INSURANCE THEORY AND CHALLENGES FACING
THE DEVELOPMENT OF MICROINSURANCE MARKETS

JAMES C. BRAU
ASSOCIATE PROFESSOR OF FINANCE
MARRIOTT SCHOOL OF MANAGEMENT
BRIGHAM YOUNG UNIVERSITY
PROVO, UT 84602
JBRAU@BYU.EDU
(801) 318 – 7919

CRAIG MERRILL
PROFESSOR OF FINANCE AND INSURANCE
MARRIOTT SCHOOL OF MANAGEMENT
BRIGHAM YOUNG UNIVERSITY
PROVO, UT 84602
CRAIG_MERRILL@BYU.EDU
(801) 422 – 4782

KIM B. STAKING
ASSISTANT PROFESSOR
DEPARTMENT OF FINANCE AND REAL ESTATE
COLORADO STATE UNIVERSITY
FORT COLLINS, CO 80523
KIM.STAKING@COLOSTATE.EDU
(301) 502 – 1369

ABSTRACT

Microinsurance institutions and instruments have developed rapidly over the last decade, with policies covering tens of millions in the base of the economic pyramid for markets in Africa, Asia, and Latin America. Ranging from simple policies providing life or health insurance to complex policies covering catastrophic risks for small landholders, it is a market with proven potential which demands closer attention. Notwithstanding the development, microinsurance markets have received relatively little interest in the academy. This paper examines some of the critical elements of insurance theory that may help us understand the challenges facing microinsurance markets and how these markets can better serve the needs of their customers. These elements include: basic utility theory as it relates to the demand for insurance and the willingness to pay at the base of the economic pyramid; the analysis of how dealing with multiple sources of risk will impact the propensity to consume insurance; the formation of pooling and separating equilibriums when information regarding risks is limited; and a unique twist on the underinvestment problem that arises at the base of the economic pyramid where entrepreneurs will not undertake positive net present value projects when there are significant levels of background risk.
Microinsurance institutions and instruments have developed rapidly over the last decade, with policies covering tens of millions in the base of the economic pyramid for markets in Africa, Asia, and Latin America. Ranging from simple policies providing life or health insurance to complex policies covering catastrophic risks for small landholders, it is a market with proven potential which demands closer attention. Notwithstanding the development, microinsurance markets have received relatively little interest in the academy. This paper examines some of the critical elements of insurance theory that may help us understand the challenges facing microinsurance markets and how these markets can better serve the needs of their customers. These elements include: basic utility theory as it relates to the demand for insurance and the willingness to pay at the base of the economic pyramid; the analysis of how dealing with multiple sources of risk will impact the propensity to consume insurance; the formation of pooling and separating equilibriums when information regarding risks is limited; and a unique twist on the underinvestment problem that arises at the base of the economic pyramid where entrepreneurs will not undertake positive net present value projects when there are significant levels of background risk.

INTRODUCTION

Microinsurance institutions and instruments have developed rapidly over the last decade. Insurers in Africa, South and Southeastern Asia and Latin America have increasingly expanded their operations to cover individuals and businesses operating at the base of the economic pyramid. While the initial policies were developed by microcredit institutions to cover losses to their credit portfolio (Churchill (2002)), usually structured as mandatory credit life policies, microinsurance policies currently being offered provide voluntary coverage for risks ranging from mortality to health (McCord and Rivers (2007), McCord (2007, 2001), McCord and Osinde (2005)), from fire to theft (McCord (2006)), and from livestock insurance to complex policies covering catastrophic risks (Tucker (2007), Mishra (1994)) for small landholders. This is a market with proven potential that demands closer attention by academic researchers (Churchill (2002)). The organization of insurance markets to deal with risks associated with natural disasters, including the impact of microinsurance programs, has also been extensively analyzed (Majul and Ghesquiere, 2007). This paper attempts to contribute to this analysis by examining some of the elements of insurance theory that will help researchers, practitioners, and financial
market regulators understand the challenges facing microinsurance markets. We conclude that while the basic elements of insurance theory have much to offer in the design of microinsurance products, the unique nature of the risks that exist at the base of the economic pyramid require a careful consideration of the multiple risks in order to most effectively target this market segment.

Tucker (2007) reports that, of the world’s population, four billion people live on less than $2 a day. Of these poor, only one to three percent have access to any type of insurance product. The lack of formal insurance choices does not stop these poor from attempting to mitigate risk. Tucker reports that poor urbanites in El Salvador spend an average of 9.2% of their income attempting to reduce disaster risk ($26 of $284 average monthly income) without the advantage of insurance.

Researchers have argued that a sufficient demand for microinsurance exists among the world’s poor (e.g., Churchill, 2002; Cohen and Sebstad, 2005). Early studies have documented that when microcredit or public health insurance is available, the poor are more likely to seek medical treatment (Nanda, 1999; Waters, 1999; and Yip and Berman, 2001). Recently, Msuya, Jutting, and Asfaw (2007) explicitly provide empirical evidence of the efficacy of microinsurance community health funds in Tanzania. The evidence from the field validates further research into microinsurance.

The majority of academic and practitioner articles report on the challenges facing successful programs and attempt to draw lessons from these experiences. In contrast, our article draws on the lessons from underlying insurance theory to inform the analysis of microinsurance. By revisiting insurance theory we hope to provide guidance to practitioners, regulators, and development agencies in the design of successful programs. The analysis highlights some of the
elements of microinsurance markets that differ from that of traditional insurance markets in ways that will inform a more strategic approach to market development.

The remainder of the paper flows as follows. The next section reviews the extant peer-reviewed literature pertaining to microinsurance. We focus on five main threads that thus far comprise the academic microinsurance literature. First, we discuss the supply of microinsurance by focusing on the various delivery methods studied in previous work. Second, we cover the demand for microinsurance. Third, we discuss three articles pertaining to agricultural (crop) insurance. Fourth, we discuss funeral insurance, which serves as a type of life insurance in the developing world. Fifth, we summarize the work which has been done in health microinsurance, perhaps the area most studied thus far.

The section “Demand for and Supply of Insurance at the Base of the Economic Pyramid” reviews the unique aspects of applying the literature on risk management to those at the base of the economic pyramid. Standard utility theory clearly demonstrates that risk-averse investors will choose to purchase insurance at actuarially fair values and that they will be willing to pay a premium load in excess of the actuarially fair premium based on their level of risk aversion and their corresponding wealth level. Risk-averse individuals at the base of the economic pyramid are expected to have a high propensity to insure given the fact that losses can potentially wipe out a large portion of wealth (Cohen, McCord, and Sebstad (2005)). Surveys regarding risk and risk tolerance find that low-income individuals do indeed spend considerable resources in managing risks (Torkestani and Ahadi, 2008; Blanchard-Horan, 2007). Lacking formal insurance markets, the poor spend considerable time and resources in developing informal risk management arrangements, including family, extended family and elaborate ties with local and distant communities (Cohen, McCord, and Sebstad, 2005; Coate 1993). The resulting risk
management arrangements provide little flexibility and often provide imperfect risk transfer. This is particularly true for catastrophic risks where the entire social network can be impacted (Tucker, 2007). The lack of risk management often results in an investment decision process that appears sub optimal. Investors at the base of the economic pyramid are often observed to sacrifice considerable potential returns for limiting risk, forgoing high net present value projects when background risk can place the entire investment, and the individual’s entire livelihood, at risk.²

The section “Microinsurance and the Underinvestment Problem” takes a close look at the underinvestment problem that can be resolved through the purchase of insurance by the microentrepreneur. However, unlike the Smith and Warner (1979) notion further developed in Mayers and Smith (1987) that levered firms will tend to underinvest when losses arise, and the investment will tend to benefit bondholders rather than equity holders, we have a situation where investment opportunities will not be undertaken by the micro entrepreneur when risk levels are high and risk transfer or risk mitigation instruments are not available. Given the scarcity of risk management alternatives, where losses will position the microentrepreneur along the left-hand portion of the utility curve, with very high associated disutility arising from losses, investment in risky undertakings, even when they are high net present value investments, may be viewed as suboptimal from the perspective of the micro entreprenuer. This section is a natural extension of the preceding section. While that section focuses on willingness to purchase insurance, this section explores the reduced willingness to take on positive net present value projects that is associated with microinsurance market participants.

The section “Microinsurance and Risk Classification (Adverse Selection)” address the risk pooling issues associated with asymmetric information in microinsurance markets. The
seminal work of Rothschild and Stiglitz (1976) is applied to the case of microinsurance. This work was expanded by Miazaki (1977), Wilson (1977) and Spense (1978) and clarified in Cummins, Smith, Vance and Vanderhai (1993). In particular attention is focused on the need of insurance companies to seek out pooling under separating equilibriums. The traditional separating equilibrium is accomplished through application of underwriting criteria to pool groups of similar risk. The challenge in microinsurance markets is that the cost of underwriting can create premium loads that dwarf the exposure and render the market unfeasible.

The final section, “Conclusions and Recommendations for Further Analysis” ties together common themes and offers specific recommendations for both future academic study and for practitioner application in the field.

**Literature Review**

In this section we review the extant peer-reviewed literature pertaining to microinsurance. We focus on peer-reviewed articles for similar rationale as Brau and Woller (2004) who argue peer-reviewed studies are of most interest to the academic community. Microinsurance, in an academic sense, is still a nascent field of study with peer-reviewed articles counted in terms of dozens and not hundreds or thousands. We structure this review first discussing supply and demand issues and then covering the principle microinsurance products (crop, funeral, health insurance). We work form the assumption that individuals operating at the base of the economic pyramid make rational choices, including choices regarding risk transfer (Lipton, 1968; Weeks, 1971), and select among available combinations of credit, savings and risk transfer based their availability, cost and reliability (Urdy, 1990; Mccord, 2006; Coate, 1993 and Platteau, 1997).
Supply (Delivery Methods)

The microinsurance movement has grown out of the microfinance movement which has its own, more developed, line of research. Within the microfinance context, there is a debate on whether microfinance institutions (MFIs) should offer microinsurance. Brown (2001) argues that MFIs are most likely not equipped to offer microinsurance. He recommends that instead of developing their own microinsurance products, MFIs should partner with established insurance providers. With these partnerships, clients can receive microinsurance products and the MFIs do not have to take on insurance risk.

Contrary to Brown (2001), Torkestani and Ahadi (2008) study Iranian MFIs and conclude that these MFIs are capable and ready to offer microinsurance. Torkestani and Ahadi discuss microinsurance in the microfinance context. They focus on the similarities of all microinsurance product types identifying five key characteristics of microinsurance products. These characteristics are: microinsurance offers social protection through the pooling of risk and diversification; client contributions fund the system typically in a flat payment and not a risk-adjusted premium; membership is voluntary and generally based on social networks; microinsurance operations are not-for-profits, using any surplus income to build reserves or expand services; and it is often beneficial to have member participation in the running of the program.

Brown (2001) anticipates that not everyone (e.g., Torkestani and Ahadi, 2008) will agree with his assessment that MFIs should not offer microinsurance and offers the following five basic principles for MFIs that wish to offer insurance products. A sufficiently large number of clients must demand the product – no less than 1000-2000. Insurance products can only be offered to protect against specific risks for which the loss probability can be computed. Risks
should not be covariant. That is, risks covered should not have the potential to occur simultaneously, thus bankrupting the insurer. The insurer must have controls on moral hazard, particularly with health and property insurance. The insurer must create a portfolio that controls against adverse selection.

Extending Brown’s (2001) principles for a successful microinsurance scheme, Churchill (2007) outlines strategies for commercial insurers to optimize existing regulations to service the poor. He argues that microinsurance has existed since at least the 1800s when mutual protection schemes co-insured poor workers. Churchill goes on to point out that the lack of economies of scale in the underwriting and administration of small policies is a significant barrier to entry for commercial insurers to pursue microinsurance. Unlike markets that are accustomed to insurance products, another major obstacle for offering microinsurance is educating the potential clientele to remove negative preconceived notions towards insurance.

Churchill next proceeds to offer suggestions on how institutions can effectively launch and administer microinsurance for the poor. He discusses regulatory barriers for creating and then distributing microinsurance products. The article concludes that insurance must be highly regulated to ensure its success but contrasts this with the need to be innovative with microinsurance products in the nascent field.

Continuing the analysis of regulation, Llanto (2007) discusses policy and regulatory issues and challenges for microinsurance in a Philippine context. He lists four primary insurance risks for microinsurance schemes: adverse selection, fraud, moral hazard, and covariant risk, along with steps to mitigate each risk. Llanto then goes on to discuss strengths and weaknesses of four delivery models: partner-agent, mutuality, direct sales, and community-based programs. Next, six conditions for success are discussed: simple insurance instruments, low transactions
cost, affordability, location, financial literacy, and role of government. Llanto concludes by taking lessons from a Filipino mutual benefit association arguing that viable microinsurance schemes can succeed given: level contributions, level benefits, frequent and affordable premium payments, simple product design, uniform benefit packages, and low overhead expenses.

Demand

The study of the supply of microinsurance would be superfluous unless the poor actually demanded it. Jutting (2004) (Senegal) and Msuya, Jutting, and Asfaw (2007) (Tanzania) empirically show that when the poor have microinsurance they seek health care more often and the care costs them less. Observing that poor clients use insurance when it is an option is one way to argue that microinsurance is in demand. Churchill (2002) and Cohen and Sebstad (2005) attempt to think more broadly about the demand for microinsurance.

Churchill (2002) advances three risk-management products: voluntary savings, varied loan products, and microinsurance. His argument for microinsurance is that it can reduce loan losses and the need to draw down savings while simultaneously generating low-risk fees. He goes on to discuss ten specific reasons why the demand for microinsurance is difficult to measure. Churchill concludes by prescribing action research projects in the context of microinsurance, liquid savings, and emergency loans as a possible approach to measure the demand for microinsurance.

Cohen and Sebstad (2005) seek to establish what products the poor demand. Their study focuses on one case in each of Kenya, Tanzania, and Uganda. After demonstrating that self-insurance is the dominant and highly inefficient method of insurance for the poor in their sample, they conclude there is clearly a demand for microinsurance. They give a “demand-led” analysis of types of microinsurance products that would add the most value to the poor and argue it is a
unique view from the typical supply-led approach of many schemes. This analysis includes products for death, sickness (health), and fire coverage resulting in life insurance, health insurance, and property insurance products (offered mostly through MFIs).

Agricultural/Crop Insurance

The preceding general discussions of supply and demand can be refined by focusing on specific types of microinsurance. Platteau (1997) studies agrarian mutual insurance schemes and argues that even though poor farmers may enter into risk-sharing arrangements, they typically do not understand the concept of mutual insurance. He contends that traditional rural communities in the developing countries view the contribution to the community plan as more of a savings account, one in which they will be paid back in the future.

Mishra (1994) tests to determine if a credit-linked crop insurance scheme improves the access to credit by small farmers in India. He focuses on the Comprehensive Crop Insurance Scheme (CCIS) originated in India in 1985 designed to provide financial support if crops fail, restore credit to farmers after a crop failure, and increase the production of certain crops. Mishra discusses the details of CCIS and then asks if the crop insurance can serve as quasi-collateral for loans from primary agricultural cooperative societies. He concludes that the CCIS substitutes as collateral by increasing credit flow, increasing repayment, and increasing loan sizes.

In the final study of crop insurance, Mosely (2001) examines three microinsurance schemes located in India, Uganda, and Ethiopia. Mosely begins by arguing that moral hazard and adverse selection problems have resulted in lack-luster performance of multiple-risk crop insurance. Mosely asks if a new design of microinsurance can succeed where earlier efforts failed to help alleviate poverty more effectively. He further argues that successful microinsurance schemes will need to strive for financial sustainability, target the poor, and
control for information asymmetry problems. Esram (1989) provides an initial analysis of credit insurance in agricultural markets in emerging economies.

Funeral Insurance

In the developed world, it is common for people have life insurance to take care of loved ones and their own funeral arrangements when they die. In the developing world, where life insurance is very rare, one of the greatest financial shocks a family can experience is the funeral expenses of a loved one. Roth (2001) compares formal and informal funeral microinsurance in rural South Africa. Roth’s case study reveals that a typical household spent 15 times its average monthly income on a typical funeral. Roth reports an average (median) cost of a township funeral without formal insurance was $626.67 ($541.67) and with formal insurance was $1,606.67 ($1,666.67). Comparatively speaking, these funeral expenses are enormous (vis-à-vis $69 per month income per capita). Roth goes on to compare funeral insurance provisions of formal insurers and informal insurers and finds that his sample of poor households are more comfortable with (and hence prefer) informal insurance methods.

Health Insurance

From our research, health microinsurance has received the greatest attention in peer-reviewed articles. Perhaps this is because of the enormous health needs the world’s poor have. Countries around the world attempt to cover their populace by providing publicly-funded governmental healthcare plans. Dror and Jacquier (1999) argue that public programs are not enough. They promote group-based community health insurance as a bottom-up solution to inadequate healthcare insurance. In proposing their concept of microinsurance, Dror and Jacquier address moral hazard, free-riding, adverse selection, underinsurance, cost escalation, and risk-pooling.
Wiesmann and Jutting (2001) use voluntary community-based health insurance (CBHI) in rural Sub-Saharan Africa as the context to discuss determinants of viable health microinsurance schemes. They argue that there are three main factors of viability, membership, and access to health care: scheme design and management, viability and behavior of health care providers; and household and community characteristics. Within the scheme design paradigm, Wiesmann and Jutting discuss the choice of the benefit package and premium level, general problems in insurance markets (moral hazard, adverse selection, and covariant risk), accounting/management, and community participation. They next stress that unless the poor have adequate health care provider availability, a microinsurance scheme is not viable (or valuable) to clients. For the final factor, Wiesmann and Jutting point out that the socio-economic position of a specific population has a large impact on the viability of microinsurance.

Extending Wiesmann and Jutting (2001), McCord (2001) examines four models of health microinsurance in Uganda, Tanzania, India, and Cambodia to identify the strengths and weaknesses of each model. Each microinsurance provider was visited for 1-2 weeks between June and August 2000. The four models investigated are the partner-agent model (Uganda), the community-based model (Tanzania), the full-service model (India), and the provider model (Cambodia). In a partner-agent model, insurers partner with existing MFIs to offer insurance in a mutual arrangement between both providers. (This is what Brown (2001) from the supply section above recommends.) The community-based model is based on the policyholders owning and managing the insurance scheme. A full-service model is similar to a formal sector insurance provider in that a single entity is responsible for all dimensions of the product. Finally, in the provider model, the provider of the service (say healthcare or funeral services) is also the insurer.
Although McCord focuses on the health industry, many of his recommendations on topics like sustainability and attrition can be applied to any type of microinsurance.

McCord and Osinde (2005) attempt to understand the supply of health microinsurance by conducting seven case studies in Uganda (3), Kenya (2), and Tanzania (2). The authors conclude by offering advice in the following areas for developing a microinsurance program: management and governance, microinsurance products, operations and accounting, marketing, risk management, and provider-insurer-intermediary relations.

In a follow-up study using the same case studies, McCord (2007) focuses more closely on sustainability and profitability. He studies the type of delivery model (provider, community based, insurer, or partnership) and discusses each related strength and weakness. In discussing managing insurance risks, he covers general and specific strategies for dealing with moral hazard, adverse selection, cost escalation, and fraud/abuse. McCord concludes that each delivery model has strengths and each has weaknesses and he encourages practitioners to continue to push forward in developing and implementing microinsurance plans based on the lessons learned from his study.

Also studying the case of Uganda, Blanchard-Horan (2007) focus on malaria and healthcare microinsurance. At the time of the study, malaria caused more deaths and illness in Uganda than any other health problem. Blanchard-Horan (2007) concludes that health microinsurance improves the quality of health care for those who carry the insurance. Health microinsurance clients went for care earlier, mitigating much of the potential malaria effects and decreasing the incidence of hospitalization.

In this final study of the literature review, McCord and Rivers (2007) also study health microinsurance and malaria in a Ugandan context. They focus on the use of insecticide-treated
bednets (ITNs) by clients of two health plans (Ishaka Hospital Health Plan and Kisiizi Hospital Community-Based Health Plan). After demonstrating the efficacy of ITNs, McCord and Rivers conclude by asserting that health microinsurers can take a larger role in promoting ITNs to help eradicate malaria.

Taken as a whole, the extant literature suggests that microinsurance, when structured properly, adds value to the poor. We now turn our attention to theoretical analyses on how microinsurance can be structured properly.

**Demand for and Supply of Insurance at the Base of the Economic Pyramid**

*Demand for Insurance*

The starting point for our analysis of microinsurance is the traditional insurance theory where a utility maximizer faces one risk with a Bernoulli distribution. This theory makes a solid claim that (a) risk-averse individuals will always purchase insurance when offered at an actually fair premium; and (b) that they will purchase insurance paying up to a risk premium, $\pi$, above the expected loss. This analysis was developed Friedman and Savage (1948), and expanded by Arrow (1965), Pratt (1964) and Ross (1981). We briefly recall known results of this theory as a starting point for analyzing the unique aspects of microinsurance.

For an individual exposed to a single loss this can be modeled as follows. The individual is assumed to be an expected utility maximize where $U(W)$ is a well-behaved twice differentiable measure of the utility associated with wealth, $W$, where $U'(W) > 0$ and $U''(W) < 0$. That is, the marginal utility of wealth increases with wealth but at a decreasing rate. The utility of zero wealth is often assumed to be infinitely negative ($U(0) = -\infty$) as with zero wealth there is zero consumption. If there is a single possible loss, $L$, with probability, $p$, the expected loss and expected wealth will be:
\[ E(L) = pL \]  \hspace{1cm} [1]

\[ E(W) = p(W - L) + (1 - p)W \]  \hspace{1cm} [2]

If full insurance were purchased any loss would be fully recompensed by the insurer. The premium would be the actuarially fair rate, \( E(L) \), plus a risk loading, \( \lambda \), which compensates the insurer for expenses and provides a return on invested capital. Thus, the wealth in both loss and no loss state would be initial wealth less the insurance premium, \( W - pL - \lambda \). The maximum risk premium above the expected loss that the individual will be willing to pay is established such that a certainly equivalent of wealth will give the same utility as the expected wealth would if it were certain. This is given by the solving for \( \pi \) in equation 3. As long as \( \lambda \) is lower than \( \pi \), the individual will choose to purchase insurance.\(^3\) The result is shown in Figure 1.

\[ U(CE) = U(W - pL - \pi) = pU(W - L) + (1 - p)U(W) \]  \hspace{1cm} [3]

\( \pi \) can also be thought of as Wealth less the Certainty equivalent less the expected loss.
There are three elements that will change the individual’s demand for insurance through their impact on the risk premium, $\pi$. The first is the curvature of the utility function which is related directly to the individual’s degree of risk aversion. The higher the degree of risk aversion, the greater the risk premium an individual will be willing to pay in excess of the expected loss. The second is the size of the loss relative to initial wealth and the probability of loss. Individuals will pay a larger risk premium to eliminate large losses as a percent of wealth than for small losses or to cover losses with a higher probability of loss. And the third is the initial level of wealth. This third element is usually presented from the perspective that the wealthy may be less willing to buy insurance as their utility curve is fairly flat at their level of wealth. For example, does a billionaire really need to buy insurance on a car with a value of $50,000? However, when we are dealing with individuals at the base of the economic pyramid, they are likely to be at a point on their utility curve where the slope is very steep. Many are in the position of dropping into abject poverty when a loss occurs. The steepness of the utility
curve leads most analysis to assume a high demand for insurance, as long as insurance markets function to keep transaction costs within a reasonable level, that insurance policies are simple and designed to cover critical risks, and that individuals are educated about their risk profile (so that subjective and objective risk distributions are closely aligned).

The situation is further complicated when losses are stochastic rather than fixed. If rather than having a loss that is fixed at $L$, losses range between $L-\delta$ and $L+\delta$, the expected loss does not change. However, since the losses that are greater than $L$ create more disutility than the utility created by losses lower than $L$ (given the concavity of the utility curve), the expected utility with a stochastic loss will decline. The adjusted expected utility is given in equation 5 and the adjusted certainty equivalent is found by solving for $\pi$ in equation 6.

$$E(\bar{U}) = p[p_\delta U(W - \delta) + (1 - p_\delta)U(W + \delta)] + (1 - p)U(W) \quad [5]$$  
$$U(\bar{CE}) = U(W - pE(L) - \bar{\pi}) = p[p_\delta U(W - \delta) + (1 - p_\delta)U(W + \delta)] + (1 - p)U(W) \quad [6]$$

The result is an increased willingness to pay for insurance when losses are unpredictable, especially when the initial wealth is low and losses are potentially large in comparison to wealth. As shown in Figure 2, insurance is purchased at higher loadings than for fixed losses.

The analysis of the demand for insurance at the base of the economic pyramid becomes significantly more complicated than this single loss analysis conveys. In this section of the paper, we examine three critical issues that need to be taken into account in looking at the demand for microinsurance and the individual’s willingness to pay for insurance protection: (a) dealing with a distribution of losses with multiple sources of risk, including having to incorporate both idiosyncratic and systematic risks; (b) the limited availability and dependability of existing safety nets; and (c) the risk of ruin (Insurer Insolvency) embedded in the insurance contract itself.


Figure 2: Exp. Utility with Risky Loss

Initial Wealth = W; Loss = ε(L-δ,L+δ); Probability = p;
Certainty Equivalent = ĈĒ; Risk Premium = π; Loading = λ

Multiple Sources of Risk

The individual/family operating at the base of the economic pyramid is faced with multiple sources of risk each with its own distribution of losses. For simplicity we divide these into risks that are idiosyncratic, in that they only impact the individual/family, while others are systematic, in that they affect all individuals in the local community, the region, or even the country as a whole. As the ability to manage and insure these differ greatly, the analysis is enriched by evaluating the risks in two separate loss distributions with their associated probabilities. The separation of idiosyncratic from the systematic risks will inform our discussion of the individual’s ability to manage these risks, possibly via social networks, savings, or other homemade forms of insurance as well as government sponsored safety nets vis-à-vis the risk transfer available in formal insurance markets.

We next model how an expected utility maximizer will make decisions about committing scarce resources to risk management and insurance activities; determining the level of the risk
premium for the individuals facing a distribution of idiosyncratic and systematic risks. We set $p$ as the probability of having a loss; while $f(p_{LI})$ is the probability density function associated the contingent probability of an idiosyncratic loss $LI$, given that a loss has occurred; and $f(p_{LS})$ is the contingent probability function that relates to a systematic loss $LS$. The expected loss can be calculated as shown in Equation 2. Losses are limited to the total wealth; hence the integrals are from 0 to $WI$ and $WS$ (wealth subject to idiosyncratic and systematic losses respectively). For simplicity, we assume that the loss functions are independent, $WI + WS = W$.

$$E(L) = \int_0^{WI} f(p_{LI})LI\,dl - \int_0^{WS} f(p_{LS})LS\,dl$$

[7]

Assuming independence, the sum of the idiosyncratic and systematic probabilities ($\int p_{LI}$) and ($\int p_{LS}$) will equal $p$, the probability of having a loss. The maximum risk premium ($\hat{\pi} = \hat{\pi}_I + \hat{\pi}_S$) that the insured would be willing to pay as shown in equation 8 is the amount that would make the certainty equivalent equal to the expected wealth given the distribution of losses and the level of the safety net. At loadings below this level the individual/family will purchase insurance in formal markets or undertake the social networking needed in informal markets to transfer risk within the respective community.

$$U(W - E(L) - \hat{\pi}) = (1 - p)U(W)$$

$$- \int_0^W f(p_{LI})(W - LI)\,dl$$

$$- \int_0^W f(p_{LS})(W - LS)\,ds$$

[8]

The total insurance/risk management costs that the individual will be willing to pay is the sum of the expected loss $E(L)$ and the risk premium ($\hat{\pi}$). In the case of microinsurance, $\hat{\pi}_I$ can
be interpreted as the sum of the microinsurance premium the individual would be willing to pay plus the level of effort that the individual will be willing devote to building social networks for their risk sharing less the level of expected losses, while \( \hat{\pi}_S \) would represent the cost that the individual is willing to pay to participate in the government safety net.\(^5\) By investing \( E(L) + \hat{n} \), absent any uncertainty in the loss payments associated with risk management and insurance markets, the individual would be assured of having a certain wealth \((W - E(L) - \hat{n})\).

Effectively the individual/family would be willing to pay the expected loss plus the risk premium and would expect repayment for any and all losses incurred. As before, the insurance loadings \((\lambda)\) would represent the cost of formal insurance which would be purchased as long as \(\hat{n} > \lambda\).

Microinsurers can take advantage of this structure by positioning their products in three ways. First, looking at the structure of informal or community-based risk transfer systems that exist in emerging markets, it is evident that loss payments can be far from certain. Implicit agreements to share risks can break down when the losses are exceptionally high or when there is correlation among losses. The repayment of systematic losses is particularly problematic as all members of the social network are hit simultaneously. Likewise, breakdowns in the social network arising from migration, social unrest, etc. can limit expected recoveries. Thus, while the individual would be willing to pay \((E(L) + \hat{n})\) for a formal insurance contract, the actual premium that they would be willing to pay would be far lower for government or community-based insurance programs, given the uncertainty of loss payments. This fact should benefit a formal insurer trying to enter into such markets and they can readily differentiate their coverage from that of government or informal community-based social networks. A solvent insurance company with access to reinsurance to cover systematic risks should be able to cover the full losses in all situations.
Second, the demand for formal insurance may be higher when there is greater skewness in the loss distribution or when the systematic component of risk is high compared to the idiosyncratic risk. Focusing on catastrophic risks (those risks that would decimate the economic well being of the individual or family) might be more viable for the microinsurer than focusing on smaller periodic losses. Major medical expenses, life insurance tied to children’s education, fire insurance on the home or principal business, and drought or windstorm insurance might elicit greater demand than insurance to cover preventative health care, theft of inventory, or non-catastrophic weather conditions. The individual/family could make the decision to cover such losses via savings, credit, etc., especially when the transaction costs are high. They may also chose to cover major and/or systematic losses in formal insurance markets while using social networks to cover less serious losses. These smaller losses (short illnesses, partial individualistic crop losses, etc.), could more easily be absorbed via savings, credit and social networks.

Third, there will be a clear relationship between the demand for insurance and wealth. While the individual/family with lower levels of wealth would, *ceteris paribus*, have a higher demand for risk transfer services (e.g., they would be willing to pay a higher risk premium), with a lower level of wealth more of their assets will be movable rather than immovable, difficult to value and track, and thus harder to be considered insurable. Small policies will only be viable when the transaction costs (including marketing and loss administration) are kept low, where the risks are uniform and well-defined and to the extent that policies can be massively distributed. Microinsurers may offer some forms of insurance to the poorest (e.g., burial insurance) while providing other products to the less poor (e.g., hospitalization, higher value life insurance, crop insurance, and fire insurance).
Limited Availability and Riskiness of Safety Nets

The second critical issue has to do with the existence of a safety net, whether provided by the individual’s local community/social networks or by regional/national governments (or in the case of extreme events such as the Asian tsunami, by the international community). Unlike safety nets in developed economies that provide a predictable and generally set level of support, the safety net in emerging markets, particularly those available at the base of the economic pyramid are unpredictable, incomplete, and not necessarily universal (Miskin, 1999; Linnerooth-Bayer, 2007). Access to safety nets may differ based on ethnic or religious backgrounds or based on geographic location (urban vs. rural). Safety nets provided via the individual’s own extended family or community based social networks may create an expectation for some level of support, but the amount and duration of such support is vague and unpredictable (Graham, 1994; Stiglitz, 2003). And in the event of a systematic disaster affecting the entire community, region or country, the safety net may be so stretched that little coverage will be available to any individual.

It is a straightforward extension of traditional insurance theory to adjust for the existence of a safety net. As shown, this will reduce the premium that a risk averse expected utility maximizer will be willing to pay (Konrad and Skaperdas, 1993; Briys et al, 1991), but more complicated to take account of the riskiness of the safety net as I done in this paper. Whenever the wealth following a loss falls below the safety net, the utility corresponding to the higher safety net level will be substituted into the calculation of the certainty equivalent and the resulting risk premium. A comparison of Figure 1 and Figure 3 notes that the individual’s perspective of the expected loss is considerably lower than the “true” actuarially fair loss as (s)he discounts losses that reduce wealth below the safety net level. Expected utility rises correspondingly, reducing the risk premium (π).
As shown in Figure 3, the expected loss (from the perspective of the individual) drops to 
$p(W-SN)$ much lower than $pL$ (the loss from the perspective of an insurer) as $L$ is greater than $W-SN$. The expected utility is increased to $pU(SN) + (1-p)U(W)$, resulting in a higher certainty equivalent. The clear result is that the maximum risk premium that the individual is willing to pay is when a safety net exists ($\pi_{SN}$) is smaller than the risk premium without a safety net ($\pi$), and perhaps significantly smaller. This will reduce the demand for insurance and the willingness to pay an insurance premia that exceed the actuarially fair rate. The closer wealth is to the safety net, the lower the demand for insurance. This provides a direct contradiction to the initial analysis that implied a potentially high level of demand for microinsurance. If the expected loss plus loadings (from the perspective of the insurer) are greater that the expected reduction in wealth plus the associated risk premium, individuals will not purchase insurance. Insurers must understand the existence and the vulnerability of the safety net if they are to design optimal policies for those at the base of the economic pyramid.
Two further extensions to the traditional insurance theory are appropriate when looking at microinsurance in the presence of a safety net. First, the “safety net” may be far from safe. Rather than thinking about a fixed safety net we need to consider a risky safety net. Second, as before we need to consider the impact of two separate and but not necessarily independent yet risky safety nets, one covering idiosyncratic risks that can be covered by the individual’s family and extended community while the other covering systematic risks that might be covered by government programs. Each of these two safety nets needs to be considered as a distribution of possible support levels rather than as a fixed point with considerable residual uncertainty. The systematic safety net may be particularly risky as a support level is based not only on a systematic risk occurring, but on the overall losses created by the systematic event.

*Risk in Safety Nets*

In a developed economy, the safety net is often considered to be relatively fixed, or at least subject to little short term volatility. Public welfare systems, health systems for the poor, unemployment insurance social security programs, etc. are well established and the rules are fairly clear. If anything, changes in the programs are fairly deliberate as they work through the political process. Even during significant economic crises, programs have remained constant or even seen expansions in eligibility or coverage.\(^6\) This is far from the case in emerging economies. Public safety nets are uncertain, subject to abrupt changes as counties enter into fiscal crises. Programs that are aimed at the poor are often the most vulnerable as those at the base of the economic pyramid have a small voice in the allocation of scarce funds (Council of Economic Affairs, 2007). Thus, as expected utility maximizers, they will make decisions based on a subjective, experienced-based risk distribution of these safety nets.
One way to model this risk would be to make the assumption that the safety net will not be present with some probability and combine this with the model of having a loss that would drop the individual below the safety net. We will set $q$ as the probability that the safety net will fail (e.g., $SN=0$) and $1-q$ being the probability that the safety net would remain in place. While this is not as complete of an analysis as imposing a specific risk distribution, the results are expected to be generalizable. With this risk to the safety net it is direct to show that (from the perspective of the insured):

$$E(L) = p(1-q)SN + pqL$$  \[9\]

$$E(W) = (p-pq)SN + pq(W-L) + (1-p)W$$  \[10\]

$$E(U) = (p-pq)U(SN) + pqU(W-L) + (1-p)U(W)$$  \[11\]

As is shown in Figure 4, there is an increase in the expected loss (from the insured’s perspective) and a reduction in the expected wealth since the safety net is no longer certain. The probability of the safety net not being present is represented by the expected utility expected wealth tradeoff beginning at a starting point formed by a linear combination for wealth following a loss in the absence of the safety net and the wealth associated with the safety net. Once again, this results in a reduction in the expected wealth, the associated utility and certainty equivalent, and in an increased willingness by the individual to pay a higher risk premium. An important caveat needs to be added to this analysis. We are assuming that the insurance is riskless, that there is no probability of default by the insurer. If the reduction in the safety net is due to some kind of economic crisis or natural disaster, this may also impact the solvency of the insurer. It is therefore critical that supervisors assure high levels of solvency by insurers. Prudential use of
reinsurance and international diversification of assets to minimize the risk of insolvency or to step forward in the event of higher than expected losses can play a critical role.

Figure 4: Exp. Utility with Risky Safety Net
Initial Wealth = W; Loss = L; Safety Net = SN, Probability = p; Certainty Equivalent = CE; Risk Premium = π; SN > W-L; Loading = λ

Correlation between Public and Private Safety Nets

The safety net facing the poor is often a combination of a community based safety net that deals with idiosyncratic losses and a public safety net that may deal with covariant or catastrophic losses. As noted above, the impact of two separate needs to be considered by the individual who recognizes that the two safety nets are both risky and that the risks are not necessarily independent. One safety net can be considered to cover idiosyncratic risks where support in the event of loss is provided by the individual’s family and extended community while the other covering systematic risks that might be covered by government programs. Each of these two safety nets needs to be considered as a distribution of possible support levels rather than as a fixed point with considerable residual uncertainty. The systematic safety net may be
particularly risky as a support level is based not only on a systematic risk occurring, but on the overall losses created by the systematic event. As corollaries we can look at the impact of correlation for both of these situations. There may be a significant negative correlation between losses and the level of the safety net when both are affected by the economic environment and exposure to natural disasters. In addition, the level of support from the dual public/community safety nets are likely to be correlated for the same reasons so that that an individual who suffers an idiosyncratic loss at the time of the systematic event may only receive the lower systematic safety net protection.

Assuming independence, the sum of the probabilities (\(\int p_{LI} \)) and (\(\int p_{LS} \)) will equal \(p\), the probability of having a loss. We define \(SN_I\) and \(SN_S\) are the safety net payments that are associated with systematic and non-systematic losses respectively. The maximum risk premium that the insured would be willing to pay is the \(\pi\) in equation 12 that would make the certainty equivalent equal to the expected wealth given the distribution of losses and the level of the safety net.

\[
U(W - E(L) - \pi) = (1 - p)U(W) \\
- \int_0^W p_{LI}(MAX (SN_I; (W - LI_I)))dl \\
- \int_0^W p_{LS}(MAX (SN_S; (W - LS_S)))ds
\]

As before, the risk premium (\(\pi\)) is the sum of the microinsurance premium the individual would be willing to pay plus the level of effort that the individual will be willing to devote building social networks for the purpose of risk sharing within the community less the expected
reduction in wealth associated with a loss. However, it can be expected that the individual will be less willing to pay the full premium for those losses that exceed the level of the safety net. Microinsurance providers will need to take this into account when designing and policies. This is far from an easy task as the presence of even a partial loss payment from an insurer may prevent the individual from receiving the loss payments associated with the safety net. The individual/family would effectively be trading the insurance contract for access to the safety net. One corollary to this observation is that the individual whose wealth/income is close to the level that would trigger the safety net will be less likely to demand insurance. When the safety net is high compared to initial wealth, insurance will have less value. A second corollary, related to the discussion in the prior section, is that individual demand would be enhanced when the safety net is uncertain, either due to deteriorating social structures, a high degree of vulnerability to systematic risks within the community, or a decline in the community’s relative wealth resulting from economic crises, deteriorating terms of trade, etc. Any time that the safety net is at risk, either at the higher level for community-based risk sharing or a lower level for regional or national systematic risk sharing, the individual/family will value a certain payment from a formal sector insurer. In these situations the microinsurer can tailor their policies to cover the larger or more systematic risks or to increase payments as a function of some economic variables that signal community strength. For example, a life insurance policy might have a higher payout if unemployment levels in the community are higher, or health insurance payments may contain a foreign exchange option that would allow payments to be made in a stronger currency if AIDS penetration in the community or region reaches a specified level. Many of the initial experiments in microinsurance were initiated by community-based organizations that were already providing some internal risk pooling mechanism, but who were concerned about their
ability to provide loss payments in the event of a systematic shock (Churchill, 2002; Cohen, et al, 2005).

*Risk of Ruin – Insurer Insolvency*

Finally, the individual or family at the base of the economic pyramid faces the risk of insolvency of the insurance system that is being used to cover both idiosyncratic and systematic risks. This is the case whether the individual uses formal micro-insurance markets, a community-based system based on social networks, or government systems, whether local, regional, or national. Whenever an individual pays an insurance premium and then suffers a loss, only to discover that the insurer has gone insolvent, the insured’s level of utility is significantly reduced. This is a particular concern at the microinsurance level where the potential insured is already living close to the margin and the loading costs of insurance as a percent of the loss is high. If a significant portion of wealth is to be committed to risk transfer, the potential insured must be convinced that the loss payments will be received. Government policymakers and the development institutions that are supporting the development of microinsurance must be certain that solvency risk is minimized. Capital adequacy and the technical quality of local insurers must be enforced. Reinsurance can play an important role in this by providing both quota share coverage as well as excess of loss coverage to the local insurers. The expertise of the reinsurers also provides a market-based signal regarding insurer solvency that can be used by regulators to manage capital adequacy.

A final issue that needs to be addressed by microinsurers is the problem that arises when subjective and objective probabilities do not coincide. If the potential insured has a lower estimate of the probability of loss than is demonstrated by the actuarial information that is gathered by the insurer, there may be a reduced demand for insurance. One could imagine that
the subjective probability might be impacted by recent events, especially if some of the higher risk events (drought, earthquake, financial crisis) are infrequent and not part of the insured’s history. This differs from the issue of adverse selection discussed previously, when the insured has better information regarding his or her personal risk and/or access to community based safety nets than does the insurer, but will have a similar impact on demand.

Supply of Insurance

While the individual/family is able to determine the maximum level of risk premium that they will be willing to pay (whether in an insurance policy or via social networking), microinsurers are focused on providing insurance services at a profit. In addition to covering the actuarially fair premium insurers must be able to charge a loading cost that will cover all costs including, marketing and distribution expenses (including premium collection), loss administration costs, general overhead, building technical reserves and profit. All of this while making sure that the loading charge does not make the insurance policy unattractive or outright unfair to the policyholder. This is no easy feat given the size of the policies. Microinsurers need to be able to provide policies that they can sell in high volume and at low loading to be successful. Few of the microinsurance programs directed at the most poor are fully profitable on a standalone basis. Many are linked to other financial services (e.g., credit life linked to microfinance institutions). Most of the climate based insurance programs have required large outside investments for the World Bank and others to set up climate monitoring stations and to develop and market the initial product (Churchill, 2006; Oxley 2008). Some reinsurance has been provided at bargain prices in the attempt to establish markets or to meet corporate social responsibility goals. Well-managed, profit-motivated insurers in as diverse places as India and Haiti report progress and growth, but many have still not reached break-even
The challenge for the insurance industry is to discover the most appropriate niches for microinsurance products, developed the supporting infrastructure and bring costs down following the example of microfinance institutions over the past decade.

**Microinsurance and Risk Classification (Adverse Selection)**

The importance of risk classification is well established in the theory of insurance (See Rothschild and Stiglitz, (1976), Cummins *et al.*, (1983)). In its most basic form risk classification looks at the problem of adverse selection when the insured is unable to classify risks while the insured knows his true risk level. This is illustrated in Figures 5, 6, and 7.

In Figure 5 we observe an insurance market that is made up of two sets of risk averse individuals (classified as high risk and low risk) where both the insurer and the insured know their true classification. Insurance is offers as price quantity-bundle with a higher rate being offered to the high risk individuals and a lower rate being offered to the low risk individuals.
this graph the higher utility is downward to the right as lower premium for a given level of coverage or greater levels of coverage at the same price are preferred. Both high and low risk insurers would choose to fully insure at actuarially fair prices. If however, insurers are unable to properly classify risks (but the insured knows the risk level), the insurer may attempt to offer a pooled price as is shown in Figure 6.

When the average or pooled price is charged, higher risk individuals will attempt to purchase more than 100% insurance while low risk individuals will purchase less than 100%. As a result losses will be above premiums received even while low risk individuals are subsidizing high risk individuals. However unless the insurer can force all individuals to purchase full insurance the pooling equilibrium is not stable and will lead to market failure.

As the insurer increases prices, low risk individuals will purchase less insurance until finally only insurance is offered at the high risk rate. It is possible for a separating equilibrium to
form whereby the high risks purchase insurance at the high risk rate while low risk insurers would purchase a limited quantity of insurance at the low rate. This combination ($S_H$ and $S_L$) is shown in Figure 7 at the point just below the intersection between the low risk rate and the high risk utility curve tangent to the high risk curve.\(^9\)

The impact of adverse selection against microinsurers is a critical problem due to the cost of gathering information regarding risk. Recently, in a conference on microinsurance in Peru, one of the microfinance institutions explained how they were able to charge a very low premium for credit life insurance (Apeseg, 2009). The indication was that over many years of operation they had experienced in their lending portfolio an average of one death per 1,000 borrowers. Two factors impacted this. First, most of the deaths were due to transit accidents as the rural transportation was fairly risky. Second, they indicated that their borrowing customers were 30-50 years old and generally in good health. If they were not able to conduct their business and/or not able to travel to meet the account officer, they would not continue to receive credit. In effect,
the microfinance institution was able to select only low risk, healthy individuals for offering credit life insurance. However, it is not clear that the same would be true if they offered life or burial insurance that was not linked to credit. If they priced insurance based on their prior experience in credit life, they might find themselves subject to adverse selection. Individuals with chronic health problems would be more likely to purchase insurance. The same might be true for other forms of insurance. Firms with higher fire risk (due to their process) or those with neighbors that had higher fire risk might have a higher demand for fire protection than the average low risk policyholder. Farmers with limited access to irrigation might purchase from crop insurance more than those close to running water.

Insurers will have to invest in low cost technologies that allow them to classify risk, similar to the low cost credit screening utilized by microfinance institutions (Munich Re Foundation and ILO, 2006). It may be important to explore contractual structures that will lead to self classification. Thus, they may offer relatively inexpensive insurance contacts with low levels of initial coverage where coverage would increase over time along side with policies that are more expensive but offer higher initial coverage. Collaboration with self-help groups or well-organized community groups that would share in a portion of the risk might provide better information regarding. The importance is not the method that is used, but making sure that the information obtained allows better classification. Fortunately, microinsurance coverage levels are generally low and insurers are able to adjust premiums over time to account for experience. Notwithstanding, if they are not able to classify, low risk insureds will end up subsidizing the high risk individuals and the value of insurance will be limited. Likewise, mandatory insurance, as is often the case with credit life insurance, without appropriate risk classification, will result in low risks subsidizing high risks.
Mayers and Smith (1987), in their analysis of the corporate demand for insurance, hypothesis that the purchase of insurance helped resolve the agency conflict between investors and creditors at the time of a sizable loss. Following the loss, the shareholders (who effectively own a call option on the assets of a firm with a strike price equal to the face value of debt) have effectively been able to expropriate value from creditors as leverage (and therefore volatility) is higher. Raising capital to replace the value of the lost investment would return this expropriated value to the creditors. In extreme cases, where the value of assets fell below the face value of debt (e.g., equity is negative), investors would often not choose to undertake an investment in a positive net present value project since they would only benefit from the value of the investment less the negative capital. In both cases, the creditor recognizing the potential for expropriation of capital will charge a higher interest rate than they would absent the risk. Thus, an underinvestment problem will exist. Insurance markets are positioned to be a platform by which shareholders and creditors can contract prior to a loss to reinvest following a loss eliminating, or at least reducing, the underinvestment problem and reducing borrowing costs.

There is a clear corollary that exists in microinsurance markets, but as is common at the base of the economic pyramid, it comes with a unique twist. As capital is scarce, individual microentrepreneurs facing catastrophic risks, whether idiosyncratic or covariate, may under invest, abstaining from high net present value projects when a loss could impact their overall livelihood. This section will explore how insurance markets may be critical in the entrepreneur taking the decision to grow and expand activities.

Observing the actions of microentrepreneurs, the general focus is not only on the small level of assets/capital but also on their flexibility in adapting to changing economic conditions. Part of this flexibility arises from the fact that there is certain level of diversification in their
asset base and in the activities that they undertake. The microentrepreneur may run a small manufacturing business but they also commercialize other goods along with their own. They may operate a small farm but provide labor seasonally either in the local village or in a remote capital. Family members often work in the business, but may have outside employment. All of these create some level of diversification. Notwithstanding as the entrepreneur grows and converts from a very informal enterprise to a semi-formal small entrepreneur, there is an increased level of concentration. Assets become more concentrated and the level of effort in the central business becomes more concentrated trading the value of diversification for a possibly steadier and higher level of income. The more concentrated enterprise requires higher levels of capital whether coming from the individual’s family savings, from microcredit institutions, from suppliers or from village money lenders.

Capital costs tend to be high for micro and small enterprises. Often they are limited to their own investment capital that has high opportunity costs given family needs. When there is limited access to loans to finance productive assets and working capital needs, these loans are priced at very high real interest rates, often ranging between 40% and 75% at microfinance institutions (Sengupta & Aubuchon, 2008). Rates tend to be higher in rural areas and for those without access to formal financial microfinance institutions that rely on local money lenders (IDB, 2000). A microentrepreneur may have a portfolio of very high net present value projects (even at these high interest rates), but is only able to finance a single project. However, if the project faces even a small catastrophic (to the individual) risk in the absence of insurance protection, the risk of undertaking the project may be too great. If a key asset or land is pledged in support of the loan, the microentrepreneur risks losing his/her entire capital. For example, a small landholder might borrow to invest in an irrigation system that would double production
and normally have a payback in 2-3 years even at high interest rates. However, a year of severe drought results in a default on the loan payments, the entrepreneur may lose both his investment in the irrigation system and the farm. One of the authors visited a market in Peru that specialized in hardware and construction supplies. Following an intentionally set fire that rapidly spread through the market, most of the small entrepreneurs lost everything.\textsuperscript{10} Only a few had fire insurance.

The extreme negative disutility associated with a loss that would cost the entrepreneur his entire capital investment and leave him in abject poverty might overweigh the high positive returns in the no-loss states. The result too often is that the project is passed over; a clear underinvestment by the entrepreneur and a loss in productive capacity for the economy. Lenders will also look at the stochastic risks as a barrier to increasing lending amount. Few microentrepreneurs make the transition to small businesses. Multiplied by hundreds of thousands of microentrepreneurs in a country, the underinvestment at the base of the economic pyramid has a significantly negative impact on the generation of employment, poverty reduction and economic growth.

Adding insurance into the equation – eliminating the stochastic shock – can ameliorate this underinvestment problem, and is one additional tool in the arsenal available to policymakers and development institutions to allow individuals living at the base of the economic pyramid to earn the higher rate of return and to add to overall economic growth and employment within the country.

Perhaps the potential solutions can best be described by example. In Peru, cotton farmers are subject to the impact of the El Niño weather patterns. Analysis by presented at the 2008 Microinsurance Conference in Cartagena, Colombia showed how parametric weather contracts
could stabilize the income risk to farmers by reducing the financial outcomes related to the El Niño events that arose every 10-15 years with variable severity (Gurkinger and Boucher, 2008). In Malawi, according to analysis by the Microinsurance Agency (Oxley, 2008), also presented at the 2008 Microinsurance Conference, farmers were able to purchase a higher quality of seed that would result in a 100% increase in yield, but this seed was less drought resistant than the traditional seed. Given that a drought occurred about every 10 years, the net increase in production would still be significant. The insurance premium could be expected to be about 10% of the insured level of production plus a small loading related to the distribution costs other expenses and profits. Since the insurance was parametric (monitored by local weather stations) and insurance was sold jointly with the improved seed, these loading could be expected to be relatively low. Not only would this insurance result in higher (almost double) incomes to the small landholders, the greatly stabilized cash flows should facilitate access to finance for capital improvements or increase land under cultivation as they would present a smaller risk to financial institutions (a portion of the insurance certificates could even be pledged in support of a loan).

While the potential reduction of the underinvestment problem is only one element of the investment decision of the microentrepreneur, it is a critical one that needs to be taken into account. Both microinsurers and microfinance institutions can work together to (a) develop the kind of insurance policies that will provide insurance protection for critical risks (going beyond the present concentration on credit life insurance) and incorporate the existence of risk management instruments into the credit decision.

Conclusions and Recommendations for Further Analysis

We have done our best to review the existing microinsurance peer-reviewed literature and to provide a rigorous analysis of the challenges facing the development of microinsurance
markets. We have applied main-line insurance theory to the special case of those who live at the base of the economic pyramid. This paper contributes to this analysis by examining some of the elements of insurance theory that will help researchers, practitioners, and financial market regulators understand the challenges facing microinsurance markets. We conclude that while the basic elements of insurance theory have much to offer in the design of microinsurance products, the unique nature of the risks that exist at the base of the economic pyramid require a careful consideration of the multiple risks in order to most effectively target this market segment.

Our four primary recommendations for practitioners (and academics alike) are:

(1) While standard insurance theory provides a strong starting point for the analysis of microinsurance market, since many of the potential losses faced by individuals operating at the base of the economic pyramid are often catastrophic in nature, microinsurers needs to look the institutional environment, including informal and community based solutions already in place and incorporate these into policy design. Indeed, constructive involvement with community based risk management systems with a focus on covering risks that exceed the capacity of the community to support will lead toward optimal policies.

(2) Careful attention needs to be focused on the multiple sources of risk, including the riskiness of both government and community based safety nets will be critical to the design of effective programs.

(3) There is a strong public interest in the development of microinsurance programs to counteract the tendency of microentrepreneurs to underinvest in high net present value activities in the presence of background risk. This is especially the case for those projects that require investment in more concentrated assets which are likely to
be projects that also generate higher incomes, higher employment and higher levels of growth.

(4) Policymakers, regulators, donors and development agencies must collaborate to ensure the solvency and effectiveness of microinsurers to avoid undermining the ability of individuals operating at the base of the pyramid to effectively transfer risks and not create additional sources of uncertainty. Coordination with international reinsurers can be critical to provide market-based signals regarding microinsurer solvency as well as providing capital to support the underlying risk transfer.

We are encouraged, and simultaneously acknowledge that it is the efforts of practitioners in the field who will move the work forward. As Jutting (2004) shows in the case of rural Senegal, microinsurance is effective in terms of use and cost, but it has not reached the poorest of the poor yet. We feel that as more attention is turned to microinsurance by both academics and practitioners, the depth of reach can deepen.
References


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NOTES

1 Using a sample of 1,798 households in Bangladesh, Nanda (1999) shows that women who have access to microcredit are more likely to seek formal health care. Similarly, Waters (1999) shows in a rigorous empirical study that a government-financed health insurance program in Ecuador is positively correlated with curative health care usage (but not preventative care) for workers in the formal sector. For workers in the farming sector, a separate government program has positive, but not significant, curative and preventative correlation. Studying a public school health insurance program in Egypt, Yip and Berman (2001) find that access to the government provided healthcare program significantly increased overall visit rates and equality of visit rates (between poor and non-poor students) over the sample period 1994-1995. All three papers may indicate that if the poor had more access to health microinsurance they would seek more health care as well.

2 These observations are based on interviews with microinsurance institutions and their target clients in Latin America by one of the authors.

3 Competitive insurance markets are expected to keep premium equal to the expected loss plus a competitively efficient loading cost that covers costs plus a fair profit.

4 This being the case, age is likely to also have a bearing on risk aversion. A younger individual can suffer a significant setback but be able to recover as the present value of human capital is large while an older individual may no longer have the stamina to rebuild following a major loss.

5 While some aspects of the government safety net that the base of the economic pyramid are provided as a social service, efforts towards formalization such as obtaining identity cards, municipal registration, paying taxes, political participation, etc. have costs and associated safety net benefits.

6 During the recent economic crisis, both European and US governments (federal and state) have extended eligibility for unemployment insurance and other social services. Source: New York Time, The Economist (various editions).

7 Even the calculation of the actuarially fair premium is difficult as the historical data is limited. Microinsurers tend to begin with rough estimates that are rounded up to account to the potential for underestimating risk and covering adverse selection/moral hazard concerns. It is only overtime, as better data becomes available that microinsurers are able to come up with more consistent estimates of the underlying parameters.

8 Findings based on presentations on microinsurance start-up projects in Asia, Africa and Latin America at recent International Conferences on Microinsurance (especially Brazil 2006 and Colombia 2008). http://www.munichre-foundation.org/StiftungsWebsite/Projects/Microinsurance.

9 While the separating equilibrium is possible it may not be stable over time as high risks may attempt to game the system by purchasing multiple insurance contracts from different insurers.

10 Observations based on personal interviews of insured microentrepreneurs in Lima, Peru by one of the authors. Interestingly, about 20 percent of the microentrepreneurs we spoke with had established multiple locations (2-3) in other specialized markets to deal with insurable risks. Each location was small and the microentrepreneur had to pay additional wages, and bore additional transportation and management costs, while not being able to carry some specialized, high margin items as capital was tied up in high levels of duplicate low margin items in each of the multiple locations. These entrepreneurs, by using costly homemade insurance were able to convert a catastrophic loss to a manageable loss. The additional costs appeared to be far higher than the 1% insurance premium charged to those microentrepreneurs that purchased insurance via a microfinance institution.