THE ECONOMICS OF POVERTY TRAPS AND PERSISTENT POVERTY: POLICY AND EMPIRICAL IMPLICATIONS

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The Economics of Persistent Poverty and Poverty Traps: Empirical and Policy Implications

The alternative mechanisms hypothesized to generate poverty traps often have quite different empirical and policy implications. After briefly reviewing these different mechanisms and their core implications, we explore in depth one such mechanism, that of multiple financial market failures. We show that this mechanism implies behaviors that would be rational only in the presence of such a poverty trap mechanism. These implications enable empirical tests indirectly in behavioral data, rather than the more traditional approach of direct testing for poverty traps based on asset dynamics. The unique policy implications of this model are also testable using experimental methods. Based on these observations, we review recent empirical efforts to test for poverty traps, both directly, by exploring asset dynamics, and indirectly, by testing for the behavioral and policy implications of different poverty trap mechanisms.

I. Introduction

Punctuated by the ambitious efforts of the Chronic Poverty Research Center (2008, 2011),[1] numerous studies utilize longitudinal data on individuals, households and communities to document the extent of persistent (or "chronic") poverty. Correspondingly, there have been a number of efforts to expand conventional poverty measures into measures of chronic poverty (see, for example, Calvo and Dercon 2009, Foster 2009). Increasingly widespread observations of persistent poverty at the micro scale feed researchers' and policymakers' interest in poverty traps. However, as we argued in an earlier contribution to this journal (Carter and Barrett, 2006), the observation that a particular family is poor for multiple time periods does not mean that they are caught in a poverty trap, nor does it by itself identify the appropriate policy intervention, which necessarily depends on the mechanisms that cause and sustain persistent poverty. In that earlier work, we suggested that an asset-based approach could help empirically identify and distinguish among different types of persistent poverty and guide appropriate policy.

In this paper, we draw on recent theoretical and empirical insights, including those offered by the papers in this special issue, to extend and refine central messages from our earlier work. We re-emphasize the centrality of asset dynamics and associated investment incentives, as well as that the appropriate policy response to persistent poverty—and the moral compulsion and economic justification to respond to it—depends fundamentally on the underlying causal mechanisms. Similarly, strategies to empirically identify poverty traps – a subset of persistent

[1] CPRC (2011) estimates that in 2005 between 336 and 472 million people were chronically poorworldwide.

poverty – depend on the mechanisms at play as do appropriate policy responses when a poverty trap exists. The intrinsically conditional nature of both empirical and policy analysis of persistent poverty and poverty traps has received insufficient attention to date (including by ourselves).

After reviewing a range of candidate mechanisms that can generate observations of persistent poverty—some of which imply poverty traps, and others of which do not—we focus on what we hypothesize is the most commonplace mechanism, what we call the "multiple financial market failures" (MFMF) theory of poverty traps. Drawing on recent analyses of a canonical MFMF poverty trap model, we discuss key behavioral and policy implications of this model. These implications suggest novel empirical strategies that can be used to test for the existence of MFMF poverty traps indirectly, by looking for behaviors that would be rational only in the presence of a MFMF poverty trap, in lieu of more traditional approaches of directly testing for poverty traps by studying asset dynamics. This indirect approach to testing for the existence and source of poverty traps provides a way around the formidable identification challenges posed by direct tests of the poverty trap hypothesis. We then take stock of what we know about the empirical importance of poverty traps, reviewing the contributions to this special issue as well as other recent efforts that test the behavioral and policy implications of the MFMF theory of poverty traps.

II. Alternative Structural Mechanisms that Underlie Persistent Poverty and Poverty Traps

The core idea underpinning the term "chronic" or "persistent" poverty is that an observed household's[2] income or expenditures—the workhorse money metric flow indicators of well-being—consistently, or at least on average, falls below a predetermined poverty line.[3] Persistent poverty is a powerful descriptor. But it intrinsically lacks an analytical foundation necessary to mount a well thought out policy response; one knows little or nothing about *why* such households are persistently poor without probing further.

Indeed, strictly speaking, observed persistent poverty is neither necessary nor sufficient to motivate intervention.[4] Consider two oft-observed examples. Persistent poverty may reflect slow growth from a low initial standard of living, such that the observed household is poor throughout the period of observation. The prevailing path dynamics of the economic system might imply, however, that the household is expected to exit poverty soon after the period of observation; its long-run standard

[2] The logic applies to any observational unit, from individual through multinational aggregates. In this paper, we use the term "household" merely as convenient shorthand, not to imply these phenomena only occur at household scale of analysis.

[3] This can readily be expanded to newer, less mainstream, multidimensional measures of poverty (Bourguignon and Chakravarty 2003, Duclos et al. 2006, Alkire and Foster 2011).

[4] This point has an important corollary: observed economic mobility does not imply sustainable, structural improvement in living conditions (Naschold and Barrett 2011).

of living is not poor despite its persistent poverty within the data so intervention – especially long after the period of observation – may not be necessary to relieve its poverty.

By contrast, in panel data with just two or three repeated observations, one routinely finds households that enjoy non-poor income or expenditure levels during each—or at least the latter—survey period(s) due to temporary good fortune even though their asset holdings suggest they are unlikely to remain non-poor for long (Carter and May 2001, Naschold and Barrett 2011). One would not want to recommend against targeting such households for assistance.

These two cases—the persistently poor poised to escape poverty soon, or the consistently lucky whose good fortune will almost surely run out soon—help motivate an interest in the structural foundations of long-term deprivation.[5] Why are people persistently poor, what are the right policy instruments to address those mechanisms, and who are the right subpopulations to target with interventions?

Hence social scientists' longstanding interest in "poverty traps", which economists typically define as "any self-reinforcing mechanism which causes poverty to persist" (Azariadis and Stachurski 2004, p. 33). A poverty trap is thus about staying poor, not just about being poor at a few moments in time. Poverty traps research therefore focuses on identifying and explaining the existence of low well-being "basins of attraction" within an economy.[6] Furthermore, given the focus on the underlying structure that shapes households' well-being dynamics, poverty traps research naturally emphasizes the evolution of the stock of productive assets that produces period-specific well-being, however measured.[7]

The literature identifies a variety of structural mechanisms that can generate poverty traps. Some operate at the level of the individual or household, while others operate at the community, regional or national scales. These mechanisms can operate on intra- or inter-generational time scales. Some are single equilibrium mechanisms in the sense that there is not a non-poor equilibrium available to the household (or to the region, *etc.*) given the existing technologies of production and income generation. Others are multiple equilibrium mechanisms, meaning that both poor and non-poor equilibria are available. What matters in multiple equilibrium models is the critical threshold or tipping point that determines whether the

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[5] For this reason authors such as Carter and May (2001) and Carter and Barrett (2006) have argued that poverty traps must be approached empirically through the lens of assets rather than income. In Section III of this paper, we explicit explore poverty trap mechanisms through the lens of an asset model of poverty.

[6] For more elaboration on the dynamical systems behind poverty traps, in both formal and informal terms, see Azariadis and Stachurski (2004), Dasgupta (2004), Carter and Barrett (2006) or Barrett, Travis and Dasgupta (2011).

[7] As Carter and Barrett (2006) explain, there are also important practical considerations that favor an asset-based approach, related to relative ease of measurement of assets as compared to expenditures or income.

household reaches the poor (poverty trap) or non-poor equilibrium. As we illustrate in Section 3, single and multiple equilibria mechanisms can coexist, with some households facing only a single equilibrium, while others confront multiple possibilities.

The distinctions between scales and single versus multiple equilibria poverty traps is of far more than academic interest. The multiple possible mechanisms behind poverty traps have varied implications for empirical strategies to identify a poverty trap and for prescriptions for policies aimed at helping the poor escape from traps (Barrett 2008). The remainder of this section organizes a brief review of different mechanisms and their distinctive implications.

(a) *Single Equilibrium Poverty Traps*

Some poverty traps may be characterized by a single stable state (or dynamic equilibrium) at a low level of well-being toward which everyone converges. Macro-scale traps can originate because of institutional phenomena (Acemoglu, Johnson and Robinson 2001, 2002) or disadvantages of physical geography that afflict all residents (Jalan and Ravallion 2002, Bloom, Canning and Sevilla 2003), leading to geographic poverty traps that engulf whole nations or regions. Much of the macroeconomic debate about "convergence" and poverty traps revolves around such phenomena. This kind of poverty trap can be understood as the result of a "technology"—broadly defined to include the institutional and organizational forms of production and exchange—that is insufficiently productive to generate non-poor standards of living, conditional on geography, climate or other fixed endowments.

There may likewise exist single stable states specific to individuals or groups of individuals, perhaps due to severe mental or physical disability, to systematic discrimination and social exclusion, or to some other mechanism that effectively precludes such individuals from attaining and maintaining a high level of well-being.[8] The key is that individuals possess some immutable characteristic(s) that sort individuals into groups, with some groups naturally bound for a high level stable state and others toward a low level one. It takes time to sort among groups but there is, in long-run expectation, effectively no durable difference among individuals within a given group.

In either the macro or micro cases of poverty traps with single stable states, persistent poverty appears as the natural consequence of an immutable condition specific to (perhaps many) households. A humanitarian impulse naturally motivates

[8] As but one example or a single equilibrium, the fetal origins hypothesis posits that adult cognitive and physical potential are largely determined in utero (Almond and Currie, 2011) or, more broadly, within the first 1000 days since conception (World Bank 2006). In the context of this paper, this hypothesis suggests that the number of people caught in single equilibrium poverty traps can be reduced through prenatal and early childhood health and nutrition interventions that enable children to realize their full genetic potential as adults.

interventions on behalf of such peoples but the fundamental structure that leads to persistent poverty cannot be remedied without wholesale societal or technological transformation to improve the long-run prospects for such households.

(b) Multiple Equilibrium Poverty Traps

Multiple equilibrium mechanisms create poverty traps that are qualitatively different than those generated by single equilibrium mechanisms. Such poverty traps are characterized by multiple stable states accessible to individual households, with at least one equilibrium associated with a poor standard of living and another with a high level of well-being. Well-being indicators are dynamically stable within a region of the possible state space, meaning that perturbations that change a state within the region merely change the short-term path to the same long-term state. The existence of multiple such regions, corresponding to multiple stable states, implies the existence of "thresholds" or "tipping points" at the boundaries between those regions. Minor initial inter-household differences that leave two households very close to each other, yet on opposite sides of a threshold, naturally lead to divergence as each household follows the path inherent to its own basin of attraction.[9] Under multiple equilibrium poverty traps, individuals suffer unnecessary, remediable deprivation, making a particularly compelling case to devise and field interventions to address these mechanisms.

Within the class of multiple equilibrium poverty traps, there exist several potential mechanisms that can give rise to such structure, each with distinct empirical and policy implications. Let us briefly consider just a few such mechanisms so as to illustrate the range of possible structural causes of multiple equilibrium poverty traps and the inherent challenge of identifying a poverty trap's origins or antidote without some strong prior information on the likely cause of the phenomenon. Section III will then delve deeply into one type of multiple equilibrium poverty trap mechanism, exploring in detail its implication for both the empirical investigation of poverty traps and for the design of anti-poverty policy.

At a macro scale, the 'big push' theory of Rosenstein-Rodan (1943) (formalized by Murphy, Shleifer and Vishny, 1989) is a prime example of a multiple equilibrium poverty trap. In this model, a technology is available that allows the economy to industrialize and thereby reach a 'non-poor' living standard. However, coordination problems between firms make it possible for the economy to become mired at a low standard of living. The policy implications of such a multiple equilibrium poverty trap are clear. If such a trap exists, then governments can ignite rapid growth through coordinated investment via industrial and trade policy to promote savings, exports and rapid factor productivity growth, as occurred in several east Asian countries in the 1960s-80s.

[9] Carter and Barrett (2006, 2007) and Barrett (2008) discuss the implications of such systems in detail. If sufficient numbers of people suffer unnecessary deprivation, the whole economy can fall into a poverty trap (Barrett and Swallow 2006).

At the intermediate level of, say, a community, a still-different mechanism can give rise to a poverty trap when people derive non-material value from interpersonal relationships. If there is an associational propensity among similar individuals—the poor network mainly with other poor people, and the rich with the rich—then multiple equilibria can result naturally from either signaling or learning effects (Montgomery 1991; Calvó-Armengol and Jackson 2004) as well as from the ability to tap social networks to overcome the fixed costs of adoption of improved technologies when the poor like access to financial markets (Chantarat and Barrett 2012). Indeed, social networks and norms can generate strong, if sometimes subtle, pressures to conform to traditional local practices, in which case innovators may be regarded as deviants, thereby retarding technological change (Barrett 2005a; Moser and Barrett 2006). Those sorts of network effects are a special case of more general spillover effects—for instance due to disease transmission (Bonds et al. 2010) or water management (Ostrom 1990)—that can easily lead to coordination failures in which there exist Pareto inferior equilibria and often multiple equilibria. Such low-level equilibria can easily become institutionalized through formal or informal rules and norms, such as property rights, social norms regarding informal taxation or patterns of contributions to public goods or information sharing, that then guide individual and group behavior (Engerman and Sokoloff 1997; Platteau 2000; Acemoglu et al. 2001; Barrett 2005a; Barrett and Swallow 2006; Bowles et al. 2006). As with "big push" macro theories of poverty traps, these meso-scale coordination problems require concerted efforts to alter interhousehold interactions, for example by changing the rules of collective action (e.g., water use rules), or by coordinating behavioral change (e.g., adoption of a visibly non-traditional technology) among a critical mass of households and making that coordinated change common knowledge (e.g., through farmer field schools) so as to tip group behavior into a new equilibrium.

At the scale of the individual or household, one of the earliest, well-developed theories of multiple equilibrium poverty trap is that based on the idea that physical work capacity declines more rapidly than wages once the wages (and the nutrition it can buy) falls below a critical level (Dasgupta and Ray, 1986, 1987 and Dasgupta 1993, 1997). In the simplest version of this theory, all potential workers are identical and own no assets. In equilibrium, a subset of them will obtain employment and enjoy a higher standard of living than their unlucky compatriots who are rationed out of the labor market and become stuck at a low level of living. In its more complex version, potential workers may own some productive assets (the returns to which give them a floor or base level of nutrition). Rationing of jobs in this case will occur in order of asset ownership, with the best-endowed potential workers hired first. In equilibrium there will be some critical asset holding such that those with at least that level obtain employment and reach a non-poor standard of living, while those below that critical level will remain mired in poverty and malnutrition. The dynamic extension of this model by Streufert and Ray (1993) shows that this tipping point can persist even in a dynamic model in which individuals can autarchically save[10] and build their asset stocks over time.

An economy with multiple equilibrium poverty traps explicitly violates a moral principle of horizontal equity as the initially similar face strongly divergent futures, depending on the equilibrium where they end up. Furthermore, the fact that initial differences in endowments can lead to markedly different futures implies avoidable human deprivation, a feature that does not exist with single equilibrium poverty traps due to individuals' immutable characteristics. This adds a powerful efficiency argument for intervention to the equity or humanitarian impulse that motivates all interventions to reduce poverty. As developed by Dasgupta and Ray (1987) and Streufert and Ray (1993), a policy that redistributes assets to those below the threshold will render them employable and not only improve their life prospects, but also boost the aggregate productivity of the economy.[11]

Yet another type of multiple equilibrium poverty trap can result from the non-tradability of essential productive inputs that can cause initial conditions to shape incentives to invest or to adopt improved technologies. That is the essential mechanism behind natural resource degradation poverty traps wherein small farmers endowed with marginal or fragile soils have no incentive to purchase and apply fertilizers or to invest in soil conservation measures, creating a downward spiral of deteriorating soils, lower productivity and people trapped in poverty (Shepherd and Soule 1998; Antle, Stoorvogel and Valdivia 2006; Marenya and Barrett 2009a,b; Stephens et al. forthcoming). Meanwhile, modestly better endowed neighbors invest in fertilizers and soil conservation, thereby maintaining yields and soil quality, crowding in complementary investments (e.g., in livestock) and leading to a higher standard of living. Small differences in a farmer's initial biophysical conditions thereby lead to larger, permanent gaps in productivity and well-being.

A further mechanism that has been attracting increasing attention in the past few years concerns the possibility of behavioral anomalies to lead to persistently inefficient activities, in the limit to poverty traps. Individuals may face psychological incentives or constraints on behavior related to self-control problems, habits, addictions and other "irrational" behaviors that cause them material harm. If those are immutable, they can lead to single equilibrium poverty traps of the sort discussed above, much like a permanent cognitive or physical disability might. But if such behaviors can be altered through "nudges" (Thaler and Sunstein 2008). to the choices and constraints agents face, most commonly through commitment devices of some sort, then multiple equilibria can emerge (Banerjee and Mullainathan 2010). This is, for example, Duflo et al.'s (2011) explanation of African

[10] Note that the Streufert and Ray (1993) analysis is a financial markets failure story, not dissimilar to the MFMF model we present in section III.
[11] This asset redistribution would not, however, be Pareto efficient as it would be impossible for the recipients of transfers to compensate the losers as doing so would eliminate the nutritional and employability gain of the asset transfer.

farmers' failure to invest in fertilizers offering high expected returns on investment, or of Ashraf et al. 's (2004) findings with respect to savings behavior in the Philippines.

A new, but related stream of literature considers ways that the key drivers of persistent poverty in standard poverty trap models (shocks and low asset levels) may cause preferences to endogenously change in ways that can generate poverty traps. Laajaj (2012), for example, uses ideas from social psychology (cognitive dissonance) to create a model in which individuals with weak asset positions react psychologically by shrinking their time horizons to avoid putting too much weight on their "gloomy future prospects." Laajaj goes on to show that a randomized intervention that enhanced individual's future prospects in rural Mozambique led to a strong, statistically significant increase in individual's time horizon, providing evidence that deep preference parameters that are mutable and endogenous to individuals' prospects.

Complementing this work, Moya (2012) shows that individuals exposed to violence in Colombia exhibit a marked increased in their levels of risk aversion, a shift that would imply a lower standard of living even in a standard, single equilibrium dynamic model. Similar to Laajaj (2012), Moya's work blurs the line between single and multiple equilibrium poverty traps. Conditional on preferences, the work of both authors suggests a single equilibrium model. However, unconditionally, their work suggests that individuals are subject to multiple equilibria, gravitating between low and high steady states, depending on endowments and realized shocks. Note also that in contrast to the Banerjee and Mullainathan (2010) and Dufflo *et al.* (2011) work, this endogenous preference does not blame the poor for their own persistent poverty (due to their intrinsic lack of self-control), but instead identifies key structural mechanisms that distort preferences in ways that drive individuals to lower long-run standards of living.

A final and oft-cited mechanism that can generate multiple equilibria poverty traps at the individual level stems from fixed costs that can generate locally-increasing returns to scale. For example, farmers might receive different farmgate prices for the products they sell based endogenously on the volume sold to a trader who incurs fixed costs in product collection. The resulting volume-based difference in prices creates different investment incentives and resulting production patterns, each corresponding to a distinct level of expected farmer well-being (Barrett 2008). Very similar patterns arise from choice among technologies that have sunk costs of adoption, leading to natural sorting among adopters and non-adopters based on initial endowments (Dercon 1998, Carter and Barrett 2006). Similar to the nutrition wage and natural resource degradation mechanisms, borrowing constraints make it impossible for the trapped producer to borrow the funds needed to increase her scale of operation and reap the higher returns that are available. Combined with another market failure, a credit market failure is a key element of this mechanism.

III. The Multiple Financial Markets Failures Poverty Trap

Given the centrality of financial constraints to many of the multiple equilibrium poverty trap mechanisms just described, this section develops in greater detail the empirical and policy implications of what we call the core multiple financial market failures (MFMF) poverty trap model. The MFMF poverty trap model brings into stark relief the compelling characteristic of unnecessary deprivation of those unlucky enough to suffer low initial endowments or who suffer a shock that knocks them below some critical asset threshold. We find the MFMF poverty trap conceptually appealing because it captures in a relatively simple format several key features that characterize quite a few settings in the low-income world, and has especially interesting empirical and policy implications. It also illustrates quite clearly how single and multiple equilibrium poverty traps can co-exist.

(a) Core Implications of the Multiple Financial Markets Failure Poverty Trap Model

In Carter and Barrett (2006) we described the general characteristics of a MFMF poverty trap model without giving it that name. To more thoroughly develop the empirical and policy implications of this model, we here summarize more recent analyses (Barrett, Carter and Ikegami 2011, and Janzen Carter and Ikegami, 2012) that draw on the following canonical poverty trap model.

In this model, an individual *i* has an immutable skill level, α_i, and can over time accumulate a stock of productive assets, the amount of which at a time *t* is given by A_{it}.[12] The individual deploys her assets and skill under either a 'high' ($F^h(\alpha_i, A_{it})$) or 'low' ($F^\ell(\alpha_i, A_{it})$) technology, each of which is monotonically increasing in both α_i and A_{it}. The high technology is subject to fixed costs such that output is greater under the low technology until a minimum scale of production is reached. After that scale is reached, the high technology is more productive, as reflected in superior marginal returns to assets under the high technology.

Over time, the individual can choose to build up her asset stock. However, assets depreciate at a rate τ and are subject to a periodic asset shock, θ_t. This asset shock is a random variable representing weather, theft, accident or anything else that might degrade the asset stock. When $\theta_t = 1$, nothing bad happens and the individual's assets are preserved. When $\theta_t < 1$, a fraction of the individual's assets are destroyed.

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[12] Note that because α_i is immutable it would not include individual skills that can vary over time due to investments in education, health, nutrition, learning by doing, etc. We conceptualize those investments as adding to the time varying capital stock, A_{it}.

Finally, we make MFMF assumptions. Specifically, we assume that the individual cannot borrow against future income earnings in order to either accumulate assets more rapidly, or to insulate consumption, c_t, against the effects of shocks. These borrowing constraints represent the first financial market failure. In addition, we assume that no insurance (contingent claims) market exists, therefore the individual does not have access to insurance contracts that would indemnify her for asset losses. There is of course a host of evidence that both of these financial market failures constrain the lives of poor people (Besley 1995). Rectifying those multiple financial market failures is a key area of policy intervention, which we discuss below.

Under these assumptions, the individual faces the following inter-temporal choice problem:

$$\max_{\underline{c},\underline{A}} E_0 \left\{ \sum_{t=0}^{\infty} \delta^t u(c_{it}) \right\}$$

$$subject\,to:$$

$$x_{it}(A_{it},\theta_t) = F(A_{it},\alpha_i) + (1-\tau)\theta_t A_{it}$$
$$F(A_{it},\alpha_i) = \max[F^h(A_{it},\alpha_i), F^\ell(A_{it},\alpha_i)]$$
$$c_{it} \leq x_{it}$$
$$A_{it+1} = x_{it} - c_{it}$$

where $\delta \in (0,1)$ is a time preference parameter, and x_{it} is consumable wealth, defined as the sum of current income and the stock of productive assets.[13] The MFMF assumptions are embodied in the constraint that says that current consumption must always be less than or equal to the consumable wealth that the individual has on hand as there are no insurance payouts, nor is credit available to augment current consumption with borrowing against future earnings. In addition, the asset stock can build up only through autarchic savings (the difference between consumption and wealth on hand), again reflecting the absence of loan markets for this individual. We also assume costless switching between technologies in any period; relaxing that strong assumption would merely reinforce the multiple equilibrium character of the model.

Dynamic programming analysis of this model reported (as reported in Barrett, Carter and Ikegami 2011) reveals a number of key implications:

1. *Endowments are expected fate*
   Figure 1 illustrates the direct implications of the model for individuals of different ability levels (shown on the horizontal axis) and different initial, or inherited, endowments of the productive assets. The solid line cutting across the

[13] Note that we measure assets in monetary value terms implicitly, but unrealistically, assuming that their price is constant over time.

figure divides the endowment space between those agents to the northeast of the line who (in probability) converge to a high-income equilibrium, and those to the southwest who in expectation collapse to a low-level, poverty tap equilibrium. For each ability level, this line defines what we call the "Micawber threshold" (MT).[14] If an individual begins, or due to an asset shock falls below, the MT, then she will fall into a poverty trap. If that same individual is above her MT, then she will tend to the high equilibrium. The model thus exemplifies a multiple equilibrium poverty trap mechanism.

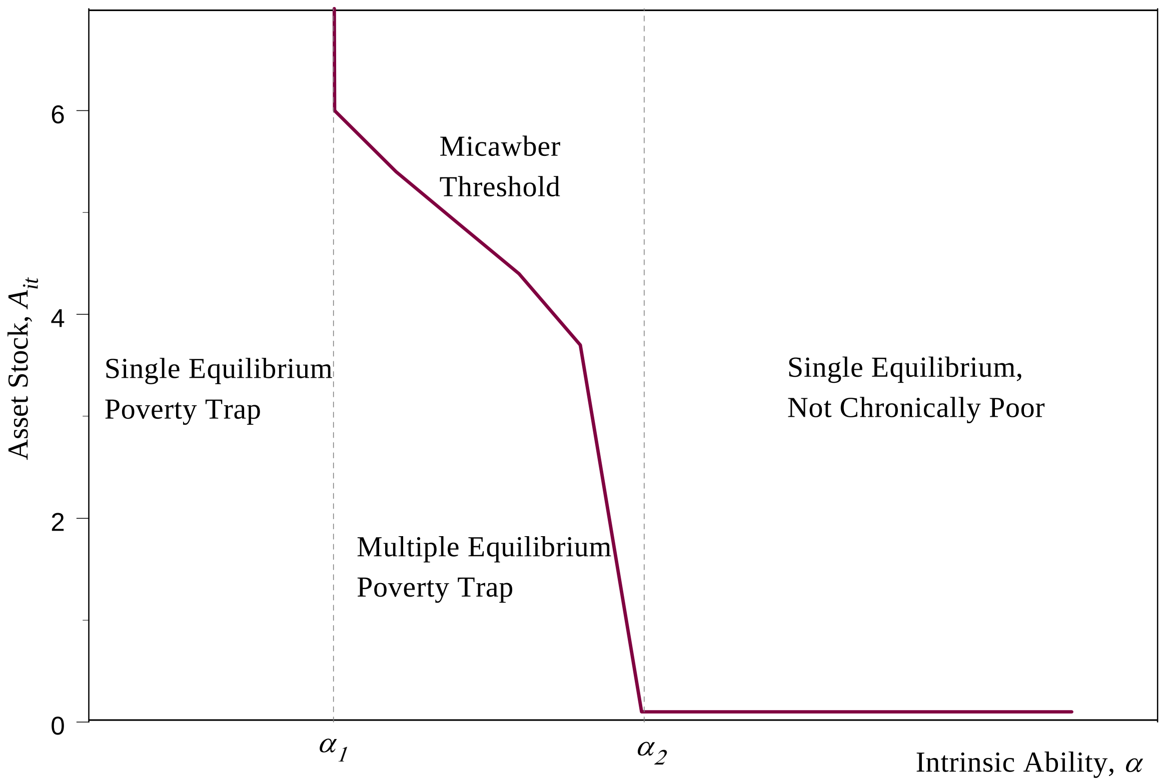

Figure 1: Multiple and Single Dynamic Equilibria in Ability-Asset Space

2. *Risk Matters and Shocks Have Permanent Consequences*
Imagine an individual who finds herself just above the MT. An event that destroys a fraction of her assets will suddenly push her below the MT and into a poverty trap. As Lybbert *et al*. (forthcoming) express it, risk matters more than

[14] Zimmerman and Carter (2001) first used this term to describe the dynamic asset threshold for this class of model. The label itself is due Lipton (1993) who used it to distinguish those who are wealthy enough to able to engage in a virtuous circle of savings and accumulation from those who are not. Lipton's label is based on Charles Dickens' character Wilkins Micawber (*David Copperfield*) who extolled the virtues of savings with his statement 'Annual income twenty pounds, annual expenditure nineteen nineteen and six, result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery.' The Micawber threshold divides those able to engage in a virtuous circle of savings and accumulation from those who cannot.

it otherwise might because one-off perturbations can have persistent effects, *i.e.*, the system can be shocked from one stable equilibrium to another by a single event. As Dercon and Christiaensen (2011) point out, lack of insurance and routinely credit trap poor households in low return, lower risk technologies, thereby perpetuating poverty.

3. *Coexistence of Single and Multiple Equilibrium Poverty Traps*
   Examination of Figure 1 reveals that the MT exists only for middle ability individuals whose skill levels lie between α_1 and α_2. Low ability individuals ($\alpha_i < \alpha_1$) face a single, low-level equilibrium and ultimately collapse to a poverty trap standard of living, even if initially endowed with significant assets, because their low intrinsic productivity limits their capacity to save or replace depreciated assets. In the MFMF model, a single equilibrium poverty trap mechanism thereby coexists with a multiple equilibrium poverty trap. Note also that high ability individuals ($\alpha_i > \alpha_2$) face a single, high-level equilibrium. They might be persistently poor in a short panel as the accumulate wealth from a low initial asset stock, but their unique long-run equilibrium is non-poor. As we discuss below, the coexistence of these distinct of poverty traps and asset dynamics create problems for empirical analysis because quite different forms of persistent poverty can readily co-exist in a single population.

4. *Systemic Change Matters*
   Figure 1, and its implications about the nature and location of poverty traps, is contingent on a number of assumptions about the productivity of the available technologies as well as the distribution of shocks (i.e., the nature of nature). In the real world, both of these evolve over time. Technology changes due to human agency and policy interventions. Nature evolves with changes in climate, disease epidemiology, etc. Changes in either technology or nature shift the location of the Micawber threshold as well as the critical values α_1 and α_2. These observations again imply further complexity for empirical testing and pose significant targeting challenges for policymakers.

As we discuss in greater detail in Section IV, most empirical work on poverty traps (including our own) focuses on implications 1 and 2 by studying asset dynamics (or the dynamics of other well-being measures). However, implications 3 and 4 substantially complicate the identification of multiple equilibrium poverty traps, as do the intrinsic difficulties of estimating asset dynamics in a multiple equilibrium system. The MFMF model does, however, also have important behavioral implications, some of which may be amendable to empirical testing in addition to or in place of the direct examination of asset dynamics.

(b) *Behavioral Responses to Shocks and Interventions*

Beyond the core insights just described, the MFMF poverty trap model has at least four important implications about behavioral responses to shocks and interventions.

1. *Asset Smoothing in Response to Shocks*
   Zimmerman and Carter (2003) noted that in the MFMF model, individuals in the vicinity of a tipping point would tend to preserve or smooth their asset stocks in the face of shocks rather than sell assets in order to stabilize or smooth consumption, as is predicted by standard models of inter-temporal choice (*e.g.*, Deaton 1990). Following up on this insight theoretically and empirically, Carter and Lybbert (2012, p.4) note the incremental (shadow) value of assets in the vicinity of the threshold is "not just the additional immediate income that can be generated with the assets, but also the strategic value that attaches to the capacity to move forward over time to a higher standard of living. We would expect that individuals in this area would be willing to make substantial sacrifices of consumption to increase assets, and to pay a substantial penalty in terms of unsmooth consumption to protect assets and avoid falling below the critical asset threshold."

2. *Risk-Taking in Response to a Poverty Trap*
   A second and closely related implication of the MFMF model is developed by Lybbert and Barrett (2011) who observe that when agents face a multiple equilibrium poverty trap, observed risk-taking behaviors reflect not just static risk preferences but also forward-looking risk management given the expected impact of shocks on future asset holdings. As a result, those just below the Micawber Threshold may consciously choose to gamble in the hope that a favorable stochastic realization will catapult them beyond the MT and onto a more favorable growth path. Conversely, better endowed individuals quite near the MT may go to great lengths to avoid risk exposure that might cast them beneath the critical asset threshold and onto an undesirable path to a poor stable state. As Lybbert et al. (forthcoming) explain, the resulting discontinuities in dynamic risk-taking behaviors pose serious complications for common approaches to estimating risk preferences. But it opens up as-yet-unexplored opportunities to study wealth-conditional risk-taking behaviors that would be the natural result of an MFMF type structure to the economy.

3. *Multiplier Effects of Small Asset Transfers*
   A third implication of the MFMF model can be inferred from Figure 1. A modest asset transfer that just suffices to lift an individual over the Micawber threshold will crowd-in additional saving and investment as the transfer beneficiary suddenly finds it feasible to strive to reach the high-level steady state capital stock. Note that this additional investment would not occur absent the modest initial asset transfer. In their simulation analysis, BCI show that a relatively low cost program of asset transfers can strongly contribute to the elimination of the

unnecessary deprivation of multiple equilibrium poverty traps. Furthermore, as Chantarat and Barrett (2012) show, if asset transfers affect social connections that matter to individual behavior, the benefits of well-targeted small transfers can spillover to generate significant investment and technology adoption effects among members beneficiaries' networks who do not themselves receive transfers. Empirically, these analysis suggest that in the presence of MFMF poverty traps, well-designed asset transfers should over time lead to large increases in the well-being of beneficiaries relative to an otherwise similar control group population and that there could likewise be important spillover gains within the networks of beneficiaries as compared against the networks of a control group. These large increases would in turn imply very high rates of return on the (modest) public dollars invested in the asset transfer. This assumes, of course, that careful targeting keeps the general equilibrium effects of such transfers modest enough so that the partial equilibrium effects dominate, a point to which we return below.

4. *Crowding-in Effects of Risk Reduction Mechanisms*
A fourth behavioral response implication of the MFMF model is that a social protection scheme that functions as, or through, an asset insurance contract could also crowd-in additional private investment. The BCI paper develops this intuition by analyzing the impact of a perfectly-targeted social protection scheme that indemnifies individuals for any exogenous asset losses that would push the household below the Micawber threshold. In their analysis, this sort of social protection (in combination with the asset transfers described above) shifts the location of the MT and has marked effects on the reduction of both the extent and depth of poverty.

While such a scheme is clearly not implementable in the real world, Janzen *et al.* (2012) ask if market-based index insurance contracts could fulfill the same function. They show that for an individual of intermediate ability ($\alpha_1<\alpha_i<\alpha_2$), asset holdings below the Micawber Threshold imply a high probability of collapse to the poor steady state, while above the MT she will likely make it to the high, non-poor equilibrium. Janzen *et al.* (2012) then go on to study what happens if the individual is offered an index insurance contract, realistically priced somewhat above the actuarially fair level, that pays off if the shock to the asset stock, θ_t, is low. The introduction of insurance shifts the Micawber Threshold back by making investment in now-safer assets more attractive. This fundamentally changes the life prospects of those who begin life with an asset endowment between the pre- and post-insurance MTs, sparing them unnecessary deprivation. In addition to this 'shifting threshold effect,' the insurance opportunity also increases both the low and high steady state asset levels, as the certainty value of investment increases with the availability of insurance (a 'shifting equilibrium effect'). Finally, the fact that with insurance, fewer individuals are knocked below the threshold implies a higher productivity economy with greater levels of investment (a 'vulnerability reduction effect').

In summary, while MFMF poverty trap models are most frequently considered in terms of their implications about bifurcating asset and income dynamics, they have a number of other, testable behavioral implications that stand in strong contrast to the predictions of standard economic models.

(c) Policy Targeting and Design in the Presence of Multiple Equilibrium Poverty Traps

While poverty trap theory is often discussed from the perspective of how shocks and initial disadvantage can create unnecessary deprivation, the theory also has the happier implication that modest investment in what Carter and Barrett (2006) term "safety nets" (i.e., policies to protect households against asset loss) and "cargo nets" (i.e., interventions to increase household asset holdings) can have strong multiplier effects by placing some individuals in a position where they can prudently make investments that they would not otherwise undertake. These implications in turn motivate the question about how resources available to combat poverty—such as through income transfers, social protection and asset building and transfers—can be most effectively allocated in the presence of multiple equilibrium poverty traps.

To date, we are aware of little work that explicitly tackles questions regarding the design and targeting of social protection and other anti-poverty programs. An exception is the theoretical and simulation analysis reported in Barrett, Carter and Ikegami (2012), which shows that for a given public assistance budget, there may be an inter-temporal tradeoff in the well-being of the poor. A purely progressive allocation of funds to the worst off (including the single equilibrium, chronically poor) will of course help those individuals in the short-run. However, in the long-run, the extent and depth of poverty may be higher under purely progressive targeting than they would be if social assistance was targeted first at braking the downslide of the vulnerable into poverty and promoting the graduation of the middle ability, multiple equilibrium poor to an asset position above the Micawber threshold. In other words, in this model, the poor are better off in the short-run under purely progressive targeting, but better off in the long-run if some resources are targeted at those at or near the Micawber threshold, inducing those near the asset poverty line to invest their way out of long-term poverty. Barrett et al. (2012) note that neither policy philosophically dominates the other, but it is crucial to be cognizant of this troubling, but important tradeoff. Given these strong implications of MFMF systems, empirical testing for poverty traps can play an important role in guiding development policy.

IV. Implications for Empirical Testing for Poverty Traps

As the preceding two sections emphasized, the many different candidate mechanisms behind persistent poverty and poverty traps can lead to markedly different empirical patterns. This diversity – along with the fact that poverty traps surely do not exist everywhere – likely helps account for the quite mixed micro-scale empirical evidence to date on the poverty traps hypothesis. The variety of poverty trap mechanisms potentially in play and the inherent endogeneity of critical thresholds and equilibria (the 'shifting thresholds' and 'shifting equilibria' effects previously described) pose challenges to researchers aiming to test for the presence of poverty traps in data on persistently poor populations. Because these challenges have received relatively little attention to date in the empirical literature on poverty traps, in this section we highlight some of these issues before drawing out the important policy implications of different sorts of empirical tests for, and findings on poverty traps.

(a) Direct tests for poverty traps

The vast majority of the empirical literature on poverty traps tries to identify low-level equilibria directly through the study of welfare dynamics, typically using asset measures. The most commonplace tests for poverty traps—following a tradition established by Jalan and Ravallion (2004), Lokshin and Ravallion (2004), Lybbert et al. (2004), Adato et al. (2006), Barrett et al. (2006), McKenzie and Woodruff (2006), Antman and McKenzie (2007), Carter et al. (2007), Van Campenhout and Dercon (2009), etc.—are actually tests for a specific class of poverty trap in which one looks for multiple dynamic equilibria, at least one of which falls below the poverty line, and the threshold that separates them. The papers in this special issue all follow in that tradition, although several push further, looking for single equilibrium poverty traps as well. There is much to be learned from these explorations, to be sure. But having estimated many such empirical models of asset dynamics ourselves, we have gradually come to appreciate the many significant shortcomings to the direct approach to testing for poverty traps.

First, empirical results are commonly misunderstood. Perhaps because the multiple equilibrium variety is the most interesting sort of poverty trap from both a theoretical and policy perspective, analysts frequently mistake failure to reject the null hypothesis of a unique equilibrium in favor of the alternate hypothesis of multiple equilibria as failure to reject the null that a poverty trap exists at all, even though this clearly does not constitute rejection of the hypothesis that a unique, poor stable state exists. Indeed, findings of a unique dynamic equilibria at a poor level of well-being—a poverty trap, but just not of the multiple equilibrium sort—are fairly commonplace (Naschold 2009, this issue; Baulch and Quisumbing this issue, Kwak and Smith this issue). The failure to find multiple equilibria does not constitute rejection of the poverty trap hypothesis, merely rejection of a particular, multiple equilibrium class of poverty trap. This sort of inferential error matters for policy purposes, as we discuss below, but happens routinely.

Second, it is no easy task to discriminate empirically between true state dependence—i.e., the existence of multiple equilibria—and heterogeneity in welfare dynamics attributable to persistent differences among individuals in characteristics that affect well-being (Heckman 1981, 1991). Permanent or near-permanent traits (e.g., cognitive or physical disability, gender, race, adult educational attainment, genetic predisposition to disease, inherited social connections, physical environment) that matter to productivity and well-being can cause conditional convergence associated with one sort of poverty trap. Yet because some of those traits (e.g., educational attainment, health status) may themselves be endogenous to initial wealth in the presence of multiple financial market failures (Loury 1981, Bonds et al. 2010), disentangling heterogeneity from state dependence empirically depends on strong identifying assumptions (Heckman 1991).

Third, even when multiple equilibria exist, they can be exceedingly difficult to pin down empirically because direct testing for thresholds falls prey to a problem akin to the Lucas critique. The underlying dynamic theory implies that the parameters that describe observed well-being dynamics—including the stable and unstable dynamic equilibria empirical researchers seek to identify—are not structural but are instead endogenous to the specific conditions under study. Any change in the underlying biophysical or economic environment, including interventions intended to facilitate an escape from a hypothesized poverty trap, can also change the underlying behavioral parameters and thus the dynamic equilibria. So any sample-based estimate of wealth dynamics is inherently unstable and vulnerable to a host of unobserved heterogeneity problems as well as to general equilibrium effects related to changes in endogenous investment, market participation and technology adoption behaviors. Put differently, the Micawber Threshold moves over time with any of a host of changes in market and non-market conditions and varies across individuals based on unobserved attributes. But variation in both cross-section and time series makes identification of unstable equilibria extremely challenging. Any of a host of cross-sectional or time series representations can arise in the data, regardless of whether the underlying dynamics are truly characterized by poverty traps. Of course, the better one can control for variables that might affect those equilibria, the more likely one can identify the true dynamics.

Fourth, many such efforts fall short, for any of a host of econometric reasons. For example, if multiple equilibria exist and the theory is correct, then thresholds should be unstable points around which one should find few observations in any sample. As a consequence, there is a strong possibility that bifurcated asset dynamics might appear instead as heteroskedastic and positively autocorrelated errors (Barrett 2005b). This problem is easily aggravated by the twin complications that (i) the individuals who identify the out-of-equilibrium dynamics are a non-random sub-sample with unknown selection, and (ii) non-random attrition is commonplace in panel data. In parametric regressions these problem are compounded by the necessary instability in estimating equilibria far from the sample means (Barrett et al. 2006), while in nonparametric regressions, one always worries about unobserved heterogeneity problems due to the absence of control variables. Naschold (2009, this issue) discusses the tradeoffs among nonparametric and parametric estimators in pushing for semi-parametric approaches to test for the existence of multiple asset dynamic equilibria in panel data. Empirical researchers employ multiple, increasingly sophisticated nonparametric and parametric estimators to try to overcome these problems through robustness checks (Baulch and Quisumbing this issue, Kwak and Smith this issue, McKay and Perge this issue).

Fifth, as the model developed in the previous section illustrates (as well as the work of Santos and Barrett, 2011), within a single population, some individuals may be subject to multiple equilibria, whereas others are not. The Micawber threshold, and even whether it exists, may be conditional on individual skill, or even on whether the individual is subject to financial market constraints. While threshold estimation (as developed by Hansen 2000) is one way to try to identify the Micawber threshold (for example, see Carter *et al.* 2007), the econometrics of conditional thresholds have yet to be developed.

Sixth, sampling strategies commonly aggravate the econometric obstacles that exist. For example, panel studies of households and individuals commonly rely on cluster sampling with a relatively small number of clusters. Not only can the resulting within-cluster correlation bias the standard errors of parameter estimates, it naturally leads to regression-toward-the-mean effects that disfavor finding multiple equilibria even if they exist. Unique poverty trap equilibria can arise due to high-levels of within-group correlation, due to political economy, institutional or geographic factors common to many households; but within-sample correlation due to sampling design can lead to spurious findings of such effects (Jalan and Ravallion 2002, Naschold this issue).

Seventh, most recent tests for poverty traps, including all of the papers in this special issue, rely on asset-based measures for the reasons discussed previously. Despite the compelling conceptual, practical and statistical advantages of asset-based approaches, they do come at a price. Asset stocks are typically slow-changing, which can make it difficult to discern change in short panels, especially with small samples. Perhaps more importantly, the diversity of types of assets poses aggregation challenges. The use of money metric measures is commonly complicated by problems of accounting appropriately for depreciation, thin secondary markets and heterogeneous asset quality. For that reason, analysts commonly rely on any of a host of different approaches to constructing asset indices so as to reduce a large number of relevant assets denominated in radically different units – land, livestock, machinery, nonfarm business equipment, vehicles, etc. – into a scalar measure amenable to the sorts of tests that have become commonplace in this literature. Furthermore, many critical financial, human capital and natural assets may be unobserved. As Michelson et al. (this issue) demonstrate, empirical tests for poverty traps prove quite sensitive to inherently arbitrary choices among asset index construction methods.

Finally, even simple descriptive tests for multiple equilibrium poverty traps that check for multimodal cross-sectional asset distributions, as demonstrated by Barrett (2005b) and Kwak and Smith (this issue), only work for very specific sorts of stochastic processes. A stochastic system truly characterized by multiple equilibria can readily generate a unimodal cross-sectional distribution depending on the nature of the stochastic error term – additive or multiplicative, its variance, etc.[15] Finding multimodal cross-sectional distributions is neither necessary to the existence of even a multiple equilibrium poverty trap, nor is it even sufficient, as two distinct modes observable in data could reflect distinct single equilibria for non-overlapping subgroups whose membership is defined by unobservables.

As the literature on poverty traps has grown, the many obstacles to direct empirical testing of the poverty traps hypothesis through the study of well-being dynamics have become increasingly apparent. Given the considerable policy importance of answering the question "are there poverty traps?" how might empirical researchers proceed?

One alternative approach involves eliciting state-dependent wealth or well-being dynamics from survey respondents in a game or an experiment in order to get respondents to directly identify apparent non-linearities in well-being dynamics explicitly controlling for state-dependence. Santos and Barrett (2006, 2012) do this with Ethiopian pastoralists, eliciting their expectations of herd growth conditional on poor, normal or good rainfall states. By blending the resulting estimated state-conditional herd growth functions according to the observed probabilities of each rainfall state in the region, they almost exactly replicate the unconditional herd dynamics observed in the same region in other data by Lybbert et al. (2004) and can disentangle the role of exogenous climate variation from initial herd size and even herding ability in determining asset dynamics. But this approach likely depends on the simplicity of the system; livestock are effectively the only non-human form in which households hold wealth in the southern Ethiopian pastoralist setting, making such an exercise feasible there although it might not be in an urban setting or in a mixed crop-livestock system with a vibrant rural non-farm economy.

A radically different approach abandons the quest of directly testing for poverty traps in asset dynamics in favor of what might be termed an allegorical or indirect approach using behavioral data. Behavioral patterns that could only result from rational response by agents confronting a poverty trap serve as a sort of allegory of the poverty trap, a representation of something more abstract and complex that often eludes direct observation. For example, do those with low asset stocks fail to invest in assets offering attractive returns, on average, while those with greater initial stocks of the same asset invest, thereby signaling locally increasing returns consistent with the existence of a threshold separating multiple dynamic equilibria? As an alternative approach to testing for poverty traps, empirical researchers might explore the testable behavioral implications of poverty traps models rather than trying to identify low-level dynamic asset equilibria explicitly, especially in panels with relatively few repeated observations.

[15] We thank David Ruppert for pointing this out to us.

(b) Indirect tests for poverty traps' behavioral effects

As discussed previously, one of the most powerful behavioral implications of a Micawber Threshold is that while canonical consumption smoothing is an equilibrium behavior over some wealth ranges, asset smoothing – i.e., willful destabilization of consumption – is an equilibrium behavior in other ranges (Zimmerman and Carter 2003, Carter and Lybbert forthcoming). This observation has led to several indirect tests for poverty traps on the basis of observed asset smoothing behaviors among an appropriate subpopulation.

Hoddinott (2006) finds consumption smoothing by Zimbabwean households who possess sufficient draught animals to ensure that they can plow their fields the next year. But those who own just a single team of two oxen (or less), destabilize consumption in the face of rainfall shocks so as to safeguard their productive assets. In a still more indirect fashion, Lybbert and McPeak (2011) estimate the risk and time preference parameters of northern Kenyan pastoralists and find that poorer households are simultaneously more risk averse and more willing to destabilize consumption than are the relatively rich. Such patterns are consistent with a poverty trap model based on herd size thresholds—of the sort found in this area by Barrett et al. (2006)—but inexplicable in the absence of such thresholds. Carter and Lybbert (forthcoming) use threshold estimation techniques to show that rural households in Burkina Faso exhibit asset smoothing, rather than consumption smoothing, in the neighborhood of critical herd sizes at which optimal accumulation behavior bifurcates. Households above the estimated Micawber Threshold almost completely smooth consumption against weather shocks using livestock sales, while those below the threshold asset smooth instead.

Along similar lines, Santos and Barrett (2011) recognize that an unstable herd size threshold between multiple dynamic asset equilibria should naturally create an inverted-U shaped pattern of informal lending in wealth space, contrary to conventional credit rationing models. Studying southern Ethiopian pastoralists who previous studies found face multiple herd size equilibria (Lybbert et al. 2004, Santos and Barrett 2006), they indeed find a "middle class bias" in informal lending favoring those in the neighborhood of a potential threshold at which wealth dynamics bifurcate. This leads to credit rationing patterns, as the poorest are excluded because of their proximity to the low wealth level attractor and the richest members are rationed out due to diminishing returns to wealth. This sort of peculiar pattern is entirely consistent with the existence of a poverty trap in this system and inconsistent with other models of informal lending.

In a similar spirit, Marenya and Barrett (2009a, b) observe that in the presence of multiple market failures, farmers' fertilizer purchase behaviors should depend on the ex ante soil quality of their farmland because the marginal returns to fertilizer application depend on initial soil quality. They indeed find that even though the average returns to fertilizer use are considerable for western Kenyan maize farmers, fertilizer application does not pay for the poorest third of farmers, who cultivate lower quality soils.I It appears optimal for the poor to fail to invest in what unconditionally appears an attractive input. An endogenous switching regression model of fertilizer purchase behavior (Marenya and Barrett 2009b) indeed finds a pronounced discontinuity in fertilizer demand at the soil carbon threshold Marenya and Barrett (2009a) identify as the tipping point for profitable fertilizer use. Stephens et al. (forthcoming) build on these findings to demonstrate in dynamic bioeconomic model how feedback between farm household economic decision-making and long-term soil fertility dynamics can generate asset thresholds that trap some households in chronic poverty and food insecurity.

The allegorical or indirect approach to testing for poverty traps also lends itself to intervention-based tests that can exploit some of the statistical identification power of natural experiments and randomized controlled trials. In principle, researchers can generate exogenous variation in the vicinity of a prospective Micawber Threshold (e.g., through randomized assignment of cash transfers, credit, insurance or fertilizer), then look for bifurcations in subsequent behaviors. For example, theory suggests that cash transfers or credit programs to address one financial market failure should interact synergistically with the introduction of insurance to address another market failure by facilitating and incentivizing investment that can induce households to accumulate their way out of persistent poverty.

We are in the midst of such an experiment in northern Kenya, where index-based livestock insurance (IBLI)[16] began a commercial pilot in early 2010 linked to a randomized encouragement research design that should enable us to identify differential behavioral responses attributable to whether or not households were insured conditional on their herd sizes. That design is overlaid on a new unconditional cash transfer program so that we can explicitly study the individual and joint effects of cash transfers and insurance against proper control communities and households. Very preliminary findings from data on households' anticipated coping strategies, gathered just as initial indemnity payments were announced in the midst of a major drought, indeed suggest that insurance leads to markedly different behaviors (Carter and Janzen 2012). Reducing uninsured risk was statistically significantly associated with lower expectations of harmful behaviors such as reduced food consumption or livestock sales, while those anticipating larger insurance payouts anticipate buying livestock to accumulate herds.

Keswell and Carter (2011) report the results of a second intervention-based test of multiple equilibrium poverty trap theory. Their study exploits a South African land reform program that operated as a natural experiment, with some approved beneficiaries receiving land transfers (worth about $4000) and others not, for reasons beyond their control and unrelated to their individual characteristics. As discussed above, MFMF poverty trap theory suggests that an asset transfer that lifts a family above their critical Micawber threshold will generate very high observed rates of return on the dollars invested in the transfer. Using a continuous treatment

[16] See Chantarat et al. (forthcoming) for details on the design of the IBLI product.

impact estimator, Keswell and Carter find that after a few years, the estimated impacts on the level of family well-being imply upwards of a 50 to 75% annual rate of return on the initial public investment in the program. Returns of this magnitude only make sense if transfers induced beneficiaries increase their own investments in productive assets. Because these investment increases are not seen in an otherwise similar control group, these results appear to identify precisely the kind of crowding-in effect predicted by the MFMF poverty trap theory.

In summary, the empirical literature tapping the potential of indirect tests of the poverty traps hypothesis remains thin. But these initial forays show considerable promise in helping illuminate important policy questions concerning the existence and nature of poverty traps.

V. Conclusions and Policy Implications

The moral and economic efficiency imperatives to intervene in the case of a poverty trap makes this line of theoretical and empirical work highly policy relevant for policymakers, donors and researchers committed to poverty reduction. Empirical findings of a poverty trap lend added evidence to arguments for more direct action to help the poor escape the structural circumstances that cast a long shadow over their future. But we hasten to reinforce McKay and Perge's (this issue) point that the absence of empirical evidence of a poverty trap does not argue against intervention. In practical terms, very slow accumulation by those far below the poverty line is scarcely different from no expected accumulation by those a bit below the poverty line. Either type of household merits assistance.

The trick is what sort of assistance. This is where more discriminating empirical testing of the poverty traps hypothesis and its behavioral implications can have considerable value.

Where we can identify – directly through the study of welfare dynamics or indirectly through the study of behaviors – poverty traps of the MFMF sort, then interventions that remedy those multiple financial market failure for even a limited time can generate large, lasting gains. Hence the promise of credit and insurance innovations and asset transfer programs coupled with research on poverty traps.

By contrast, if persistent poverty and poverty traps arise mainly due to heterogeneity in persistent traits – early childhood health and nutritional status, educational attainment, gender, race, etc. – that leads to conditional convergence on a single, low-level dynamic equilibrium, then short-lived interventions to remedy MFMF are unlikely to have great lasting impact on intended beneficiaries' long-term status. More appropriate policy responses would then address the longer-term sources of the underlying heterogeneity that gives rise to subpopulation-specific poverty traps. Hence the importance of testing for poverty traps of any sort, not just of the multiple equilibrium variety central to the MFMF model.

These questions matter fundamentally to development policy. Sachs' (2005) well-known argument for a major expansion of aid and for large-scale development interventions rests firmly on a foundational theory of poverty traps. Incremental changes make little difference when the prevailing dynamic equilibrium is a poor one. The possibility of such poverty traps also undercuts arguments that favor experimentation with many small randomized controlled trial (RCT) interventions in order to learn and subsequently scale-up what works at the margin (Banerjee and Duflo 2011, Karlan and Appel 2011). In the absence of poverty traps, significant changes identified in small-scale RCTs can indeed lead to big impacts once taken to scale. But where poverty traps exist, small-scale changes effected within RCTs are, by design, intended not to alter the underlying structure of the economic system in which individuals find themselves and thus should rarely be expected to make a big difference. The absence of evidence of impact at the margin tells us little about likely effects at larger scale or scope (i.e., across multiple interventions, since complex multifactorial designs are exceedingly rare in RCTs). The exception, of course, is where small, randomized interventions are carefully targeted to bump intended beneficiaries just beyond a pre-identified (or hypothesized) Micawber Threshold or to shift that threshold. But such outcomes require ex ante identification of critical asset thresholds through non-experimental methods.[17]

The burgeoning empirical development microeconomics literature on poverty traps, nicely exemplified by the papers in this special issue, exhibits enormous potential to inform poverty reduction policies. The next steps will likely need to combine more rigorous theorizing with more creative, indirect empirical testing of the behavioral implications of poverty traps.

[17] In Barrett and Carter (2010, in press) we make the case for combining experimental and observational empirical research for precisely this reason (among others).

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