Displaced distortions:
Financial market failures and seemingly inefficient resource allocation in low-income rural communities

Christopher B. Barrett*

July 2007 draft for festschrift volume in honor of Arie Kuyvenhoven

Abstract: Poor households in rural areas of the developing world commonly lack access to (formal or informal) credit or insurance. These financing constraints naturally spill over into other behaviours and (asset, factor and product) markets as households rationally exploit other market and non-market resource allocation mechanisms to resolve, at least partly, their financing problems. These displaced distortions of financing constraints commonly manifest themselves in allocative inefficiency that may lead researchers and policymakers to mistakenly conclude that poor households routinely make serious allocation errors and to direct policy interventions towards the symptoms manifest in other markets rather than towards the root financial markets failures cause.

Keywords*: allocative inefficiency, credit, insurance, poverty traps*

Nature abhors a vacuum, quickly filling it by distributing the pressure over space. Economies work similarly. Where a vacuum exists in rural financial markets in low-income communities, the pressure that results from households' limited ability to smooth consumption across time through insurance or credit, or to finance investment by borrowing against expected future earnings inevitably spreads throughout the rural economy. People lacking access to (formal or informal) credit or insurance markets rationally exploit other markets and non-market resource allocation mechanisms to resolve, at least partly, their financing problems. They may also or instead pass up seemingly remunerative investments or liquidate productive assets that offer high expected future returns. The consequence of impeded access to financial services is thus seemingly significant inefficiencies in resource allocation, but I emphasize these are only "seemingly" inefficient because they can, in fact, be the rational response of households strapped for finance. These are displaced distortions.

Such distortions are pervasive in low-income rural economies. As this chapter discusses, displaced distortions manifest themselves in factor markets for land, labor and other productive inputs, in product markets, in patterns of natural resources use, and in disinvestment and investment behaviors, including those associated with disadoption and

* Department of Applied Economics and Management, Cornell University, 315 Warren Hall, Ithaca, NY 14853-7801 USA, email: cbb2@cornell.edu. This work has been made possible by support from the United States Agency for International Development (USAID), through grant LAG-A-00-96-90016-00 to the BASIS CRSP, the Strategies and Analyses for Growth and Access (SAGA) cooperative agreement, number HFM-A-00-01-00132-00, and the Assets and Market Access CRSP. The views expressed here and any remaining errors are the authors' and do not represent any official agency.

adoption of improved agricultural production technologies and natural resources management practices. Imperfect or missing markets for financial services lead to substantial and sometime persistent inefficiencies that lower the welfare and impede improvement in the well-being of subpopulations rationed out of formal or informal markets for financial services. Note that "market failure" in this setting does not require the complete absence of transactions in financial services; rather, following de Janvry et al. (1991) and a vast literature on nonseparable household modelling, it implies idiosyncratic, household- or individual-specific rationing or self-selection out of a market in equilibrium. And as with other household-specific market failures, idiosyncratic financial markets failures often lead casual observers to mistakenly conclude that poor households make systematic resource allocation errors (de Janvry et al. 1991, Barrett 1997). Mistaken inferences too often lead to ill-designed policy, which is the reason this topic of displaced distortions bears reflection and discussion.

The gaps in financial networks

Credit offers a means of intertemporal trade while insurance enables simply trade across states of nature. When markets are complete and competitive and such trade is unfettered, there exist unique interest rates and insurance premia in equilibrium and households will, in general, achieve Pareto efficient allocations of resources and risk. When barriers to trade across time or states of nature exist, however, different households or individuals may face different shadow prices of capital and when liquidity constraints bind, this will effect households' current shadow valuation of other factors, goods and services. This naturally leads to errors in assessment of farmer-level efficiency. More importantly, when barriers impede trade across time or states of nature, there are, in general, foregone gains from trade, i.e., potential Pareto improvements may exist.

Casual inspection suggests that formal credit markets are missing or incomplete for many prospective borrowers in low-income economies, so that foregone gains from trade in financial markets is a widespread phenomenon. Financial institutions simply do not exist or the institutions' liquidity is itself constrained by the absence of interbank markets so that they have to ration credit, either by price (e.g., high interest rates) or by quantity (i.e., lending only to a subset of prospective borrowers and/or giving borrowers only a portion of the credit they request). In the case of price rationing, many people will self-select out of the credit market.

More importantly, there will generally be quantity rationing due to adverse selection and moral hazard concerns caused by asymmetric information about borrowers' creditworthiness and their use of funds in the presence of limited liability, as well as the fixed costs of lending (e.g., checking creditworthiness, etc.) , which will commonly ration smaller volume (i.e., poorer) borrowers out of lending markets because their average fixed costs are higher for them than for larger borrowers (Stiglitz and Weiss 1981, Carter 1988, Besley 1995). In the quantity rationing case, there will be unmet excess demand for credit from the formal sector at prevailing credit terms, but the social process of rationing will commonly lead to similar "rationing from the top", wherein local elites are included and more marginalized subpopulations are commonly excluded.

Formal insurance markets are likewise almost wholly absent in low-income economies, especially among the poorest segments of society. The large-scale, commercial risk pooling among anonymous individuals familiar in wealthy countries – e.g., life, home, or vehicle insurance – rarely exists in low-income economies and when it does, it is usually extremely limited in its reach beyond the cohort of indigenous elite and expatriates. Surely this absence is not because risk does not matter to the poor. If anything, risk matters more to the poor than to the wealthy since empirical tests of risk preferences tend to find support for the decreasing absolute risk aversion hypothesis. Nor is it because low-income economies are relatively riskless environments for which there is little need for insurance. Coefficients of variation of income in developing country agriculture typically vary far more than in the high-income, post-industrial economies. Rather, insurance markets fail idiosyncratically for the same reasons that credit fails: asymmetric information, covariate risk, and high costs of search, transactions, monitoring and enforcement relative to the insured capital.

Informal lending and insurance plug part of the gap left by missing formal markets for financial services in low-income rural economies. By reducing problems of asymmetric information, search, transactions and enforcement costs, etc. social relationships can facilitate lending and mutual insurance arrangements that are commercially unprofitable for formal businesses. Hence the important role such institutions play in rural development.

But financing gaps still commonly remain, especially for the poorest peoples, who too often find themselves excluded from social networks that make informal credit or insurance available. Thus the informal provision of credit or insurance merely shrinks the scope of the problem; informal finance comes nowhere near eliminating the problem of idiosyncratically missing financial markets. Problems such as covariate risk, contract enforcement, identifiable poverty trap thresholds and social invisibility[1] sharply limit many people's access to financial products, especially among poorer and more socioculturally marginalized subpopulations. As a result, there is considerable uninsured risk and widespread unmet demand for credit in rural areas of the low-income world.

The routine absence or limited availability of credit and insurance in low-income communities does not change the underlying fact that individuals often need to borrow or to insure against adverse shocks in the face of uncertain incomes. Without access to formal financial markets, people inevitably find other ways to obtain 'quasi-credit' or 'de facto insurance'. Such behaviors are often mistakenly perceived by outsiders as inefficient, irrational or short-sighted. In my experience, they instead more often reflect the cleverness and industriousness of poor smallholders and the crushing lack of options they too often face.

[1] See Santos and Barrett (2006) and Vanderpuye-Orgle and Barrett (2007) on this more recent point about social invisibility, i.e., that within villages not everyone is equally well known or connected to others, therefore access to informal financial services mediated by social networks is likewise highly unequal.

When poor people's demand for credit or insurance is not met through direct financial services, whether provided through formal financial institutions or by family, friends or neighbors, they resourcefully find other means to resolve their latent demand for financial services. These displaced distortions of financial markets can, however, have a high cost to their or their community's future welfare. For individuals without savings, their choices are often limited to distress sale of the limited non-financial assets they possess or seemingly irrational market participation and investment decisions that effectively provide 'quasi-credit,' by allowing consumption today which has a significant opportunity cost in the future, or 'de facto insurance' by cushioning consumption today by drawing down some (often natural) asset stock.

It is important that researchers and policymakers understand this phenomenon of displaced distortions when they observe seemingly irrational behavior in factor (e.g., labor, land) or product (e.g., food) markets, or in patterns of natural resources exploitation, investment or technology adoption. Appropriate policy responses to such patterns may not involve an intervention directly in the distorted market. The first-best response may instead be in resolving the financial market failures at the root of seemingly irrational individual behavior.

Factor market solutions to market imperfections

The development economics literature has long implicitly recognized the efficiency costs and behavioral distortions induced by financial market failures. Stiglitz (1974) famously explained sharecropping contracts as optimal arrangements for balancing the moral hazard of a tenant's labor allocation against the uninsured risk inherent to farming. In that case, uninsured risk causes tenants to surrender part of their residual claim on the fruits of their labor, resulting in Marshallian inefficiency that has spawned a vast literature on the institution of sharecropping and the potential efficiency gains of various sorts of land-to-the-tiller tenurial reforms. Of course, if tenants could freely borrow, such inefficiencies would vanish and debates over land rights and the efficiency effects of sharecropping would naturally disappear. Thus inefficient contracting over land is the consequence of failures in a different, financial market, and the policy debates that emerge around this inefficiency may often be misplaced by the displaced distortion.

Uninsured risk is likewise one of several factors that drives a wedge between the marginal revenue product of labor and the prevailing market wage rate for the same workers' labor, violating the textbook allocative efficiency criterion for utility-maximizing labor allocation under complete markets. For example, Barrett et al. (2007) find that labor allocation by rice farmers in Côte d'Ivoire systematically reflects a wedge between on-farm and off-farm productivity, with the difference strongly related to land/labor endowment ratios and access to finance in a way consistent with theories of rational labor allocation in the presence of uninsured risk, credit constraints, or both. But these labor allocation patterns, while rational, reflect real foregone income on the part of poor households.

Poor farmers who need cash commonly work for wealthier farmers during peak planting and harvesting periods. As a result, they choose to mis-time work on their own plots, missing optimal field preparation, planting, weeding and harvesting periods – often by several weeks – because their need for cash necessitates working for others when paying jobs are available. But mistiming on-farm activities on workers' own plots leads to non-trivial productivity losses. Furthermore, cash constrained farmers often have difficulty hiring laborers during periods of peak labor demand and therefore have to leave land idle or work fields at a suboptimally slow rate due to insufficient labor availability. These productivity losses due to labor mistiming and under-hiring are a disguised interest rate on the de facto borrowing these farmers engage in through labor markets. If these farmers could borrow, they would not need to suffer these losses.

Consider, for example, the difference between two neighbors in one village in Madagascar's southern highlands. One is a single mother of four children. She has only two years' education and six ares (600 m^2) of rice land, having had to sell off half her land to buy food several years ago. In spite of the limited area she cultivates, she leaves another two ares idle because she cannot afford to keep her eldest two children home to work that land; her son treks eight hours to another village to work for cash for several weeks at a time while her daughter finds unskilled work in the nearest town. And she cannot afford to hire workers or even just to buy the food to feed reciprocal *entraide* laborers.

The school teacher in this woman's village also has only six ares of land, and he has seven children, a wife and an elderly parent to support. But he completed eleven years' education and became a teacher, so he has steady cash and in kind income from his non-farm employment (many families pay his wages in rice). He owns one zebu cattle, uses his salary to buy inorganic fertilizer and to hire workers seasonally to help with his small rice fields, reaping yields more than four times that of his more cash constrained neighbor. These yields, plus the rice he receives for teaching, leave his family food secure and enable him to keep his children in school. Indeed, his oldest is in boarding school now in the provincial capital and hopes to study electronic engineering in college. These two farmers' basic land endowments are identical, but the teacher's regular non-farm income – made possible by his superior education, a past investment financed by missionaries – permit him to manage his land optimally and to accumulate surpluses sufficient to give his children an even better prospect than he enjoys. By contrast, none of the woman's children has finished even four years of school. Lacking land, livestock and education, they almost surely face a lifetime of unskilled labor and grinding poverty.

Quasi-finance through commodity markets

Liquidity constrained individuals do not only use factor markets to resolve their financing problems, they use product markets as well. One interesting, common example is the "sell low, buy high" phenomenon in smallholder grain marketing. The market price for storable staple grains typically exhibits a seasonal cycle, reaching a low during and immediately following crop harvest and typically peaking during the growing season, as the preceding season's accumulated stocks run low. This is natural in even complete and

competitive markets, which must account for storage costs and losses. But in many low-income rural areas, seasonal price changes far exceed apparent storage losses or interest rates. For example, in Madagascar we found the mean *quarterly* change in rice prices across the island was 29 percent, at a time when mean *annual* interest rates on lending were only 27 percent (Moser et al. 2005). Plainly, it pays to hold rice stocks in Madagascar.

Yet many Malagasy farmers do not hold rice stocks in anything approaching an optimal quantity. Individuals unable to borrow or to insure themselves against recent losses often seek out 'quasi-credit' by selling at low prices and subsequently buying at far higher prices in commodity markets. People can only optimally time their sales for maximal profitability when they possess sufficient assets to enable them to artbirage the market, i.e., to wait to sell when prices peak during the pre-harvest hungry season and to wait to buy when prices hit their seasonal lows post-harvest. With limited savings or credit access, poor households often cannot afford to wait.

Take for example the case of a smallholder farmer in Iandratsay, a village in one of Madagascar's prime agricultural regions. This gentleman sold paddy at FMG1000/kg to a local collector in the commune who evacuates the paddy by ox cart to an urban wholesaler. Yet he predictably runs out of rice three months before his next harvest. He winds up buying rice back from the same fellow using proceeds from his groundnut and maize crops. Accounting for milling losses, he is paying FMG1850/kg paddy-equivalent. So he effectively buys back in January the rice he sold the preceding June at a premium of 85%. This is the implicit interest rate (including storage losses) he pays on seasonal quasi-credit obtained through the rice market. When the financial markets fail, people find alternative means of engaging in intertemporal arbitrage, even when it proves very costly, in this case, due to storage losses, transport costs and the transactions costs associated with multiple physical exchanges.

Such cases are commonplace and have an effect on broader markets that exposes rural residents to greater price risk than those who live in urban areas with better storage infrastructure and superior access to interseasonal finance (Barrett 1996). Roughly one-third of Malagasy rice producers both buy and sell rice in the same year (Moser et al. 2005). This leads to significant seasonal flow reversals, wherein grain flows in the harvest period from rural areas to cities, where commercial traders store grain interseasonally, shipping food back to the rural food-producing areas in the hungry season, once farmers have depleted their own stocks. In so far as seasonal flow reversals are predictable they reflect significant apparent inefficiency because this round-tripping of staple foods adds transport costs and profit margins for marketing intermediaries. The large scale of seasonal flow reversals in Madagascar reflects major inefficiencies in food marketing due to spatial patterns of interseasonal grain storage – underinvestment in efficient storage capacity in rural areas – and credit availability.

The farmers who routinely sell low and buy high seasonally are most commonly the poorest farmers. Of course, they can never really get ahead when they sell when prices collapse post-harvest and buy when prices peak. This distortion of their rice marketing behavior impedes accumulate of the savings necessary to buy fertilizer or improved seed

or livestock and thereby increase their productivity on the farm, or to invest in an ox cart or a small store that they could use to diversify into higher-return non-farm activities. The lack of seasonal credit, even consumption credit in the hungry season, lies at the heart of this problem (Zeller et al. 1997).

Similarly, consider a milk producer in Ambohiambo, who can sell milk to Tiko, the main national dairy processor, for FMG 2000/liter, but there is a two week payment lag on sales to Tiko. Alternatively, she can sell to a local trader for the lesser price of FMG 1750/liter with immediate cash payment. If this were a more conventional loan for FMG 1750, with repayment of FMG 2000 – the opportunity cost of not selling to Tiko – in two weeks, the implicit interest rate of 14.3% for two weeks implies an annualized compound interest rate of more than 3000%! Despite the high rate, she often opts to sell to the local trader, revealing that her immediate need for cash is sometimes worth the extremely high effective interest rate she pays by selling at a low price for cash.

These distortions of produce marketing behavior are by no means exclusive to Madagascar. Stephens and Barrett (2007) develop a simple theoretical model of market participation over multiple seasons in the presence of liquidity constraints and transactions costs to explain the "sell low, buy high" puzzle. Applying their model to data from western Kenyan maize growers, they find that access to off-farm income and credit indeed seem to influence crop sales and purchase behaviors in a manner consistent with the hypothesized patterns. Financial market failures appear to exert a significant influence of commodity marketing patterns.

Liquidity constraints and technology adoption patterns

Financial market failures manifest themselves as displaced distortions of investment and technology adoption behaviors as well. A sizeable literature on agricultural technology adoption routinely points to liquidity constraints and access to finance as key explanatory factors of nonadoption or late adoption of remunerative new production and processing methods.[2] This result is intuitive when the improved technology requires cash outlays, as is common for improved seed, livestock or mineral fertilizers. Smallholders lacking cash savings and access to credit commonly cannot afford higher yielding hybrid seed varieties, mineral fertilizers, productivity-enhancing equipment, etc.

What is less well understood is that non-adoption of improved technologies due to financing constraints occurs even when no cash outlay is necessary. Many improved agricultural production technologies and natural resources management (NRM) practices require only labor inputs initially. But for the same reason that poor farmers commonly mis-time their own on-farm activities, the poor commonly seek out cash wage labor rather than invest time in yield-improving innovations on their own farms.

This has been observed in the non-adoption of the system of rice intensification (SRI), a method developed in rural Madagascar that increases yields by more than 80 percent, on average, with no new seed and no mineral fertilizers, just a change in agronomic practices

[2] See Feder et al. (1985) and Sunding and Zilberman (2001) for excellent reviews of this literature.

that increases field preparation, planting and weeding labor demands in the initial few years following SRI adoption (Barrett et al. 2004). In spite of the considerable expected yield gains, few poorer Malagasy rice farmers have experimented with the method. They cannot afford it, even though it requires no cash outlay. They must instead seek off-farm wage labor in order to get the cash necessary to buy food for their families during the hungry season. Current credit constraints limit their ability to seize on the promise of greatly increased yields several months down the line, while their inability to insure against the added yield risk associated with SRI likewise discourages uptake of this method in spite of the great yield increases it generally offers (Moser and Barrett 2003, 2006).

Similarly, we observe a strong positive relationship between farmers' wealth and their likelihood of adopting improved NRM practices in land scarce areas of the western Kenyan highlands (Marenya and Barrett 2007a). Practices such as tilling crop residues into the soil, applying manure to cultivated fields, and terracing require labor but not cash. Yet few of the poorer farmers in Vihiga District adopt such practices. The primary reason is, once again, that they cannot afford to invest the time today in increasing the future productivity of their own farm because they need to find off-farm employment, even at meager prevailing wages (less than US$1/day per adult worker) to meet immediate subsistence needs. The absence of credit for investing in on-farm improvements or consumption credit to meet immediate needs induces underinvestment that results predictably in lower future productivity and persistent poverty.

Such findings extend well beyond rural Africa. Rosenzweig and Wolpin (1993) report that the availability of certain nonagricultural income has a substantial positive effect on agricultural output and efficiency, suggesting that residual risk exposure indeed leads to efficiency and output losses due to induced producer response in semi-arid India. In a similar spirit, Rosenzweig and Binswanger (1993) look at the effect of rainfall timing on the composition of productive and nonproductive asset holdings. They find that a one standard deviation increase in weather risk induces Indian households of median wealth to reduce expected farm profits by an estimated 15 percent while households in the bottom quartile reduce expected farm profits by 35 percent. The wealthiest quartile households, on the other hand, have adequate independent risk coping mechanisms, so they adjust input use patterns hardly at all to increased exogenous risk.

Townsend (1995) finds that insufficient insurance in rural Thailand contributes to the nonadoption of improved rice varieties. Failure to adopt improved technologies obviously imposes a welfare cost on nonadopters and on society as a whole, given the general equilibrium effects of reduced output on food prices. Fafchamps and Pender (1997) similarly find that poor Indian households are discouraged from making investments that return 19-22% per year in real terms because of the lumpiness and irreversibilty of the investment in the face of liquidity constraints associated with their poverty. So the consistent finding of most empirical studies of the effect of residual risk attributable to credit and insurance market failures is that it impedes technology adoption and therefore proves costly in terms of foregone output, and diminished productivity and well-being.

Asset degradation and ex post response to shocks under liquidity constraints

Not only do financial market failures cause households to forego investments of known high return, they can often force asset depletion, one of the most common and costly methods of dealing with financial market failure, but a quite common one in the wake of an adverse, uninsured shock. A shock hits – drought, flood, a cyclone, pest infestation, wildlife destroys one's fields, or someone falls ill or is injured or killed – and suddenly the family needs cash. In the absence of (formal or informal) insurance, they then commonly have to sell off productive assets in order to meet these immediate needs. But that comes at a high price in terms of foregone future productivity. Because households well understand the future consequences of asset liquidation to cope with uninsured shocks, we observe that households typically destabilize consumption intentionally in order to try to protect their stock of productive assets (Barrett et al. 2006, Hoddinott 2006). Families commonly reduce the number of meals they consume or cut back on the quantity or quality of meals or other basic expenditures before they resort to sale of assets to smooth consumption. Nonetheless, the financing gap faced by poorer households is often too big to weather through expenditure reduction when current consumption is modest in the best of times. Such households often regretfully make distress sales of key assets, predictably leaving them worse off in the future, simply because they lack access to proper insurance today.

So too do households predictably deplete natural capital – the store of wealth held in forests, soils, water and wildlife – when faced with binding credit constraints that impede their ability to conserve scarce natural capital and thereby invest in their future productivity. This is manifest in deforestation patterns in Madagascar (Barrett 1999), wildlife harvest in Tanzania (Barrett and Arcese 1998), and soil nutrient depletion in Kenya. As a result, we see a strong positive relationship between soil quality and household wealth and income measures in Kenya's western highlands (Marenya and Barrett 2007b). In order to meet immediate needs, farmers sacrifice the quality of the soil on their farms, even past the point where soil rehabilitation is reasonably easy. Of course, this then drives them into a poverty trap wherein they lack incentive to rehabilitate degraded soils or even to apply mineral fertilizers to boost current productivity because the marginal returns to fertilizer application are directly affected by broader soil health (Marenya and Barrett 2007b).

Policy interventions

Poor people face difficult decisions when confronted with financial market failures that leave them searching for alternative, costly means to meet immediate cash needs or that cause them to forego otherwise attractive investment opportunities. We observe that poor people throughout the world commonly choose seemingly inefficient or myopically short-sighted responses that carry a high cost. This high cost is, effectively, the astronomical interest rate or quasi-insurance premium they must pay for credit or insurance not available through more conventional channels. The resulting displaced

distortions of production and exchange behaviors impede asset accumulation and help to perpetuate poverty.

This is a development challenge of the first order. Hence the recent Nobel Prize awarded to Muhammad Yunus for his pioneering work in creating the Grameen Bank and effectively launching the microfinance revolution of the past twenty years. He began this effort after he repeatedly failed to persuade Bangladeshi banks to lend money to poor families living near the campus where he taught. Only once he offered to guarantee the loans himself could they obtain credit. And these borrowers proved highly creditworthy in spite of the banks' ex ante assessments, paying back their loans completely and on time (Yunus 2006).

What can be done to address this problem? Part of the solution lies in activating rural financial markets, to be sure. The standard first reaction is to create micro-finance institutions to try to fill the financial services lacuna that plagues most poor rural communities. But this can be difficult, as reflected in a burgeoning evaluation literature that offers quite mixed evidence on the efficacy of micro-finance interventions (Morduch 1999, Armendáriz de Aghion and Morduch 2005).

Farmers' involvement in certain commercial activities may make it easier to tap into financial networks that already exist. In Embu, in the central highlands of Kenya, for example, tea factories have arranged for payments to be delivered to smallholder growers through a formal bank account. This has resulted in much greater participation by farmers in formal financial networks, with significant increases in credit access due to the establishment of a relationship between farmers and the banks via the tea payment scheme.

Given the tendency to use commodity and labor markets to resolve credit constraints, interventions in these markets can also help the rural poor avoid paying extreme implicit rates of interest on quasi-credit. For example, commodity price fluctuations partly reflect poor rural infrastructure and storage capacity. Assisting farmers with the installation of paddy or grain banks, or with better on-farm storage can limit the need to seek credit in the first place by reducing yield depreciation and cutting the costs of distribution.

Well-functioning safety nets – e.g., through public works schemes operationalized through food-for-work projects paying reasonable wages – can also provide a viable means to mop up surplus labor in the face of adverse shocks to crop and livestock production (Barrett, Holden and Clay 2004). Market demand for unskilled labor collapses when drought or flooding occurs. Governments and nongovernmental organizations can use pre-planned public works schemes to soak up now-idle labor so as to meet the immediate cash needs that drive people into the unskilled wage labor market, else they will be displaced into distress asset sales, soil mining, deforestation, wildlife poaching, etc.

Another option is one-off subsidies of adoption of improved production technologies so as to obviate credit constraints. For example, food for work schemes for on-farm

investment in soil and water conservation structures have been shown to yield increased productivity and complementary private investment in soil and water conservation structures (Holden et al. 2006). Carefully targeted subsidies of this sort can enable poor, liquidity constrained households to get a toehold on the ladder out of poverty by surmounting short-term financing constraints that can otherwise trap them indefinitely in low levels of productivity.

When appropriate, affordable financing is unavailable, people find alternative ways to address current consumption needs. Credit and insurance market imperfections thereby lead to displaced distortions of other markets that negatively impact the productivity and welfare of low-income rural communities. If people don't have access to financial services, they finance necessary expenditures through other markets, notably asset, factor and product markets and by drawing down non-marketed assets, including natural resources in which distant, far wealthier populations take a keen interest. This can have undesirable long-term consequences as it reduces productivity and accumulation, helping to trap people in chronic poverty. It may also have undesirable externalities, both pecuniary externalities such as higher food prices that predictably result from nonadoption of improved agricultural production technologies, and real externalities such as those associated with natural resource depletion associated with deforestation and wildlife poaching. The good news is that ways exist to help people break out of the poverty traps associated with these displaced distortions.

References

Armendáriz de Aghion, B. and J. Morduch, 2005. The economics of microfinance. MIT Press, Cambridge, MA.

Barrett, C.B., 1996. Urban bias in price risk: The geography of food price distributions in low-income economies. Journal of Development Studies 32 (6): 830-849.

Barrett, C.B., 1997. How credible are estimates of peasant allocative, scale or scope efficiency? A commentary. Journal of International Development, 9 (2): 221-229.

Barrett, C.B., 1999. Stochastic food prices and slash-and-burn agriculture. Environment and Development Economics 4(2): 161-176.

Barrett, C.B. and P. Arcese, 1998. Wildlife harvest in integrated conservation and development projects: Linking harvest to household demand, agricultural production and environmental shocks in the Serengeti. Land Economics 74(4): 449-465.

Barrett, C.B., S. Holden, and D.C. Clay, 2004. Can food-for-work programs reduce vulnerability? In: S. Dercon (ed.) Insurance against poverty. Oxford University Press, Oxford, UK.

Barrett, C.B., P.P. Marenya, J.G. McPeak, B. Minten, F.M. Murithi, W.Oluoch-Kosura, F. Place, J.C. Randrianarisoa, J. Rasambainarivo and J. Wangila, 2006. Welfare dynamics in rural Kenya and Madagascar. Journal of Development Studies 42 (2): 248-277.

Barrett , C.B., C.M. Moser, O.V. McHugh and J. Barison, 2004. Better technology, better plots or better farmers? Identifying changes in productivity and risk among Malagasy

rice farmers. American Journal of Agricultural Economics 86 (4): 869-888.
Barrett, C.B., S.M. Sherlund and A.A. Adesina, 2007. Shadow wages, allocative inefficiency, and labor supply in smallholder agriculture. Agricultural Economics, in press.

Carter, M.R., 1988. Equilibrium credit rationing of small farm agriculture. Journal of Development Economics 28(1): 83-103.

de Janvry, A., M. Fafchamps and E. Sadoulet, 1991. Peasant household behavior with missing markets: Some paradoxes explained. Economic Journal 101(409): 1400-1417.
Fafchamps, M. and J. Pender, 1997. Precautionary saving, credit constraints, and irreversible investment: Theory and evidence from semiarid India. Journal of Business & Economic Statistics 15(2): 180-194.

Feder, G., R.E. Just and D. Zilberman, 1985. Adoption of agricultural innovations in developing countries: A survey. Economic Development and Cultural Change 33(2): 255-298.

Hoddinott, J., 2006. Shocks and their consequences across and within households in rural Zimbabwe. Journal of Development Studies 42(2): 301–321.
S. Holden, C.B. Barrett and F. Hagos 2006. Food-for-work for poverty reduction and the promotion of sustainable land use: Can it work?" Environment and Development Economics 11 (1): 15-38.
Marenya, P.P. and C.B. Barrett, 2007a. Household-level determinants of adoption of improved natural resources management practices among smallholder farmers in western Kenya. Food Policy 32 (4): 515-536.
Marenya, P.P. and C.B. Barrett, 2007b. State-conditional fertilizer yield response on western Kenyan farms. Cornell University working paper.
Morduch, J., 1999. The microfinance promise. Journal of Economic Literature 37(4): 1569-1614.
Moser, C.M. and C.B. Barrett, 2003. The disappointing adoption dynamics of a yield-increasing, low external input technology: The case of SRI in Madagascar. Agricultural Systems 76(3): 1085-1100.
Moser, C.M. and C.B. Barrett, 2006. The complex dynamics of smallholder technology adoption: The case of SRI in Madagascar," Agricultural Economics 35(3): 373-388.
Moser, C.M., C.B. Barrett and B. Minten 2005. Missed opportunities and missing markets: Spatio-temporal arbitrage of rice in Madagascar. Cornell University working paper.

Rosenzweig, M.R. and H.P. Binswanger, 1993. Wealth, weather risk and the composition and profitability of agricultural investments. Economic Journal 103(416): 56-78.

Rosenzweig, M.R. and K. I. Wolpin, 1993. Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: Investments in bullocks in India. Journal of Political Economy 101(2): 223-244.

Santos, P. and C.B. Barrett. 2006. Informal insurance in the presence of poverty traps: Evidence from southern Ethiopia. Cornell University working paper.

Stephens, E.C. and C.B. Barrett, 2007. Incomplete credit markets and commodity marketing behavior. Cornell University working paper.

Stiglitz, J.E., 1974. Incentives and risk sharing in sharecropping. Review of Economic Studies 41(2): 219-155.

Stiglitz, J.E. and A. Weiss, 1974. Credit rationing in markets with imperfect information. American Economic Review 71(3): 393-410.

Sunding, D. and D. Zilberman, 2001. The agricultural innovation process: Research and technology adoption in a changing agricultural sector. In: B.L. Gardner and G.C. Rausser (eds.) Handbook of Agricultural Economics, volume 1A. Elsevier, Amsterdam, the Netherlands.

Townsend, R.M., 1995. Financial systems in northern Thai villages. Quarterly Journal of Economics 110(4): 1011-1046.

Vanderpuye-Orgle, J. and C.B. Barrett. 2007. Risk Management and Social Visibility in Ghana. Cornell University working paper.

Yunus, M., 2006. Nobel Lecture. Accessible online at http://nobelprize.org/nobel_prizes/peace/laureates/2006/yunus-lecture-en.html.

Zeller, M., G. Schrieder, J. von Braun, and F. Heidhues, 1997. Rural finance for food security for the poor: Implications for research and policy. IFPRI, Washington D.C., USA.