Theories of Poverty Traps and Anti-Poverty Policies

Maitreesh Ghatak

In this paper we provide a conceptual overview of alternative mechanisms leading to poverty traps at the individual level, making a distinction between those that are due to external frictions (e.g., market failure), and those that are due to behavior under extreme scarcity in the absence of any frictions. We develop a common theoretical framework to examine alternative scenarios, characterizing conditions under which poverty traps (in the sense of multiple stable steady states) arise, as opposed to (possibly, conditional) convergence to a unique steady state. We apply this framework to discuss the relative merits of alternative anti-poverty policies, such as unconditional and conditional cash transfers, and direct interventions aimed at improving market access to the poor or improving public service delivery. JEL codes: D13, D23, O12, O15

Introduction

There are two distinct strands of thinking on poverty. One view is that the poor are just like the nonpoor in terms of their potential (that includes ability, preferences), and they simply operate in a more adverse environment, in terms of individual characteristics (e.g., factor endowments) or economy-wide characteristics (e.g., prices, infrastructure, various government policies). The best known statement of this view is Schultz's phrase "poor but rational." Modern development economics has extended this view to what Duflo (2006) calls "poor but neoclassical" by studying various frictions that impede the smooth functioning of markets as well as technological nonconvexities that make it disadvantageous to be poor or operating at very low scales. We lump these together and call them "external frictions" (along with frictions that arise from poor governance, infrastructure, etc.) that prevent the poor from making the best use of their

Maitreesh Ghatak is a Professor of Economics at the London School of Economics; his email address is: m.ghatak@lse.ac.uk.

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endowments through exchanges in the marketplace or through technology. The implicit premise of this view is that poverty is a consequence of individuals operating with an unfavorable *external* environment. To the extent this can be fixed by placing a poor individual in a more favorable external environment, it will be a transient phenomenon but otherwise the poor may be trapped in poverty. In a sense, in this view the phenomenon of poverty, other than being *inequitable*, is also *inefficient*: a combination of individual rationality and market forces should work to utilize any potential gains (e.g., lost income from insufficient investment in human capital) and the question is, what external frictions prevent this from happening.

A very different view of poverty is, even if there were no external frictions, the poor are subject to different pressures and constraints from the nonpoor and that drives them into making choices that are very different, and more importantly, that can reinforce poverty. Having very low incomes means an individual has to engage in a day-to-day struggle for survival for herself and her family, and there may be a self-reinforcing dynamics at work through the choices that are made under extreme scarcity that keep those with poor initial endowments of financial and human capital, poor over time and across generations. It is tempting to call this view "poor but behavioral," but we are going to argue that this is a broader phenomenon, as even if all individuals are rational in the neoclassical sense, choices under extreme scarcity can reinforce the tendency of the poor to stay poor. For example, at very low income levels, subsistence considerations may rule out the feasibility of saving at a reasonable rate, and investing money in health and education to secure a better for future for themselves and their children. In fact, the relevant scarce resource does not have to be money but can also be time or attention span.[1]

In this paper we develop a conceptual framework and simple unifying model that distinguishes between what we call "friction-driven" and "scarcity-driven" poverty traps corresponding to the two views of poverty discussed above. We start with a standard dynamic model of an individual saving or leaving as bequests a constant fraction of income, and investing over time and study how her income and wealth grows. Then we introduce various external frictions and study conditions under which rather than converging to a unique steady state, there could be multiple stable steady states, and which steady state an individual ends up depends on her initial wealth, that is, a poverty trap exists. We focus on poverty traps at the level of *individuals* and adopt a partial equilibrium approach (i.e., take prices as given) to examine under what conditions two individuals who are identical in all respects but only differ in their initial wealth may end up with different steady state wealth levels. We do not look at *aggregate* or macrolevel poverty traps, where interest rates or wages adjust with capital accumulation or

1. See Banerjee and Mullainathan (2008) for a formalization, and also Mullainathan and Shafir (2013) for various examples.

general equilibrium effects.[2] We then extend the model to relax the assumption that people save a constant fraction of their income and allow the choice of saving to depend on income in a nonproportional way (which results from nonhomothetic preferences) and characterize conditions for poverty traps to emerge. We consider the role of behavioral biases as well as insufficient intergenerational altruism in this context.

We draw a number of interesting inferences. We show that capital markets frictions play an important role in determining the possibility of poverty traps, but these are neither necessary nor sufficient for poverty traps to arise, even if we restrict attention to friction-driven poverty traps. This suggests being careful in making inferences about whether poverty traps do or do not exist from any piece of evidence suggesting the presence or absence of any single friction. We also show that poverty traps can exist even without *any* external frictions due to the operation of strong income effects in the behavior of individuals, and this is possible without any behavioral biases.

We then discuss the distinctive policy implications of these two kinds of poverty traps. We will focus on a representative "poor" agent and assume that the policymaker has some resources (which are costly due to taxes being distortionary and there being alternative uses of public funds) and wants to help the poor individual escape poverty, defined in terms of some minimum level of income, consumption, or wealth. For the most part, we assume the policymaker's objective function is the same as the individual's preferences, but in some cases there may be grounds for having paternalistic preferences.

We distinguish between policies that are aimed at improving market access to the poor as well as improving productivity in general (e.g., through better public service delivery) by dealing directly with the frictions and those that involve direct transfers to the poor. We show that for both types of poverty traps, lump-sum transfers work (under some conditions). However, if poverty traps are friction-driven, then it is possible to substitute lump-sum transfers with "supply-side" policies that directly tackle the frictions. We also show that to the extent scarcity and frictions coexist, there are strong complementarities between policies that increase the purchasing power of the poor and those that are aimed at removing a friction. We show that to the extent the preferences of the individual differ from that of the policymaker (which can be due to behavioral biases or insufficient intergenerational altruism or gender bias), unconditional lump sum transfers will not be the most efficient form of intervention and there may be a case for "paternalistic" interventions such as conditional cash transfers.

The plan of the paper is as follows. In the next section we develop a benchmark model without any frictions, as well as any scope for the behavior of the poor to be different due to the operation of income effects. In the third section

2. See Azariadis (1996) and Banerjee (2003) for reviews of the literature on poverty traps. See Mookherjee and Ray (2003) for an example of a poverty trap with general equilibrium effects that arise from the equilibrium returns from *different* occupations adjusting in response to individual choices.

we analyze poverty traps that are driven by frictions (subsection titled External Frictions) and, choice under scarcity (subsection titled Non-Homothetic Preferences). In the fourth section we discuss the policy implications of our theoretical framework. The final section concludes with some observations of interesting issues that are worth exploring further in future research.

The Benchmark Model

In this section, we develop a standard model of a representative individual using capital to produce output, with no market friction or any kind of nonconvexity. In addition, we assume preferences are homothetic in income, and therefore, in a proportional sense, there is no difference in the "behavior" or "choices" of the poor from that of the rich, say, in the context of savings.

One-Period Model Suppose production (q) depends on one input (x) given by a standard neoclassical production function:

$$q = Af(x).$$

A denotes the productivity parameter which could be driven by skills, ability, infrastructure, institutions. The function $f(x)$ is assumed to have the standard properties of a neoclassical production function. Whenever convenient, we will use the example of the Cobb-Douglas production function: $q = Ax^{\alpha}$ where $\alpha \in (0, 1)$. We will focus here on physical or financial capital, denoted by k and so $x = k$. We will consider the role of other inputs in the next section. Here we can think of a self-employed individual using capital to run a business.

To keep the notation simple, we assume k is working capital and therefore, fully depreciates after use. Since capital fully depreciates with use, returns to a unit of capital, denoted by r, has to exceed 1: That is, r is the *gross* rate of interest. As mentioned earlier, we focus at a representative individual, and take r as exogenously given all through. An individual has capital endowment $\bar{k}$. Her profits are

$$\pi = \max_{k} Af(k) - rk.$$

With perfect capital markets her income is:

$$y \equiv \pi + r\bar{k}.$$

This shows that the endowment of capital or wealth does not matter for *productive efficiency* although it does matter for *final disposable income*. Through rental or sales (in a one-period model they are equivalent), they adjust to maximize efficiency, with all production units using the same amount of capital given by k^* which is a solution to $Af'(k) = r$. If someone is capital-rich, she can lend

capital, and borrow otherwise. Therefore, with perfect markets and no frictions (e.g., nonconvexities), we have a *separation* between productive efficiency and individual economic outcomes.[3] To the extent we care about an individual's income falling below some minimum threshold, that is, poverty, there is a case for redistributive transfers, but they will not have any positive productivity impact on the recipient.

Infinite Horizon Model We now introduce dynamics in the one-period model to allow for savings and capital accumulation over time so that the current endowment of the capital stock $\bar{k}$ (equivalent to wealth in this model) is the result of past choices rather than being exogenously given. We assume preferences are homothetic and people save at a constant rate s, as in the Solow model. Alternatively, we can assume that individuals live for one period, pass on a constant fraction s of their wealth as bequests to the next generation. In the next section we will examine the consequences of relaxing the assumption of a constant saving rate.

The constant rate of saving or bequest can be micro-founded in the following way that is standard in the occupational choice literature (see Banerjee 2003). Suppose individuals have preferences over consumption (c) and bequests (b) and the utility function is given by:

$$U(c, b) = \log c + \beta \log b$$

where $\beta \geq 0$. As is standard, we assume bequests cannot be negative. If we maximize this subject to the budget constraint $c + b \leq y$ then we get the usual result: $b = sy$ where $s \equiv \frac{\beta}{1+\beta}$. This budget constraint implies the presence of intertemporal borrowing constraints. We will discuss the implications of this assumption, as well as that of bequests being non-negative later in this section.

Let k_t denote the capital endowment in time t. The bequest of generation t determines capital endowment in period $t+1$: $b_t = k_{t+1}$. With perfect capital markets we get:

$$k_{t+1} = s(\pi + rk_t).$$

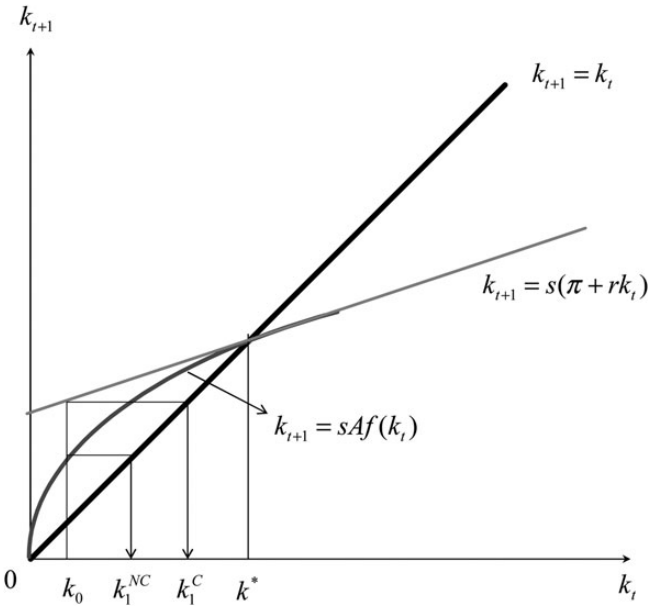
Assuming $sr < 1$ we get convergence to a unique steady state as figure 1 shows, using a familiar diagram.

In the figure, the grey line (we will turn to the concave curve in the next section) represents the equation that gives the evolution of the capital stock over time. The unique steady state capital stock k^* is given by

$$k^* = \frac{s\pi}{1 - sr}.$$

3. This is the same as the separation result in the context of Agricultural Household Models, as developed by Singh, Squire, and Strauss (1986).

FIGURE 1. Convergence in the Solow Model



Since we assume no interpersonal heterogeneity, all individuals will converge to the same steady state k^*, that is, we have unconditional convergence. However, as is well known, convergence may take time depending on parameter values, and so as in the one-period model, there may be a case for pro-poor policies on redistributive or equity grounds.

DEPARTURES FROM BENCHMARK MODEL

Now we proceed to study two sets of departures from this model: first, we introduce external frictions that constrain the choices available to the individual, due to market imperfections, technological nonconvexities; second, we look at the consequences of individuals having non-homothetic preferences, so that the poor behave or make choices that are different from those who are not poor even in the complete absence of external frictions.

External Frictions

In this section we discuss relaxing various assumptions of the model outlined in the previous section that allow the possibility that two individuals who are *identical in all respects except for their initial endowment of capital (or wealth)*, k_0, can end up with different levels of incomes and capital stocks in steady state, which is a formal way of describing a poverty trap in this framework.

Below we discuss the consequences of relaxing a number of assumptions in the benchmark model.

Capital Market Imperfections Suppose capital markets are imperfect. In fact, for expositional simplicity, let us assume that there are no capital markets. This means, on top of intertemporal borrowing constraints, it is not possible to borrow to finance working capital within a given period. In the one-period model the separation result breaks down: output is now $q = Af(\bar{k})$. Turning to the infinite-horizon model, the case of no capital markets is equivalent to the standard Solow model where individuals save a constant fraction of their income to accumulate capital over time. As we assume capital fully depreciates, the modified transition equation is:

$$k_{t+1} = sAf(k_t).$$

This is captured by the concave curve in figure 1. Following a standard argument, there will be convergence to k^*, assuming r is given by the marginal product of capital evaluated at the steady state capital stock, namely, $Af'(k^*)$.[4] Initial conditions will not matter in the long-run.

Of course, if A differs across individuals then we get *conditional convergence*. What this diagram shows is, if we introduce capital markets, convergence is speeded up. The capital stock used in production will reach the steady state level right away, while the owned capital stock of the individual will grow along with income, and eventually reach this steady state level.

We could allow intermediate levels of capital market imperfections, where the amount of capital that an individual can use is some multiple of her initial capital stock, i.e., σk_0 where $\sigma > 1$ (and not too large so that capital market frictions do have bite), which can be generated by one of the standard channels of credit market frictions, such as *ex ante* or *ex post* moral hazard (see, e.g., Banerjee 2003).

The main lesson of this exercise is that, subject to the same fundamentals, being capital-poor is no handicap in the long run as individuals accumulate and converge to the same steady state even if capital markets are imperfect. Of course, the convergence can take a long time and this might be grounds to have in place policies that facilitate access to capital of the poor. But history does not matter, and one-shot policies cannot have long term effects: two individuals who are identical except for their initial endowments of capital being different will end up in the same steady state. However, if there are additional frictions, then capital market frictions can lead to poverty traps, as we will see below.

4. This is in order to have the same benchmark under these two different scenarios (perfect and no capital markets), and can be justified by the assumption of having many atomistic individuals with the same deep parameters (A, s etc), but with different initial values of k_0 (and in particular, those with $k_0 \geq k^*$ being able to meet the demand of those with $k_0 < k^*$, on aggregate).

Nonconvexities Suppose the production technology is subject to nonconvexities. In particular, let us introduce set-up costs as an example of nonconvexities in the following form:

$$q = Af(k), \quad \text{for } k \geq \underline{k}$$
$$= \underline{w}, \text{otherwise.}$$

where $0 \leq \underline{w} < Af(\underline{k})$, is returns from a subsistence activity. It is assumed that the subsistence activity needs no capital and only labor.

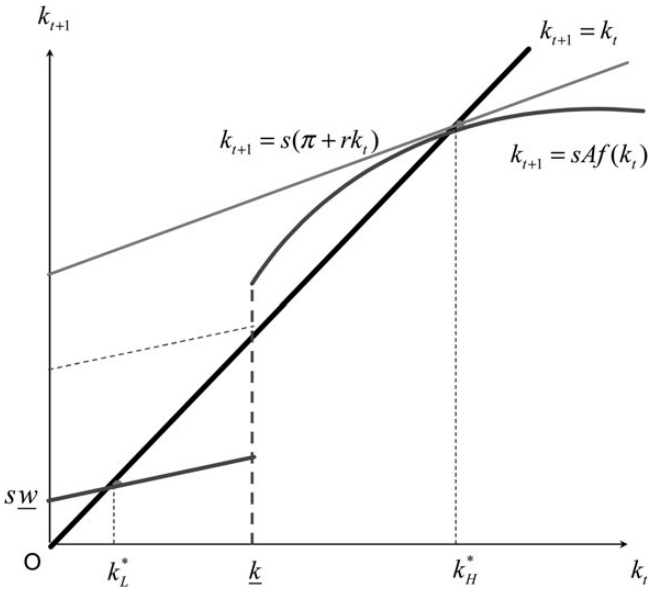
It is possible to interpret this nonconvexity as reflecting imperfections in the market for some input other than capital. For example, suppose without a minimum amount of land, production using the modern technology (given by $Af(k)$) cannot take place. Clearly rental markets or time-sharing arrangements could overcome this indivisibility and to the extent those are not possible due to some institutional or contracting friction, the indivisibility will have bite. At the end of this section we will explore the role of inputs other than capital and imperfections in those markets.

First let us assume capital markets are perfect. Then profit maximization yields $\pi = \max_k Af(k) - rk$ for all individuals since the subsistence technology is an inferior option. As a result, with perfect capital markets the equation of motion is:

$$k_{t+1} = s(\pi + rk_t) \quad \text{for all} \quad k \geq 0.$$

It is depicted by the thin and grey line segment in figure 2.

FIGURE 2. Nonconvergence in the Solow Model



As before, we will have a unique steady state at $k = k^*$. Therefore, with perfect capital markets, an individual can borrow $\underline{k}$ or more, and so the indivisibility does not bind and there is no poverty trap.

If capital markets are absent then the transition equation is given by:

$$\begin{aligned} k_{t+1} &= sAf(k_t) \text{ for } k \geq \underline{k} \\ &= s(\underline{w} + k_t), \text{ otherwise.} \end{aligned}$$

Since the subsistence activity needs no capital, any capital that an individual owns is part of total income, but there is no interest earned on it, as capital markets are assumed to be absent. We are assuming that saving is feasible even without capital markets, for example, through some storage technology. Also, we are assuming that all individuals save a fraction s of their income whether they are operating the subsistence technology (for which no capital is needed) or the modern technology. We could alternatively have assumed that for $k \leq \underline{k}$ individuals don't save at all, that is, $k_{t+1} = 0$ and that would not change our conclusions. We postpone the discussion of the saving rate varying with income to section 3.2.

For $k \geq \underline{k}$, the transition equation is strictly concave and increasing as in the case of no nonconvexities and autarchy. This part is depicted by the concave curve in figure 2. For $k \leq \underline{k}$, the transition equation is linear, as given by the transition equation above. As there are no capital markets, the transition equation has slope s rather than sr. It is depicted by the thick and grey line segment in figure 2. As we can see that there will be multiple steady states: for those whose initial endowment of capital was $\underline{k}$ or more will converge to k_H^* while those who started with less than $\underline{k}$ will converge to $k_L^* < k_H^*$. This is an example of a poverty trap: initial conditions matter, even in the very long run. However, having capital market frictions and nonconvexities is not *sufficient* for poverty traps. If s or $\underline{w}$ are high enough (as depicted by the dashed line segment), then it is possible to save one's way out of the poverty trap.[5]

Even if the production technology is convex, nonconvexities can arise in other ways. For example, suppose A (which captures complementary inputs, such as, infrastructure) depends on k such that wealthy get an advantage, that is, $A = A(k)$ and in addition, this function is subject to nonconvexities. If capital markets are perfect, then individuals should be able to overcome this indivisibility through borrowing. A similar argument applies if in the absence of capital markets that prevent borrowing or saving through external financial institutions, the poor in addition, do not have access to a good savings technology (e.g., storage), due to, say, imperfect property rights while the rich do (because, e.g., it is easier to steal from the poor). To the extent the relationship between wealth and the *effective* savings rate (as opposed the *intended* one, which is determined by preferences) is subject to nonconvexities, poverty traps can result.

5. Non-convexities can take many other forms (e.g., an *S*-shaped production function that captures increasing returns at low levels of capital, and diminishing returns at higher levels in a more continuous way), but the basic intuition of our analysis goes through.

Alternatively, suppose that if $c \leq \underline{c}$, people do not survive or are unproductive (similar to the nutrition-based efficiency wage argument as in Dasgupta and Ray 1986). Now the transition equation is

$$\begin{aligned} k_{t+1} &= sAf(k_t) \text{ for } (1-s)f(k_t) \geq \underline{c} \\ &= 0, \text{ otherwise.} \end{aligned}$$

Again, we will get a threshold $\underline{k}$ defined by the equation

$$(1-s)f(k_t) = \underline{c}.$$

If capital markets are perfect, individuals can borrow to and invest in their health and therefore, there is no poverty trap. Otherwise, this form of nonconvexity, like those for the production technology, the savings technology, or the productivity parameter A, can generate poverty traps when coupled with capital market imperfections.[6]

More broadly, even though we have taken here the example of physical capital, the point about the relationship between capital market frictions and nonconvexities affecting the production technology applies more generally. Instead of a minimum consumption constraint, suppose the productivity of individuals depend on nutrition (as in Dasgupta and Ray 1986) and that relationship involves nonconvexities. If capital markets existed and were perfect (a possibility that Dasgupta and Ray [1986] do not allow), individuals would have borrowed and achieved the efficient level of nutrition. The higher wages that would result form being more productive would help them pay off the loan. To get a poverty trap in this setting, one would need capital markets to be imperfect.

Other Market Frictions Let us augment the basic one-period model of section 2 by adding an additional input, h, which we will refer to as human capital (but can be interpreted as other inputs such as land in some contexts, as discussed below). Suppose the initial endowment of human capital of the individual is $\bar{h}$ and that h can be obtained from a competitive market at cost ρ per unit. Output is now

$$q = Af(k,h).$$

Profits are $\pi = q - rk - \rho h$. Profit-maximization yields the standard first-order conditions:

$$\begin{aligned} f_k(k,h) &= r \\ f_h(k,h) &= \rho. \end{aligned}$$

6. An alternative way of treating minimum consumption constraints is discussed in the next section, where people *choose* to save at a lower rate when they are poor. Here it is modeled similar to an external biological constraint like "maintaining" the (human) capital stock.

The optimal levels of $\hat{k}$ and $\hat{h}$ can be solved from these as functions of r and ρ and as before, the endowment of the individual will not matter in determining productive efficiency, although it will matter for the income of the individual. A rental or sales market will achieve the efficient allocation and in the absence of specific contracting frictions, these are equivalent. Even if there is a cash-in-advance constraint that applies for inputs other than capital - namely, they must be paid for in advance in cash - our conclusion is unchanged so long as capital markets are perfect.

Now let us assume that there is no market for h (with or without cash-in-advance) while the market for k operates just as before. In that case, the individual's choice of k will be give by:

$$f_k(k, \bar{h}) = r$$

and the optimal choice, which we will denote by $\hat{k}$, will depend on $\bar{h}$. For convenience, let us assume the Cobb-Douglas production function: $q = Ak^{\alpha}h^{\beta}$ with α, $\beta \in (0, 1)$ and $\alpha + \beta \leq 1$. In this case, solving the above equation explicitly for k as a function of r and h we get

$$\hat{k} = \left(\frac{A\alpha}{r}h^{\beta}\right)^{\frac{1}{1-\alpha}}$$

and substituting in the production function, we get

$$q = A^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}h^{\frac{\beta}{1-\alpha}}.$$

Net output (taking into account the cost of k) is:

$$q - rk = A^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)h^{\frac{\beta}{1-\alpha}}.$$

Let $\phi(h) \equiv A^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha)h^{\frac{\beta}{1-\alpha}}$ denote net output as a function of h. It is an increasing and strictly concave function of h for the case of decreasing returns ($\alpha + \beta < 1$) or linear in the case of constant returns ($\alpha + \beta = 1$). Now the individual's income y is net output plus interest earned on owned capital:

$$y = \phi(h) + r\bar{k}.$$

Turning to dynamics, let h_t and k_t denote the human and physical capital endowment of the individual at time t. Income at time t is given by

$$y_t = \phi(h_t) + rk_t.$$

The equation of motion for k_t is:

$$k_{t+1} = s(\phi(h_t) + rk_t) \quad \text{for all} \quad k \geq 0.$$

Now we turn to the interesting question, namely, how does h_t evolve over time. Suppose income can saved and spent on investing in h, similar to how savings is used to accumulate k. Even though in a given period, h cannot be rented or bought to be used in production, suppose it can be "produced" for the next period by saving a certain fraction of income (e.g., investing in the education of children). In particular, let

$$h_{t+1} = \gamma y = \gamma(\phi(h_t) + rk_t)$$

where $\gamma \in (0, 1)$ and $s + \gamma < 1$ to ensure that total saving (in k and h) as a fraction of income is less than 1. The advantage of this formulation is that the accumulation equation for h is identical to that for k, up to a multiplicative constant:

$$h_{t+1} = \frac{\gamma}{s} k_{t+1}.$$

The equation of motion of k in this case is:

$$k_{t+1} = s\left(\phi\left(\frac{\gamma}{s} k_t\right) + rk_t\right).$$

This allows us to characterize the steady state level of k^* by standard arguments:

$$k^* = \frac{s\phi\left(\frac{\gamma}{s} k^*\right)}{1 - sr}$$

and h too converges to

$$h^* = \frac{\gamma}{s} k^*.$$

What is interesting to note is that we do not get poverty traps but unconditional convergence.

Of course, this conclusion changes if there are nonconvexities in the relationship between h and y. Suppose the production function is

$$\begin{aligned} q &= \bar{A}k^\alpha \quad \text{for} \quad h \geq \hat{h} \\ &= \underline{A}k^\alpha, \text{otherwise} \end{aligned}$$

where where $\hat{h} > 0$ and $\bar{A} > \underline{A} > 0$. The only change from above is now net output as a function of h as captured by $\phi(h)$ is no longer a smooth and continuous strictly concave function but has a discrete jump at $h = \hat{h}$. Income y is given by:

$$y_t = (\overline{A})^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) + rk_t \quad \text{for} \quad h \leq \hat{h}$$

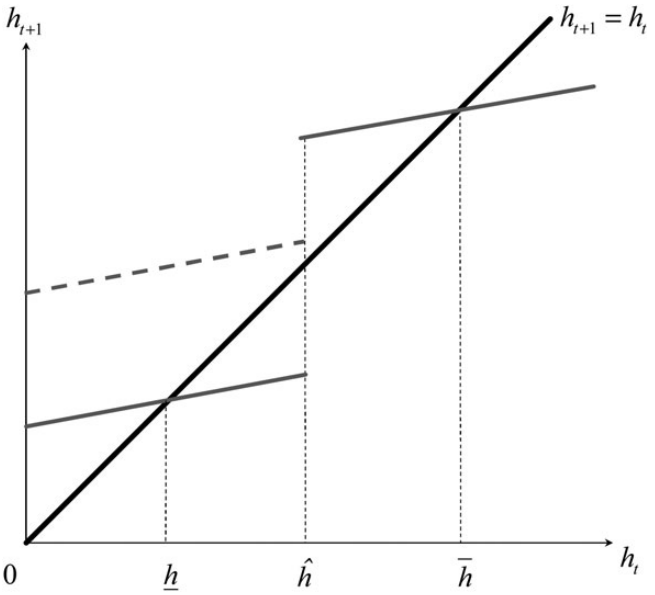
$$= (\underline{A})^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) + rk_t \text{ otherwise.}$$

Since $h_{t+1} = \gamma y_t$ and $k_{t+1} = sy_t$, both the human and physical capital transition equations will be piecewise linear with discrete jumps at $h_t = \hat{h}$ and $k_t = \frac{s}{\gamma}\hat{h}$, respectively. The transition equation for h is given by:

$$h_{t+1} = \gamma\left\{A^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha) + \frac{sr}{\gamma}h_t\right\}$$

with A taking the values $\bar{A}$ or $\underline{A}$, depending on whether $h_t \geq \hat{h}$ or $h_t < \hat{h}$. There will be a parallel transition equation for k. By standard arguments, we may have two stable steady states, i.e. a poverty trap may exist as we depict in figure 3 (ignoring the dashed grey line for the moment).

FIGURE 3. Human Capital & Poverty Traps



We have depicted the poverty trap in terms of h, i.e., the long run level of y and h depend on the initial level of h. However, since k depends on income y, the long-run level of k depends on the initial level of h, although not the initial level of k unlike in the earlier model with k being the only input.

As noted in the context of a single input production technology earlier, market frictions and nonconvexities are necessary but not sufficient for poverty traps. That would depend on parameter values. Here too if the values of $\underline{A}$ and/or $\frac{sr}{\gamma}$ are not too low, it is possible that through their saving behavior, individuals escape the poverty trap. If the transition equation for $h_t < \hat{h}$ is given by the dashed line instead of the continuous one, then there is a unique steady-state and that involves a high level human capital in steady state.

Let us examine what assumptions drive this kind of a poverty trap. We already saw that when the relationship between h and y was given by a smooth strictly concave function we get a unique steady-state, exactly as in the Solow model. Therefore, nonconvexity in the production technology with respect to h is playing a key role here.

It is interesting to think about what is the role of market frictions here. We are assuming capital markets are perfect as far as k is concerned. It can be bought, sold, rented and accumulated without any friction (within a period). The market for h is imperfect however, and that is clearly driving the results. If h could be bought or rented without any constraints, we would get unconditional convergence as we saw above. When h can only be autarchically "produced" by saving out of current output, this reflects a market failure that prevents individuals who have a higher endowment of human capital from transmitting it to children of families where parents have a lower endowment of human capital, e.g., through a perfect market for education. Alternatively, if h is interpreted as land and not human capital, the presumption is, a land-poor individual cannot rent or lease in land due to some institutional failure but it is possible to accumulate it through saving out of current income and buying it. However, capital market frictions implicitly show up, in the form of restrictions on intertemporal transfers since what can be accumulated through savings can presumably be bought by a loan. We now turn to this issue.

Restrictions on Intertemporal Transfers There is a sense in which we are assuming an intertemporal capital market imperfection when discussing technological nonconvexities in physical or human capital. Since saving out of income does help accumulate h or k, in principle, individuals could be forward looking, and as capital markets are being assumed to be perfect, they should be able to borrow and/or save at temporarily high rates to get over the hump at $\hat{h}$. We briefly explore here the consequences of modifying our basic model of choice between consumption and bequests introduced earlier by allowing individuals to be forward-looking and flexible in their savings behavior *and* given this, examine the role of intertemporal constraints on resource allocation

Suppose as in our basic model output depends on one nonlabor input x given by the same production function $q = Af(x)$. However, now x is required to be

invested in the previous period to be of productive use in the current period. After use, it depreciates completely. In the current period, individuals are endowed with an exogenous level x_0 of x and rental markets are not useful given the lagged nature of the production process. Therefore, current output is $q_0 = Af(x_0)$, in the next period output is, $q_1 = Af(x_1)$ where x_1 is chosen by the individual at time $t = 0$, and so on. We can view x as physical or human capital, although the particular lag structure is more suggestive of human capital.

If we first think of a two-period model, where in the first-period the individual chooses how much to consume in the present period (c_0) and the next (c_1), and also how much to invest in x. The individual maximizes

$$\log c_0 + \beta \log c_1$$

subject to the intertemporal budget constraint:

$$c_0 + \frac{c_1}{r} + x_1 \leq q_0 + \frac{Af(x_1)}{r}.$$

It follows immediately that independent of their preferences over present and future consumption, individuals will choose x_1 to maximize their lifetime resources. This is an extension of the separation result mentioned in the one-period model at the beginning of this section to a two-period setting—with perfect markets and no constraints on intertemporal transfers, individual preferences should not affect the efficiency of intertemporal resource allocation. The optimality condition for the choice of x_1 is

$$Af'(x_1) = r$$

which is, the marginal return from investment should be equal to the interest rate.

The result holds even if the production technology is nonconvex with respect to x. Suppose investment is a binary decision $x \in \{0, 1\}$ and the cost of investment is normalized to 1. Without investment, output is $\underline{q}$ but with investment, it is $\underline{q} + \Delta$. This is similar to the model with human capital in the previous subsection. So long as $\Delta > r$ individuals would undertake the investment.

However, if there are constraints on intertemporal resource allocation, then this property will no longer hold. In the extreme case, it is not possible to borrow at all, and therefore, the budget constraint facing the individual in the current period is:

$$c_0 + x_1 \leq q_0$$

while in the next period it is

$$c_1 \leq Af(x_1).$$

The choice of x will now be determined by the condition:

$$\frac{1}{c_0} = \beta \frac{1}{c_1} Af'(x_1)$$

and x will depend on, among other things, q_0 which is determined by the initial endowment of x.

The basic logic extends to the case of individuals with Barro-Becker altruistic preferences, which by a standard recursive argument becomes equivalent to an individual maximizing the present discounted value of the utility stream of current and future generations in a forward-looking way over an infinite-horizon:

$$\sum_{t=0}^{\infty} \beta^t \ln(c_t)$$

with an intertemporal budget constraint (using standard arguments to rule out unlimited long-term asset or debt accumulation):

$$\sum_{t=0}^{\infty} \frac{c_t}{r^t} + \sum_{t=0}^{\infty} \frac{x_{t+1}}{r^{t+1}} \leq q_0 + \sum_{t=0}^{\infty} \frac{Af(x_{t+1})}{r^{t+1}}.$$

In the absence of any intertemporal borrowing constraints, investment decisions will be efficient, while in their presence, the initial endowment of x will affect investment decisions, opening up the possibility of poverty traps (e.g., if in addition, there are indivisibilities in the production technology).

Even if capital markets are perfect as such, in most societies negative bequests are not permissible by law and violations of this are considered morally offensive, such as bonded labor. This is equivalent to an intertemporal borrowing constraint: a poor parent cannot borrow to send her child to school such that the child will pay off the loan when she is an adult.

What this discussion implies is that, to the extent bequests are required to be non-negative, this puts a constraint on intertemporal resource allocation which is separate from what is often meant by capital market frictions, namely, constraints on short-term loans. Coupled with other frictions (e.g., nonconvexities in the production technology), this can lead to poverty traps. Of course, additional capital market frictions (due to standard frictions such as problems of enforcement and informational asymmetries) will reinforce this tendency. These could be for short-term loans or for long-term loans, with the latter contributing to intertemporal borrowing constraints.

Friction-Driven Poverty Traps - The Key Implications The key points from our discussion of friction-driven poverty traps are as follows.

First, no single friction is sufficient to trap individuals in poverty. Whether it is capital market frictions or restrictions on intertemporal resource allocation as

implied by the constraint that bequests have to be non-negative, we would require some other friction, such as non-convexities in the production or the savings technology, to prevent the poor to be able to save the "right" amount of physical or human capital and for their families to escape poverty in the long-run. Therefore, the fact that some studies fail to find any direct evidence of lumpiness of investments alone is not sufficient to conclude that there is limited empirical support in favor of poverty traps. Poverty traps could still result if there are borrowing constraints in addition to lumpiness with respect to the savings technology or in the production technology with respect to some input other than capital. Similarly, the fact that some studies find that microfinance loans have not been effective in reducing poverty significantly too is not conclusive evidence against the presence of poverty traps. First of all, without the "right" amount of loan it may be hard to escape the trap. Also, to the extent there are indivisibilities in the production technology with respect to other inputs, combined with frictions in those markets, poverty traps could still result in theory, as we saw above. At the same time, we saw that multiple frictions are necessary but not sufficient for poverty traps. Therefore, one has to be very careful in interpreting existing evidence to infer the presence or absence of poverty traps and not conclude from any single piece of evidence for or against the presence of a specific friction that poverty traps at the individual level exist or not (as, e.g., Kraay and McKenzie [2014] seem to do).

Second, if capital is the only input or all other inputs have perfect rental or sales markets so that capital is, in effect, a "sufficient" input (for example, in the presence of cash-in-advance constraints), and so capital market frictions play a central role in determining whether poverty traps could arise. In this case, capital market frictions or restrictions on intertemporal resource allocation are *necessary* for friction-driven poverty traps to emerge independent of any other frictions.

Third, if inputs other than capital are needed for production (such as human capital or land) and these markets are subject to imperfections, then the previous conclusion has to be modified. In such cases, even if (short-term) capital markets are perfect we could get poverty traps. We saw this could happen if the production technology is nonconvex with respect to it and there are intertemporal borrowing constraints due to either restrictions on negative bequests or frictions in capital markets for long-term loans.[7]

7. A deeper issue is what are the underlying sources of these frictions in capital markets and markets for other inputs, and to what extent they may be inter-related. As we know from the literature of land reform (see Mookherjee 1997) if there are agency problems, a landlord will not sell off his land to his tenant or offer a fixed rent contract instead of a sharecropping contract, even though that will give the tenant better incentives because the tenant will not be able the afford the price at which the landlord will be willing to sell. However, for exactly the same agency problem, a lender cannot step in and offer the tenant a loan to buy off the land, since in the loan repayment process, the same agency problem will raise its head.

Non-Homothetic Preferences

In the previous subsection we assumed preferences are homothetic and focused on external frictions. Now we assume there are *no external frictions*, and examine the role of how extreme scarcity may cause the poor behave differently from the nonpoor, and whether this can lead to poverty traps. For example, the poor may discount the future too heavily, be too risk averse, may not care enough about their children, or may be more subject to various behavioral biases. With non-homothetic preferences, income effects can play an important role, and in particular, even though the deep preference parameters are the same (β in our framework) and there are no external frictions, for low levels of income individuals may behave differently (in terms of how much they save or leave as bequests) and this can reinforce low incomes, generating a very different mechanism for a poverty trap. We call these kind of poverty traps *scarcity-driven* poverty traps.[8] While we focus on money, we also discuss the relevant scarce resource being time or attention span. This argument is to be distinguished from one which says preference-related parameters have an effect on an individual's economic outcome. That is a conditional convergence type argument: for example, those who do not put enough weight on the future (lower β) will end up with a lower steady state income.

The main idea is there is no external friction to be potentially fixed to help people get out of a poverty trap. What is interesting about scarcity-driven poverty traps is that, short of a direct transfer of income or a general increase in productivity (an increase in A that raises π, for example) they can persist even when a whole range of supply-side interventions aimed at fixing various kinds of market failures are in place.

We avoid calling this class of poverty traps "behavioral" poverty traps because that may be confused with those arising from behavioral biases *only* (e.g., loss aversion, hyperbolic discounting, excessive expenditure on temptation goods). That is certainly a possible channel, as we discuss below, but it is possible to have these kinds of poverty traps with standard preferences as well, as the model below indicates.

Scarcity Driven Poverty Traps - The Benchmark Model As in the benchmark one-input model of section 2, assume that output is given by $q = Af(k)$ where the technology is convex, and that capital markets are perfect, so that the income of an individual is

$$y_t = \pi + rk_t$$

where

$$\pi = \max_k Af(k) - rk.$$

8. Azariadis (1996) provides an overlapping generations version of a model that is similar in spirit to the one that is presented in this section.

As before, let us assume agents derive utility from consumption c and from bequest b. Even though in a narrow sense b captures financial bequests, we can interpret it as any investment (e.g., human capital) from current income that enhances the productive capacity of children (e.g., health, education). Even though this is the interpretation we will focus on, as earlier, we could also view b as saving or an investment in an individual's own human capital. For now, let us assume $b \geq 0$ but we will see below that in this particular model, this "friction" that constrains intertemporal resource allocation, does not play a major role.

In addition, we allow individuals to consume a luxury good z. The utility function is given by:

$$U(c, b) = \log c + \beta \log(b + B) + \gamma \log(z + Z)$$

where $B > 0$, $Z > 0$, $\beta \in (0, 1)$, and $\gamma \in (0, 1)$. We assume that the marginal utility of bequests at $b = 0$ is higher than the marginal utility of luxury goods when $z = 0$:

$$\frac{\beta}{B} > \frac{\gamma}{Z}.$$

We can think of c as basic consumption, b as money passed on to children, and z, a luxury good (durables, a vacation) which is not essential for survival but is consumed as income goes up. Our assumption will ensure that for low levels of income, all income is spent on c, for moderate levels of income it is split between c and b, and finally, for high levels of income it is split between c, b, and z.

Total income at time t is

$$y_t = \pi + rk_t$$

and as before, $k_{t+1} = b_t$. The budget constraint is

$$c_t + b_t + z_t = \pi + rk_t.$$

It is straightforward to derive that there will be two income thresholds, $\underline{y}$ and $\bar{y}$, and two corresponding thresholds for capital:

$$\underline{k} \equiv \frac{B - \beta\pi}{\beta r}$$

and

$$\bar{k} \equiv \frac{(1 + \beta)Z - \gamma B - \gamma\pi}{\gamma r}$$

such that $\bar{k} > \underline{k}$. This follows from our assumption

$$\frac{\beta}{B} > \frac{\gamma}{Z}.$$

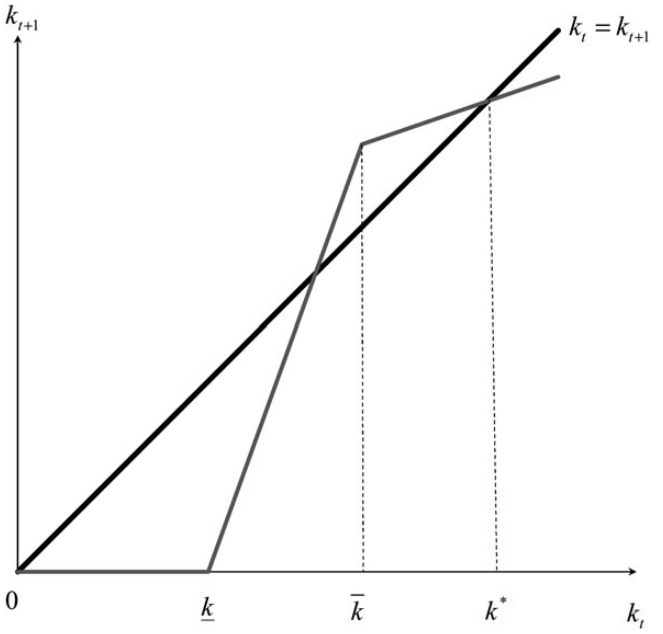
Using the fact that $b_t = k_{t+1}$, we get the dynamics of how the capital stock will evolve:

$$\begin{aligned} k_{t+1} &= 0 \quad \text{for} \quad k \le \underline{k} \\ &= \frac{\beta}{1+\beta}(rk_t + \pi) - \frac{B}{1+\beta} \quad \text{for} \quad \underline{k} \le k \le \bar{k} \\ &= \frac{\beta}{1+\beta+\gamma}(rk_t + \pi) - \frac{(1+\gamma)B - \beta Z}{1+\beta+\gamma} \quad \text{for} \quad k_t \ge \bar{k}. \end{aligned}$$

This is depicted in figure 4.

We have assumed in the figure that $\frac{\beta}{1+\beta} r > 1 > \frac{\beta}{1+\beta+\gamma} r$ and $B - \beta\pi > 0$ (which is likely in economies with low productivity, namely, a low level of A). Moreover, for a poverty trap to result, the middle segment of the equation of motion needs to intersects the 45° line at a point that is lower than $\bar{k}$, the specific condition being $\frac{B-\beta\pi}{\beta r-(1+\beta)} < \bar{k}$. Under these conditions, families that start poor (capital stock less than $\underline{k}$) don't save at all and therefore, have a steady state capital stock of 0, those who start with more than $\underline{k}$ grow rapidly up to the point

FIGURE 4. Income Effects & Poverty Traps



where the saving rate falls (as luxury consumption kicks in), and they converge to a high capital stock (k^*). Of course, if the above conditions are not satisfied, it is possible to have a unique steady state (e.g., if $B - \beta\pi \leq 0$).

As noted above, so far we assumed $b \geq 0$: Suppose we allow $b < 0$ (but smaller in absolute value than B, given the utility function we have assumed), that is, parents can borrow against the earnings of their children that the children will have to pay off. Given that in the current framework, this borrowing cannot be used to invest in the human capital of children that will generate returns in the next period, this option turns out not to be consequential. In particular, it is straightforward to show that instead of $b = 0$, for families starting with low initial levels of assets, $b < 0$ (as opposed to $b = 0$) will be a stable steady state under conditions similar to those derived above, in addition to a high wealth steady state.

Time Rather than Money Being the Scarce Resource The sources poverty traps that are possible if preferences are non-homothetic in income, can be more general than in the specific channel developed above. For example, the scarce resource in question may be time or attention span or cognitive capacity rather than physical or financial capital. Suppose individuals can allocate time between generating current income, and spending it with their children to help develop their human capital. Assume income depends on human capital only, and physical or financial capital plays no direct role in production. In particular, suppose the budget constraint is:

$$c_t \leq wh_t(T - l_t)$$

where c_t is consumption, l_t is the time spent with children, and h_t is human capital at time t. We assume that w is the exogenously given wage rate per unit of human capital, so that someone with twice as much human capital will earn twice as much for the same amount of time spent working. Also, let $h_{t+1} = h_t l_t$ be the equation of motion of human capital - a more educated parent is more effective in converting her time spent with the children to transmit human capital to them.[9] Suppose preferences are similar as before:

$$\log c_t + \beta \log(l_t + B) + \gamma \log(z + Z).$$

It is straightforward to check that, for low levels of h_t, individuals may choose $l = 0$ and we can have a poverty trap.

Extending the Scarcity Channel It is possible to extend the scarcity channel to consider how it interacts with insufficient intergenerational altruism, as well as various behavioral biases. Interpreting b broadly as any investment in the productive capacity or welfare of children, suppose society puts a greater weight

9. Notice that, in principle, we can allow for a market in hiring a private tutor - parents can buy $h'l$ units worth of human capital for their children by paying an amount wh', where h' can be different from h_t. What matters here is full income in the sense of Becker.

(say, $\hat{\beta}$) on the welfare of children (or, in the case of gender bias, a greater weight on the welfare of female children) than parents do (i.e., β) where $\hat{\beta} > \beta$. Given the income effect identified under the scarcity channel, we can readily see that the gap between the socially optimal level of investment and what will be chosen by parents will be larger, the poorer are the parents.

Similarly, we can allow individuals to have behavioral biases in addition to the channel of limited time or attention span discussed in the previous subsection (see, e.g., Banerjee and Mullainathan 2010; Bernheim, Ray, and Yeltekin 2013). The point is not that only the poor are subject to these kinds of biases, but that low incomes exacerbate these biases, or, their negative consequences. A satisfactory treatment of this issue is beyond the scope of the present exercise but we can modify the benchmark model above to briefly examine the implications. Suppose we introduce an inessential consumption good (e.g., tobacco or alcohol) v and add the term $\delta \log(v + V)$ (where $\delta \in [0, 1]$ and $V > 0$) to the utility function and make the assumption $\frac{\delta}{V} > \frac{\beta}{B}$. This is similar to what Banerjee and Mullainathan (2010) call a temptation good. By a familiar argument, individuals will spend all their income on c for very low levels of k, but now they will spend some of their incomes on v as k crosses a threshold, and only for a higher threshold they will choose a positive value of b. Earlier, a cash transfer to increase the financial resources of a poor family above $\underline{k}$ would be sufficient to help them escape the poverty trap. But now, there is an intermediate range of k such that an unconditional cash transfer will partly get frittered away on v, an issue we will touch upon in section 4 where we discuss anti-poverty policy.

Barro-Becker Altruistic Preferences A reasonable question to ask is, will our results go through if rather than having warm-glow type preferences where parents care about the bequests they pass on to their children, they cared about the utility of their children, and through a recursive argument, all future generations. Even with Barro-Becker altruistic preferences (as introduced in section 3.1), it is possible to get multiple steady states without any external friction. For example, it has been shown that such an outcome may occur when the poor discount the future too heavily (see, e.g., Iwai [1971] and Azariadis [1996] for more references on these kind of "impatience traps"). We can illustrate the basic argument quite simply. Suppose an individual maximizes

$$\sum_{t=0}^{\infty} \beta^t \ln(c_t).$$

Let k_t be capital at time t, let capital markets be perfect with a constant interest rate $r>1$, and let there being no constraints on intertemporal transfers. For simplicity, suppose individuals earn a constant flow of income $y_t = y$ every period. Then the per-period budget constraint is:

$$k_{t+1} = r(k_t + y - c_t).$$

Dynamic optimization yields the standard Euler equation:

$$\frac{c_{t+1}}{c_t} = \beta r.$$

If β is less than $\frac{1}{r}$ the individual will run down his assets, with decreasing consumption levels, and will eventually reach a steady-state where he would just consume at the subsistence level (e.g., assuming a constraint like $c_t \geq \underline{c} > 0$ for all t). If instead β is greater than $\frac{1}{r}$ then he will accumulate assets, with rising consumption levels over time. If $\beta = \frac{1}{r}$ then there would be a steady-state with a constant consumption level (higher than the subsistence level) every period. If the discount factor β is increasing in c and for low levels of c, $\beta < \frac{1}{r}$, we can readily see the possibility of multiple steady-states. This suggests that our results on strong income effects leading the poor to save too little are not dependent on the particular set of preferences of the individual or the particular form of non-homotheticity we introduced earlier.

Combining Friction and Scarcity Driven Poverty Traps Clearly, external frictions and income effects can coexist and can combine to generate poverty traps. Indeed, Banerjee and Mullainathan (2008) is an example of this.[10] Their core model is similar to the time allocation problem in the previous subsection.[11] They juxtapose this with a model where human capital affects income via productivity but there are nonconvexities in this relationship, while current human capital depends in a linear fashion on the previous period's human capital. As we saw in section 3.1, these two features are sufficient to generate poverty traps via the external frictions channel alone. Therefore, from the theoretical point of view, having both these channels is not necessary to generate poverty traps. However, the interaction between scarcity and friction driven poverty traps does raise interesting conceptual issues. For example, in an environment where the population is very poor, there will be little incentives for suppliers of specific inputs to set up shop due to lack of sufficient demand, and so supply-side frictions may be endogenous. We will return to this issue when discussing policy in the next section.

Another example of a combination of a friction-driven and a scarcity-driven poverty trap is when individuals are risk-averse and the degree of risk-aversion is decreasing in income (e.g., if the utility function displays decreasing absolute risk aversion). The poor will focus on low risk and low-returns projects, while the rich will focus on high risk and high-returns projects, and these can generate poverty traps. However, this argument implicitly assumes insurance markets being imperfect, because otherwise, with full insurance all individuals would maximize the certainty equivalent of their income and this kind of poverty trap

10. Similarly, Moav (2002) shows that a convex bequest function may lead to poverty traps using a utility function that leads to corner solutions in bequests that is similar to us. However, he assumes capital markets to be imperfect.

11. In their model, individuals either choose all of their time (or attention span) at home or at work, but as we saw above, one can get a poverty trap even with interior solutions.

will be difficult to sustain. More generally, it is hard to separate the roles of credit and insurance markets, because if individuals are risk-averse then the optimal contract should factor in both liquidity constraints and uninsured risk (as in the standard principal-agent model where the principal is risk neutral and the agent is risk-averse). Therefore, the emphasis on capital market frictions should be broadened to financial markets more generally when agents are risk-averse.

Scarcity-Driven Poverty Traps - The Key Implications The key points from our discussion of scarcity-driven poverty traps are as follows.

First, poverty traps can exist even without any external frictions due to the operation of strong income effects in the behavior of individuals. This is possible without any behavioral biases, although it is consistent with the attention span of the poor being overloaded with decisions that have to do with day to day struggle for survival, at the detriment of forward-looking planning or expending greater productive effort at work (Mullainathan and Shafir 2013).

Second, as the root cause of scarcity-driven poverty is scarcity, the most obvious policy implication is a lump-sum transfer to the poor. Of course, if there are external frictions to fix (say, in capital markets or in health or education) then these can go together, but there are likely to be strong complementarities between these kinds of policies, as we discuss in the next section.

Third, to the extent there are grounds for a paternalistic intervention, because the preferences of the individual is different from that of the policymaker (which can be due to behavioral biases or insufficient intergenerational altruism or gender bias), unconditional lump sum transfers may not be the most efficient form of intervention and there may be a case for other policy instruments (e.g., conditional cash transfers).

What Theory Can Tell Us about Policy

We now turn to discussing the implications of our theoretical framework for the design of anti-poverty policy. Various anti-poverty policies can be divided into three broad categories: those that are aimed at enabling the poor greater access to markets, those that are aimed at improving the access of the poor to public services and infrastructure, and those that are explicitly redistributive in nature. Examples of the first include reducing transactions costs in specific markets (e.g., savings, credit, insurance), providing inputs which are not readily available in the market (e.g., training specific skills), improving access to information, and reforming property rights. Examples of the second include various measures to improve accountability and reduce leakage and corruption in the provision of public services like health and education. Examples of the third class of policies involve directly transferring resources to the poor, in cash or in kind. Cash transfers can be unconditional, or conditional on children attending school and family members receiving preventative health care (e.g., programs such as Progresa, renamed Opportunidades and more recently, Prospera, in Mexico, and Bolsa

Familia in Brazil) or in-kind (e.g., food, sanitation, education, health services provided free or at a subsidized rate to the poor). We will refer to the these as UCTs, CCTs, and IKTs.

Given the focus of this article, we will ignore delivery or implementation issues that imply an entirely different set of costs and benefits of alternative anti-poverty policies. For example, conditional transfers have the advantage that they can screen out the nonpoor and achieve better targeting than unconditional cash transfers). Similarly, we will not discuss situations where externalities are important (e.g., health interventions like deworming or insecticide-treated bednets) that make certain types of conditional transfers preferable to unconditional ones.[12] I will also not attempt a review of the extensive empirical literature evaluating the performance of these programs but rather will make a number of conceptual points based on the framework developed in the previous section.[13]

The first point is other than improving access to capital and savings, or an UCT, any other *single* intervention is unlikely to get rid of poverty traps. This follows from our discussion of friction-driven poverty traps where we saw that other than removing whatever constrains the ability of the poor to borrow and save, no single friction is sufficient to trap individuals in poverty. Also, for both friction and scarcity-driven poverty traps, a UCT of an appropriate magnitude will help the poor overcome poverty traps in our framework, unless there are grounds for paternalism, an issue we discuss below. More broadly, this reflects the standard economic argument that unless we know what is the specific friction, it is best to leave it to the recipient to decide what she will do with the savings or loan, or the cash transfer. Only in an extreme case where some critical noncapital input (e.g., training or land) is not available in the market or is very costly, and the income generation technology is nonconvex with respect to it, there are grounds for intervening directly to make that input accessible to help overcome poverty traps. This is one of the arguments behind the recent policy interest in UCTs. For example, the work of GiveDirectly in Kenya, a charity that gives no-strings attached cash grants, equivalent to almost two year's worth of local income, to the poor has received a lot of attention. While long-term impacts are yet to be known, at least in the short run the impacts are quite good in terms of helping build assets, encouraging investment in, and generating revenue from businesses (Haushofer and Shapiro 2013). In addition, several studies using randomized field experiments have highlighted the importance of capital and access to a savings technology. A well-know study by De Mel et al. (2008) have found high potential rates of return to capital in small business among Sri Lankan microenterprise owners that far exceed formal sector interest rates. Another important study shows that providing access to non-interest-bearing bank accounts led to significant increase in savings, productive investments and private expenditures (Dupas and Robinson 2013).

12. We refer the reader to Das et al (2005) for a good discussion of some of these issues.
13. See, e.g., Baird et al (2013) for a review of CCTs and UCTs in the context of developing countries.

Second, even with policies that improve access to capital or savings or a UCT, at best poverty traps in a narrow sense will be eliminated. That is, two individuals who, except for income or wealth (y or k in terms of our model), are identical will not end up very differently in the long run. But if other markets are underdeveloped (e.g., acquiring skills), infrastructure is poor, then neither will do very well. In terms of our model the main problem is A is low, that is, the problem of conditional convergence remains and individuals who are otherwise identical but live in better environments (in terms of market access, infrastructure) will do better. As noted above, cash transfers or facilitating borrowing or saving will have limited impact on incomes if markets for certain critical (noncapital) inputs are not developed. In such circumstances, a direct intervention in improving A (or, encouraging migration from a low A to a high A area) may be the best policy, and an excessive focus on poverty traps can distract our attention from this more basic problem. Indeed, even if there does not exist multiple steady states, the elasticity of response to changes in certain policies can be quite high. In the version of the Solow model we discussed in the previous section, the steady-state level output is $q^* = (A)^{\frac{1}{1-\alpha}} s^{\frac{\alpha}{1-\alpha}}$, i.e., the steady state output is a *convex* function of A and so elasticity of response to policy changes could be quite high.

Third, a mix of interventions that relax the budget constraints of the poor *and* remove certain external frictions are likely to yield significantly high returns compared to an intervention that addresses only one of these problems. For example, if we fix financial markets or give a large cash grant, and improve access to training or infrastructure, gains are likely to be much higher than these individual interventions. Recall from our basic model that $q = Af(k)$, that is, k and A are complements. If due to external frictions k is lower than what it could be as dictated by the deep parameters, then a direct lump-sum transfer can be used to raise k but suppose that some of these resources could also be spent to increase A. Given the complementarity between k and A, it is likely that rather than spending the available funds either on increasing k or on improving A only, the gains will be larger if it is split between the two. Indeed, Bandiera et al. (2013) find that sizable transfers of assets and training to impart skills in Bangladesh enable the poorest women to shift out of agricultural labor and into running small businesses, which persists and strengthens after assistance is withdrawn, and leads to a 38% increase in earnings. Similarly, Blattman et al. (2014) find that cash transfers coupled with business training very effective among impoverished Ugandan women. In contrast, McKenzie and Woodruff (2014) review training business owners from a dozen randomized experiments and find little lasting impact on profits or sales.

Fourth, some interventions (e.g., credit, savings) are likely to have similar effects, and it is important to diagnose which underlying friction is more important. For example, if the main problem facing the poor is that they do not have access to a good savings technology (with or without self-commitment problems), then availability of small loans to be paid in short installments via microfinance may help them smooth consumption or purchase durables, but a better

solution yet might be to improve their ability to save. Indeed, Dupas and Robinson (2013) find that the take-up for their savings package is very high (87%), in contrast to the relatively low take-up rate in most rigorous studies of microfinance (e.g., 27% in the study by Banerjee et al. [2014] of a microfinance in India), and this suggests that access to a good saving technology may be a higher priority for the poor.

Finally, we turn to the question of under what circumstances CCTs may be strictly preferred to UCTs. In our model this can happen only in the case where the individual's preference and the policymakers preference differs, due to the presence of behavioral biases (e.g., excessive weight on temptation goods or present consumption), insufficient intergenerational altruism, or gender bias.[14] As we saw, a low value of β coupled with low incomes can generate poverty traps. Even though there isn't that much evidence that the poor fritter the money away (Evans and Popova 2014), there is fairly compelling evidence that CCTs are more effective than UCTs in raising educational outcomes. Baird et al. (2013) studied twenty-six CCTs, five UCTs, and four programs that ran both in parallel and found that school enrolment rose by 41% on average across all the CCT programs, while under the UCT programs, the increases was 25%. This does not necessarily mean CCTs are better in welfare terms than UCTs, but as with taxes or subsidies on a specific good or service, it does affect behavior through the standard combination of price and income effects. Also, if the amount the poor invest on children (b in our model) depends on income (y) or wealth (k) in a way that is convex over some region (as in section 3.2), then given the complementarity between A and k noted above, combining a UCT with a policy that directly tackles a friction on the supply side (say, better schools or health facilities) or raises overall productivity A, is likely to yield higher returns than a policy (with a comparable budget) that makes a cash transfer conditional on individuals undertaking a certain minimum investment in b. However, if indeed the underlying grounds for paternalism are strong or externalities are significant, then arguments in favor of CCTs continue to be valid.

Conclusion

We developed a conceptual framework to examine conditions under which individuals can be trapped in poverty, distinguishing between the role that external frictions play, versus those that are due to choices made under extreme scarcity. We then applied this framework to discuss various types of antipoverty policies, distinguishing between policies that are aimed to facilitate market access for the poor, and those that are redistributive in nature, and in the latter category, discussed the relative merits of unconditional and conditional cash transfers and in-kind transfers.

14. As noted earlier, we are ruling out screening issues in targeting the poor, or more generally, implementation-related issues.

There are several related and interesting issues that we did not address. First, we worked with a representative agent framework and this precludes many interesting issues that heterogeneity among individuals raise. Even within the same area and similar socioeconomic characteristics, individuals have different preferences, abilities, beliefs, and aspirations; therefore, we have to think beyond a one-size-fits-all policy. Indeed, most studies evaluating specific policies find significant heterogeneity in their impact on different individuals. Second, we did not discuss problems of implementation, including targeting, and this raises a whole new set of interesting issues. Third, the policy interventions that we discussed are likely to alter individual behavior if they are expected to be in place, and as the discussion of various welfare programs in developed countries suggest, it is important to study the incentive effects of various antipoverty policies, rather than viewing them as being administered from "outside the system" to lift the poor out of poverty. Finally, another interesting issue is how to diagnose what the most binding constraint is in a given environment at the microeconomic level, similar in spirit to the growth diagnostics approach (see Rodrik 2010). Is it an external friction, and if so, which one (see Karlan et al. [2014] for an interesting experiment along these lines), or is it really the behavior of the poor under extreme scarcity? All these, and undoubtedly many more, seem potentially exciting avenues of future research.

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