are divisible and profitable,

limiting their ability to reinvest their way towards a high steady-state.⁶ Nevertheless, these same types of small firms do appear to grow over time in a growing economy (de Mel et al, 2013), suggesting that any behavioral constraints on firm growth do not prevent the owners responding over time to rising demand.

4.6 Micro Meets Macro: Geographic Poverty Traps

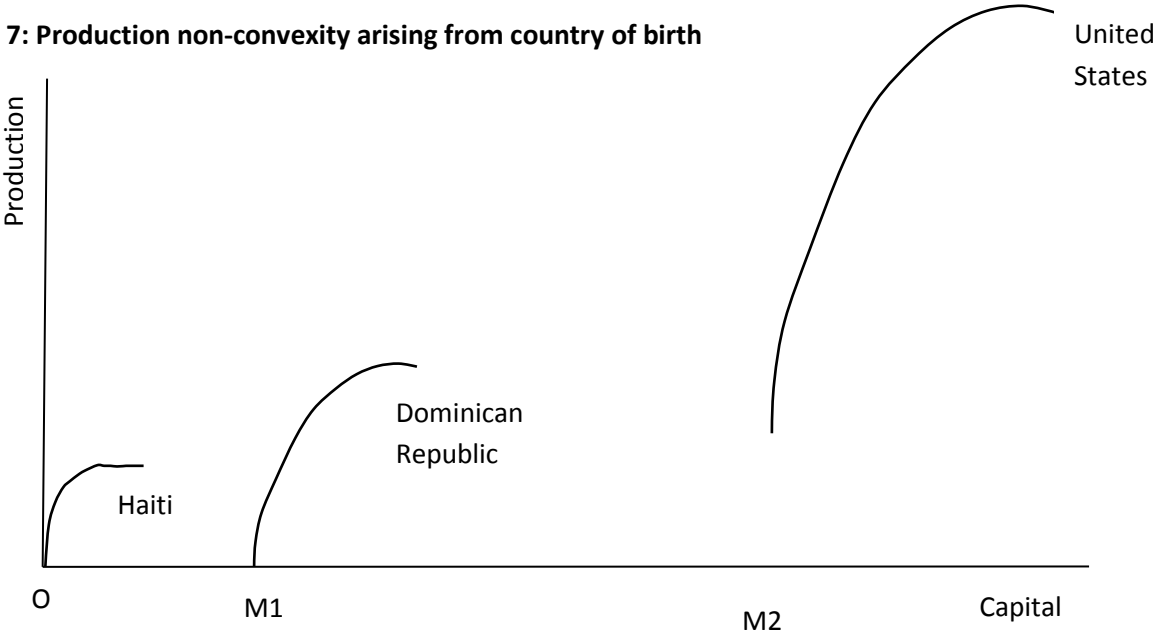
It is notable that the evidence most consistent with poverty traps comes from poor households in remote rural regions – whether it is the work among East African pastoralists, or the suggestion of breaking individuals out of poverty traps in some of the ultra-poor programs. In these remote rural areas, isolation reduces the number of available production technologies, so that Figure 3 may be a closer approximation than Figure 6 to the productive choice set. This brings us back to the idea that poverty is much more persistent in some places than others, and of the existence of “geographic poverty traps”. Jyotsna Jalan and Martin Ravallion (2002) define these to be formed when the characteristics of a geographic region are such that a household’s consumption cannot rise over time, while an otherwise identical household living in a different, better-endowed, area, would enjoy a rising standard of living. They use farm household panel data from rural China to estimate a dynamic consumption model which allows fixed or slowly changing geographic characteristics to influence household consumption and find evidence to support the idea that, all else equal, living in a poor area lowers the productivity of a farmer’s own investments, with areas with insufficient geographical capital, such as few rural roads, potentially in geographic poverty traps.

The key question is then why more people do not move out of poor areas? In the Chinese context, mobility restrictions such as the household registration (*hukou*) system, along with thin rural land markets and uncertain land property rights might explain low mobility (Jalan and Ravallion, 2002). But many people remain in poor rural areas throughout much of the world, despite high returns to internal migration. Cost can be one reason – the same credit market failures that prevent investing in more productive assets can also prevent households financing the costs of moving. Gharad Bryan et al. (2013) conduct experimental work in Bangladesh to try to understand why more households don’t undertake seasonal migration, which they show to have high returns, and conclude that another part of the explanation seems to be that households close to subsistence are unwilling to take the risk of migration, but will do so if insured against this risk.

⁶ See also Michael Kremer et al. (2013) and Esther Duflo et al. (2011) for additional examples of small business owners not undertaking small investments with high marginal returns.

More broadly, in our view the strongest evidence for a poverty trap is the one based on country of residence. The same individual can be in persistent poverty or earning substantially more depending solely on the country they happen to work in. For example, using a visa lottery, McKenzie et al. (2010) estimate that Tongan workers experience a 263 percent increase in their (purchasing power-adjusted) income within a few months of migrating to New Zealand. Michael Clemens et al. (2008) estimate that a male worker with 9 years of education would earn 7.8 times as much working in the United States as in Haiti. Consider an individual born in Haiti. They face a range of production technologies in Haiti, as in Figure 6, but all with low productivity. Alternatively they can pay the migration costs $M1$ of moving to nearby Dominican Republic and face a whole range of new production technologies there, or the much larger migration costs $M2$ of moving to the United States and face the range of production technologies there. Figure 7 illustrates this set of choices:

Figure 7: Production non-convexity arising from country of birth



This brings us back around to the multiple equilibrium technology-based poverty-traps- but here the constraint is the ability to pay the costs needed to move to a more productive country. These include not just the monetary costs of movement, but the costs of overcoming substantial barriers to movement – which could include the costs of skills training and certification needed to qualify for migration through a high-skilled immigration category. Individuals unable to pay these costs will be stuck at much lower income levels, and in some countries poverty.

5. Implications for Policy

Our view of the existing literature is therefore that there does not appear to be strong evidence for many of the common mechanisms theorized to give rise to poverty traps. Coupled with the fact that even poor countries have managed to grow at a rate similar to the historical growth rate of the United States over the past 200 years, we suggest that one should be skeptical of claims that countries need a big push of aid to take them over some threshold at which their growth prospects will shift dramatically. Likewise, one should be skeptical of claims that microfinance will be the solution to poverty traps caused by the interaction of financial constraints and lumpy investment technologies, or that there are many workers for whom receiving more calories will be the difference between them being stuck working at low productivity, or not.

This does not mean that there is no role for aid. Even if they are not in a trap, people can be persistently poor, or be converging very slowly to a steady-state, and still benefit from aid. We only get to observe income and asset dynamics for individuals who live, so aid projects which reduce premature mortality are an obvious example where a lack of poverty traps need not preclude large benefits from aid. Many other successful aid projects like conditional cash transfers, deworming, school reforms, etc. have outcomes that improve the well-being of recipients in important ways, even though they are unlikely to move that person from one equilibrium to another, or at least to a very different one. Nor are they likely to lead to a sharp acceleration of growth at the aggregate level as the country breaks free from a poverty trap.

Finally, while poverty traps appear rare, this does not mean they can never exist. The clearest evidence for traps appears to come from people being trapped in low productivity locations – whether this be remote rural regions within a country, or in low productivity countries. Policy efforts to lower the barriers to internal and international mobility therefore appear to offer large potential payoffs in terms of taking people out of poverty.

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