ABSTRACT

Title of Dissertation: ESSAYS ON VULNERABILITY, MICROFINANCE AND ENTREPRENEURSHIP

Sarah Pearlman, Doctor of Philosophy, 2007

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This dissertation explores the problems of low productivity in the microenterprise sector and of low formal credit use, principally microfinance, by poor households. I propose vulnerability to risk, defined as the inability to smooth consumption across negative income shocks, as a new explanation for both phenomena. I argue that limited ability to manage risk may lead some poor households to choose low yield, low risk enterprises over higher yield but more risky options. It also may lead them to forgo formal credit if this is used to finance high yield/ high risk projects. Using both theoretical models and empirical evidence from microentrepreneurs in Lima, Peru I find that vulnerability is an important determinant of enterprise choice and microfinance selection. This has important implications for our understanding of the income choices of poor, urban households, how these choices allow these households to exit poverty, and the importance of credit in this process.

ESSAYS ON VULNERABILITY, MICROFINANCE AND ENTREPRENEURSHIP

by

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Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2007

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ACKNOWLEDGEMENTS

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Chapter I

Introduction and Background

Microenteprises, non-crop enterprises with 10 or fewer employees[1], are increasingly

recognized as major generators of income and employment in the developing world[2]. In

Latin America, the region of focus of this dissertation, microenteprises are estimated to

account for 20% of GDP and anywhere from 30%-50% of total urban employment[3]. Recent

evidence also suggests that the size of the sector is driven by voluntary entry[4]. For example,

in a 2004 representative survey of urban, microentrepreneurs in Ecuador (SALTO Ecuador

Project), the majority report incomes to be higher under self-employment than under wage

labor and report no desire to leave the microenterprise sector. The same surveys also reveal,

however, that despite enthusiasm on the part of many microentrepreneurs, a large portion of

microenterprises exhibit low productivity. The authors of the report on the Ecuador survey

remark that:

> "…very few microenterprises demonstrated the kind of improvements or growth
> normally associated with a successful or growing business. Relatively few
> microentrepreneurs felt that sales were increasing… Very few have added employees.
> And even fewer have made measurable improvement to their businesses." (Magill
> and Meyer 2005)

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[1] The most common definition of microenterprises is enterprises with 10 or fewer employees (USAID, IADB, ADB). The definition in the text comes from a 1997 ADB report. Frequently these enterprises are informal and employ only the entrepreneur and unremunerated household members.

[2] The Asian Development Bank (1997) estimates microenterprises account for 60% of all enterprises and 50% of all employment in developing Asia. Liedholm and Mead (1999) estimate microenterprises account for between 17-27% of total employment in 7 African countries. In Peru, a 1996 household survey estimates the micro-enterprise sector employs 75% of the economically active population and accounts for 40% of GDP (Peruvian Ministry of Labor)

[3] IADB 2003, Fajnzylber, Maloney, Rojas 2006, Maloney 2004

[4] SALTO-Ecuador project (www.salto-ecuador.com), Mexican Survey of Microentrepreneurs, multiple years, Maloney 2004

Revelation of the size and stagnation of the microenterprise sector have led many to argue that improving the productivity of microenterprises may be a necessary step towards reducing urban poverty (Fajnzylber, Maloney, Rojas 2006).

Recent surveys also reveal the low use of formal credit by poor, microentrepreneurs; an important, related phenomenon. For example, in the Ecuador survey less than 8% of microentrepreneurs report using formal credit to start their enterprises and less than 3% report using formal credit for on-going operations. Low credit use is troubling to researchers and practitioners because credit constraints are frequently cited as the main barrier to poor household's ability to engage in more productive and lucrative activities. Several theoretical papers have shown that in the presence of entry costs or continual investment requirements credit constraints prevent households from engaging in high yield enterprises (Banerjee and Newman 1993, Lloyd-Ellis & Bernhardt 2000). Credit constraints can have economy wide implications, both for the inefficient allocation of resources, as highly talented entrepreneurs are unable to launch their projects, and for poverty levels, as poor households are barred from activities that would increase incomes and wealth.

In many cases low credit use exists despite policymakers' and development practitioners' efforts to increase access to formal credit. The most important of these efforts are microfinance institutions (MFIs), which began over 30 years ago with the purpose of providing working capital loans to poor entrepreneurs unable to obtain formal credit elsewhere. Since its inception microfinance has become a popular part of poverty reduction programs, and thanks to billions of dollars of donor support the industry has spread around the world, growing substantially in terms of number of clients and breadth of services. Despite impressive expansion, however, there is a little cited phenomenon which is that

many microfinance institutions face low penetration rates. It turns out a significant number of potential microfinance borrowers never seek out these loans. In the case of Peru, the main country of focus of this dissertation, it is estimated that only 5% of all microentrepreneurs have microfinance credit. Similar estimates exist for Brazil, Kenya and Tanzania. Given that the majority of poor entrepreneurs do not have access to other types of formal credit, low penetration rates weaken MFIs' mandate to improve the well-being of poor households by expanding credit access.

The standard explanation of low penetration rates is restricted supply of microfinance credit, stemming from limited loanable funds on the part of the lender or limited entrepreneurial ability on the part of the borrower. Microentrepreneurs may be turned down for loans or never apply because they know they will be rejected. Although supply factors clearly influence non-participation behavior, there are strong indications that restricted demand also plays a vital role. In many cases non-participation actually comes from borrowers who qualify for loans but decide they don't want them. For example, in the Ecuador sample 44% of households with a history of formal credit have not applied for a loan in the past 12 months. They cite fear of overindebtness and no need as the main reasons. Additionally, a recent survey from Bank Rakyat Indonesia, one of the largest microfinance lenders in Asia, finds that about half of all poor households deemed creditworthy (identified as such by the bank) do not seek credit (Johnston and Morduch 2007). Similarly, they cite aversion to debt as the main reason. Muted observed demand challenges assumptions that lack of credit access is the only barrier to high productivity enterprises or the principal obstacle to reducing poverty. The authors of the Ecuador survey comment: "it is important for donors to recognize the limits of finance. Many of the conditions described by the

respondents…suggest that increasing the supply of credit may not benefit most microentrepreneurs." (Meyer and Magill 2005)

The difficulty is that while credit constraints are a reality for many poor households, they are neither the only problem facing these households, nor the only barrier to productive and lucrative projects. Indeed, the major other barrier frequently cited is lack of entrepreneurial skill (Jovanovic 1982, Townsend and Paulson 2004, Karlan and Valdivia 2006). Due to lack of business acumen some households may be relegated to low yield projects that generate insufficient returns to service microfinance loans, in which case only highly skilled entrepreneurs can enter high yield projects and "afford" formal loans. While skill clearly plays a role, the skill based argument it is unsatisfactory as the explanation of enterprise choice and formal credit use because it ignores risk altogether, a fundamental driver of poor households' behavior. Only if the level of risk is constant across projects and tolerance for risk constant across entrepreneurs can skill represent the only barrier to high yield projects and formal credit. It is highly unlikely, however, that high and low yield projects have the same level of risk or that tolerance for risk is constant given different levels of wealth and access to credit and insurance. Risk is so significant a consideration for many poor households, in fact, that even after removing the skill barrier many entrepreneurs likely would continue to avoid high yield projects and microfinance. Perhaps, then, ability to manage risk forms an additional barrier to high yield projects and formal credit use.

This dissertation argues the above point, proposing vulnerability, defined as the inability to smooth consumption across negative income shocks, as a new, explanation for the dual phenomena of low productivity in the urban, microenterprise sector and low formal credit use by poor, urban households. It argues that limited ability to manage risk may lead

some poor households to choose low yield, low risk enterprises over higher yield but more risky options. It also may lead them to forgo formal credit, specifically microfinance, if this is used to finance high yield/ high risk projects. The idea that vulnerability to risk drives income choice has a long history in development economics, and there is a large body of theoretical and empirical literature on this relationship amongst rural households (Lopez, Nash and Stanton 1995, Heltberg and Tarp 2001, Rosenzweig and Binswanger 1993, Eswaran and Kotwal 1990, Fafchamps 2003, Morduch 1990, Walker and Ryan 1990, McKloskey 1991, Wright 1978). The novelty of my work is to extend this rationale to an urban setting and derive the implications for credit use. By examining the interplay of skill, vulnerability and credit we can better understand the income choices of poor, urban households, how these choices may allow these households to successfully exit poverty and the importance of credit in this process.

The link between vulnerability and the decisions of poor microentrepreneurs is examined in three parts. The first part, encompassed by chapter 2, explores the relationship between vulnerability and enterprise choice. It first develops a theoretical model of enterprise choice where risk-averse entrepreneurial households decide how to divide resources across a high yield, high risk enterprise and a low yield, safe enterprise. After controlling for entrepreneurial skill, the model shows that the portion of resources dedicated to the risky enterprise increases as ability to consumption smooth improves. The theoretical prediction is then tested using data on microentrepreneurs in Lima, Peru. After outlining empirical measures of enterprise choice and vulnerability, I find evidence that more vulnerable entrepreneurs have enterprise portfolios with lower expected return and risk than their less vulnerable counterparts. This indicates vulnerability is an important determinant of

enterprise choice. Finally, the chapter begins the investigation of the link between vulnerability and microfinance use. If the channel lies in enterprise choice, we should see a difference in the enterprise composition of entrepreneurs with and without microfinance. Comparisons of groups in the ACP find this to be the case. Households with microfinance invest more heavily in high yield/high risk enterprises than households without microfinance, suggesting vulnerability may be a component of microfinance selection.

The second part, contained in chapter 3, investigates the relationship between vulnerability and the use of microfinance by poor, microentrepreneurs. The chapter first outlines a theoretical model where the risk level of projects and a household's ability to manage risk help determine whether or not a household can "afford" microfinance. The model predicts that even after controlling for entrepreneurial skill and wealth, more vulnerable households will forgo microfinance. The model also predicts that vulnerability's role in microfinance selection declines in skill and wealth. The theoretical predictions are then tested using data from ACP, a large, profit-oriented microfinance institution in Peru. Positive evidence is found that vulnerability is significant in determining microfinance participation. More vulnerable entrepreneurs are 7-35% less likely to select microfinance than their less vulnerable counterparts, implying vulnerability might dictate the benefits of microfinance and other policies designed to expand credit to the poor.

The third part, contained in chapter 4, uses a large, representative cross-section on urban, micro-entrepreneurs in Ecuador to gain some understanding of the characteristics of the general microenterprise sector. This is done to address questions about the relevance of the results using the small, Peruvian sample. Comparisons of household and enterprise characteristics reveal that the Peruvian sample is slightly better off, slightly more

entrepreneurial and uses significantly more credit than the average, urban microentrepreneur in Ecuador. To the extent the Ecuadorian sample is somewhat representative of the universe of microentrepreneurs, these comparisons suggest the behavior exhibited by the Peruvian entrepreneurs is also found in the general population. This implies that links between vulnerability, enterprise choice and credit use found in the Peruvian data are not anomalous and may have important implications for the sector as a whole.

Overall this dissertation contributes to the existing literature in development economics on two fronts. First, it extends the discussion of income choice for poor households to an urban setting, applying the framework outlined in a rural context to microenterprises. This is an important extension because microenterprises are the major income source for the urban poor. Furthermore, poor, urban households face different choice sets and constraints than their rural counterparts and, aside from work examining the causes and consequences of informality and recent work examining returns to capital (McKenzie and Woodruff 2006), there is limited research on their income decisions and how these relate to risk management strategies.

Second, it contributes to the discussion of whether or not access to credit is sufficient to achieve poverty reduction goals. Despite new empirical evidence that credit access helps some households exit poverty (Burgess and Pande 2005, Khandker 2003), various experiments in the provision of credit to the poor, specifically microfinance, have demonstrated that credit expansion is not a magic solution. Many microfinance borrowers do not appear to be one or two loans away from crossing the poverty line. This suggests other factors, principally vulnerability, may prevent households from benefiting from financial sector development and engaging in more productive entrepreneurial activities.

Chapter II

Vulnerability as a Determinant of Enterprise Choice

I. Introduction

Microenteprises, non-crop enterprises with 10 or fewer employees[5], are increasingly

recognized as major generators of income and employment in the developing world[6]. In

Latin America, the region of focus of this dissertation, microenteprises are estimated to

account for 20% of GDP and anywhere from 30%-50% of total urban employment[7].

Furthermore, recent work suggests the size of the sector is due to demand (enterprises offer

higher income than other options) rather than supply (lack of other income options,

principally wage labor) factors[8][9]. For example, in a representative survey in Ecuador the

majority of microentrepreneurs report entering the sector voluntarily and considering

themselves better off than under previous engagements. Despite the enthusiasm for self-

employment, however, another observed phenomenon of the sector is low productivity. The

majority of microenterprises do not hire employees, do not make new investments, and

generally do not grow. This stagnation has led some researchers and practitioners to argue

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[5] The most common definition of microenterprises is enterprises with 10 or fewer employees (USAID, IADB, ADB). The definition in the text comes from a 1997 ADB report. Frequently these enterprises are informal and employ only the entrepreneur and unremunerated household members.

[6] The Asian Development Bank (1997) estimates microenterprises account for 60% of all enterprises and 50% of all employment in developing Asia. Liedholm and Mead (1999) estimate microenterprises account for between 17-27% of total employment in 7 African countries. In Peru, a 1996 household survey estimates the micro-enterprise sector employs 75% of the economically active population and accounts for 40% of GDP (Peruvian Ministry of Labor)

[7] IADB 2003, Fajnzylber, Maloney, Rojas 2006, Maloney 2004

[8] Papers arguing the informal, self-employment is involuntary and inferior and papers arguing the opposite, that these enterprises are voluntary and first-best are described by Maloney (2004). There are also papers "in between", arguing that labor intensive, low entry barrier enterprises can serve to absorb surplus labor while capital intensive, high entry barrier enterprises likely pull workers from other sources. (Daniels (2003))

[9] The SALTO Ecuador Project, 2004, asks entrepreneurs what type of work they had prior to opening their enterprises and reasons for switching. Very few list inability to find renumerated work as the primary reason. In the primary reasons listed are desire for independence (37%) and opportunity to earn more money (36%).

that reducing urban poverty may depend on eliminating impediments to microenterprise productivity (Fajnzylber, Maloney, Rojas 2006).

Despite research on determinants of selection into entrepreneurship[10] and differences in the size and productivity of microenterprises[11], no definitive answer has emerged as to the impediments to microenterprise productivity. The most commonly cited barriers are lack of enterprise credit and lack of entrepreneurial skill (Lloyd-Ellis and Bernhardt 2000, Jovanovic 1982, Townsend and Paulson 2004, Gine and Townsend 2004, Banerjee and Newman 1993, Karlan and Valdivia 2006)[12], but there is mixed evidence that these factors, either together or in isolation, are the only deterrents to increased productivity. In the case of credit, empirical studies find conflicting evidence on the degree to which credit constraints bind and prevent entrepreneurs from high yield activities[13]. In particular, a recent study specifically focused on urban microentrepreneurs (McKenzie and Woodruff 2006) finds no evidence of binding constraints and finds that returns to capital are highest for entrepreneurs with the lowest level of enterprise assets. In the case of entrepreneurial skill, while recent work finds that 1-2 years of business training in conjunction with microfinance credit leads to higher enterprise sales (Karlan and Valdivia 2006), many practitioner surveys of credit-with-training programs find muted results. One survey in particular finds that benefits are highly correlated with wealth (Shaw 2004), a curious result since wealth does not determine access for participants. Most importantly, experiments in the expansion of credit to poor entrepreneurs, principally

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[10] Paulson, Townsend and Karaivanov 2006, Jovanovic 1982, McKenzie and Woodruff 2006
[11] Liedholm and Mead 1999, ADB 1997, Shaw 2004, Cunningham and Maloney 2001
[12] Lack of credit would preclude poor households from high productivity activities if they have high entry costs (Banerjee and Newman 1993), or if lack of credit leads to underinvestment, despite access to profitable, high return projects (Lloyd-Ellis & Bernhardt 2000). Lack of skill can serve as a barrier if it is an input into more productive enterprises, or as an indirect barrier, if it is linked to credit access.
[13] Banerjee and Duflo (2002) and Gine and Townsend (2004) find positive evidence of binding credit constraints for entrepreneurs in India and Thailand, respectively. McKenzie and Woodruff, however, (2006) find no evidence of entry costs amongst microentrepreneurs in Mexico, implying that credit constraints should not serve as a barrier to entry.

microfinance, have yielded limited empirical corroboration of positive impacts on enterprise incomes and assets[14]. While lack of appropriate data for impact assessment is partly to blame, the absence of compelling results suggests factors beyond credit and skill may also play important roles in enterprise choice.

I propose vulnerability, defined as the inability to smooth consumption across negative income shocks, as one such additional factor that drives enterprise choice and inhibits microenterprise productivity[15]. Given that high yield projects likely carry a higher level of risk than low yield projects, and that tolerance for risk likely varies due to different levels of wealth and access to credit and insurance, it is possible that households better able to manage the higher risk associated with higher yield enterprises choose these projects, while those less able to manage higher levels of risk choose lower yielding alternatives. Under this scenario vulnerability, in combination with or in lieu of skill and credit barriers, drives selection into entrepreneurial projects. The idea that vulnerability to risk drives income choice is not novel, for there is a large body of theoretical and empirical literature on the relationship between vulnerability and crop choice amongst rural households (Lopez, Nash and Stanton 1995, Rosenzweig and Binswanger 1993, Fafchamps 2003, Eswaran and Kotwal 1990, Morduch 1990, Walker and Ryan 1990, McKloskey 1991, Wright 1978). The extension of this rationale to an urban setting, however, is unique. Poor, urban households face different choice sets and constraints than their rural counterparts and there is limited

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[14] See Armendariz and Morduch (2005) for discussion of state owned development banks and the provision of subsidized credit, and mixed impact results for microfinance programs. Also see Shaw (2004) and ADB (1997) for brief discussions of the observed positive link between wealth and microfinance outcomes. Less wealthy households are less likely to seek out microfinance loans and are less likely to have positive impacts on income post treatment than their wealthier counterparts, a curious result if credit access is the only barrier in place.
[15] Enterprise credit alone is insufficient to render a household not vulnerable, since many types can only be used for the working capital needs of the business, rather than for consumption purposes. While loan use generally is not tracked and some degree of fungibility exists, the short maturity lengths and frequent repayments of loans granted at the enterprise level these loans are generally mean they are restricted to covering short-term business needs.

work examining their income decisions and how these relate to risk management strategies. As such, this paper forms part of a growing literature not just on microenterprises, but on income choice under uncertainty for poor, urban households[16].

I first explore the theoretical link between vulnerability and enterprise choice. Following models of credit and insurance (Eswaran and Kotwal 1989) and income smoothing (Morduch 1994), I outline a model of income portfolio choice under uncertainty in an urban setting. In the model risk-averse households decide how to divide resources between a high yield/high risk enterprise and a low yield/low risk enterprise. I find that even after controlling for entrepreneurial skill, household that are more vulnerable (have less ability to smooth consumption) dedicate a lower portion of resources to the high yield/high risk enterprise. More vulnerable households therefore exhibit lower average enterprise income and lower variance of income than their less vulnerable counterparts.

I then empirically test the theoretical prediction using panel data on urban microentrepreneurs in Lima, Peru. After outlining measures for the portion of resources dedicated to high yield/high risk enterprises, vulnerability and skill, I find positive evidence of a negative relationship between vulnerability and investment in a risky enterprise. More vulnerable entrepreneurs are found to dedicate fewer resources to high yield/high risk enterprises, supporting the contention that inability to manage risk creates an additional barrier to entry into high return projects.

Finally, I explore the implications of enterprise choice for the use of microfinance, the only type of formal credit available to many microentrepreneurs and one that many

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[16] Field (2003) discusses how previous research on the impact of property rights reform has focused on agricultural households and largely ignored their urban counterparts.

potential borrowers actually eschew[17]. If the choice of projects determines whether or not an entrepreneur has the capacity to service microfinance loans, the determinants of enterprise choice, such as vulnerability, play a role in which entrepreneurs select microfinance and which do not. Using the ACP data I find positive evidence that enterprise choice differs across households with and without microfinance. Households with microfinance are found to invest more in high yield/high risk enterprise than those without, suggesting a link exists between enterprise choice and microfinance status.

The chapter proceeds as follows. Section 2 provides a theoretical framework for income choice under uncertainty, formalizing the inverse relationship between the amount invested in a risky enterprise and vulnerability. Section 3 provides a description of the data, including information on the entrepreneurs in the sample and their enterprises. The section also outlines measures for the key variables in the theoretical prediction: the amount invested in the risky enterprise and vulnerability. Section 4 uses these measures to test the predictions of relationships between vulnerability and the amount invested in the risky enterprise. Section 5 discusses the implications of these findings for selection into microfinance programs and tests if enterprise choice differs across households with and without microfinance. Section 6 concludes.

2. Theoretical Model

This section provides a model of household income portfolio choice under uncertainty in an urban framework. The theory formalizes the intuition that even after controlling for skill, vulnerability governs the decision of how many resources poor entrepreneurs devote to a risky enterprise. In adopting a model in which vulnerability to risk determines income portfolio choice I employ several elements of other models of income choice under

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[17]See next chapter for more details on the low penetration rates faced by many microfinance institutions.

uncertainty, such as Morduch's 1994 model of income smoothing and Eswaran and Kotwal's 1989 model of credit as insurance. The agent of focus is modified to an urban microentrepreneur and the central decision is modified to the choice of an entrepreneurial portfolio. By ignoring all other income sources, such as wage labor, the construction of an optimal entrepreneurial portfolio translates into the construction of an optimal income portfolio, which is different from similar models in an agricultural setting.

Consider a two period model in which risk averse households decide how to allocate resources across different enterprises at the beginning of the first period. Households begin period 1 with an exogenous skill endowment (T) and an exogenous endowment of labor (L). For simplicity I assume labor is the only input of microenterprises, making it the only resource households must allocate. The skill endowment varies and can take one of two values, T_H or T_L, where T_H=high skill and T_L=low skill. The labor endowment is the same for all households. Both endowments stay constant in the second period.

After receiving initial endowments entrepreneurial households choose how to allocate labor across two income sources: a safe enterprise (SE), that has a low return and zero risk, and a risky enterprise (RE), that has a high return and positive risk. The portion of labor devoted to the risky enterprise is denoted by θ, where $\theta \in [0,1]$, with the remaining portion, (1-θ), allocated to the safe enterprise (SE). θ is the variable of interest in the model and to focus on one decision I assume θ cannot change in the second period; first period allocation choices carry over to the second period. The fixed nature of θ makes sense if there are costs to households changing enterprise portfolios, which may occur if there is an initial investment of labor required to learn how to run a particular business.

Income from both types of enterprises is realized at the end of period 1 and is a simple, linear function of the only input, labor. In the case of the safe enterprise, income is certain across states and independent of skill. In the case of the risky enterprise income is uncertain, depends on the state of nature and on entrepreneurial skill. For the state of nature, realizations occur immediately after households choose θ and can take two possible values, a good state (G) or a bad state (B). The probability of a good state equals p and the probability of a bad state equals $(1-p)$. For entrepreneurial skill, greater skill allows households to generate higher profits from the risky enterprise in good and bad states. This is captured by the variables G_T and B_T, where $G_{TH} > G_{TL}$ and $B_{TH} > B_{TL}$. These variables, along with θ and labor, L, determine first period income from each enterprise as follows:

$$SafeEnterpriseIncome_1 = Y^1_{SE} = (1-\theta)LS \quad w/\,probability = 1 \tag{1}$$
$$RiskyEnterpriseIncome_1 = Y^1_{RE} = \theta LG^1_T \quad w/\,probability = p \tag{2}$$
$$RiskyEnterpriseIncome_1 = Y^1_{RE} = \theta LB^1_T \quad w/probability = (1-p)$$
$$\text{where } T = T_H \text{ or } T_L \text{ and } G^1_H > G^1_L > S > B^1_H > B^1_L \tag{3}$$

The inequalities in (3) capture the fact that for equal labor allocation high skill households generate greater income from the risky enterprise in both states than low skill households.

In order for any household in the model to have $\theta > 0$ the probability of a good state must be sufficiently high to ensure that, for equal labor allocation, expected risky enterprise income is greater than safe enterprise income. If this does not hold, there is no risk premium attached to the risky choice and no risk-averse household will devote resources to it. To avoid this I establish that the probability of a good state, p, must lie above the value at which expected risky and safe income are equal. This value is defined as $\bar{p}$ and equals:

$$\bar{p}\theta LG^1_T + (1-\bar{p})\theta LB^1_T = \theta LS \Rightarrow \bar{p} = \frac{S - B^1_T}{G^1_T - B^1_T} \tag{4}$$

The actual value of p must lie above $\bar{p}$, which means $pG_T^1 + (1-p)B_T^1 > S$ (5)

The strict inequality of (5) ensures that expected income from the risky enterprise surpasses

certain income from the safe enterprise, allowing for the possibility of positive θ values.

Total first period income generated from the enterprise portfolio comprised of the safe

and risky enterprise[18] can take one of two values; income in a good state (Y_{1G}) and income in

a bad state (Y_{1B}). Combining (1) and (2) these are:

$$Y_{1G} = (1-\theta)LS + \theta LG_T^1 \qquad \textit{with probability=p} \qquad\qquad (6)$$
$$Y_{1B} = (1-\theta)LS + \theta LB_T^1 \qquad \textit{with probability= (1-p)}$$
where $T=T_H$ or T_L

In the second period the enterprise portfolio remains the same, since θ is fixed from the

first period. Safe enterprise income is certain and assumes the same value as in the first

period. Risky enterprise income, however, changes in the second period. It becomes certain

and equals expected first period income: $Y_{RE}^2 = E(Y_{RE}^1)$. Given (1) and (2) this means:

$$Y_{RE}^2 = p\theta LG_T^1 + (1-p)\theta LB_T^1 \qquad\qquad (7)$$

Thus second period income depends on the portion of resources dedicated to the risky

enterprise in the first period. This creates an added incentive for households to engage in the

risky enterprise in the first period, despite increased risk, as it leads to higher second period

income. The assumption of certain second period income follows other models of income

choice under uncertainty (Morduch 1994, Eswaran & Kotwal 1989) and is necessary to

simplify the analysis and focus on one decision for households. It also allows for a simple

introduction of vulnerability, discussed in more detail below. Intuitively the assumption of

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[18] In the Peruvian data used in this paper most households operate more than one microenterprise, which is why it is instructive to think of income choice in terms of an enterprise portfolio. Beyond this, one can think of enterprises as business models, which can co-exist within the same location. Entrepreneurs may then combine risky and safe products or services within the same enterprise.

certain second period income can be explained by better management of enterprises after the initial period, which may constitute a trial period for operation[19].

Combining the safe and risky enterprises, total certain second period income is:

$$Y_2 = E(Y_1) = p\theta LG_T^1 + (1-p)\theta LB_T^1 + (1-\theta)LS \tag{8}$$

It is now possible to introduce vulnerability, defined as the inability to smooth consumption across negative income shocks. Empirically, vulnerability is determined by liquid wealth, access to insurance and access to consumption credit, but for simplicity I model it purely as a function of access to consumption credit. This assumption appears strong, but it matches evidence from the ACP data, where households list borrowing as the most important mechanism for managing negative shocks[20]. Consumption credit, in turn, largely depends on informal networks of family and friends. For example, of households that list borrowing money to manage a shock, almost 60% say the funds came from family and friends. Due to the large dependence on informal networks I assume consumption credit access is unrelated to skill. This assumption is plausible since a household's number of family and friends may be delinked from entrepreneurial skill. The assumption also is necessary to separate the impact of skill from the impact of vulnerability on income choice.

Access to consumption credit is modeled as an idiosyncratic borrowing constraint households face in the first period. The constraint, denoted by φ (where $\varphi \in [0,1]$), dictates the portion of certain second period income (φY_2) households can borrow in the first period to smooth consumption. Thus φ is the measure of vulnerability in the model. Higher values denote greater ability to smooth consumption and lower vulnerability, while lower values

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[19] Eswaran and Kotwal adopt a similar explanation in reference to technological adoption amongst farmers, claiming that reduced uncertainty over second period returns from the new technology stems from improved knowledge and ability in its utilization.

[20] Households who were hit with a negative shock were asked the main mechanism for managing the shock. 23.5% list borrowing, while 17.5% list savings use.

denote less ability to smooth consumption and greater vulnerability. The constraint φ is revealed to households at the beginning of Period 1, such that households know their vulnerability status prior to choosing θ. Since borrowing and saving in this context is largely informal[21], interest rates over the one year period are assumed to be zero ($r = 0$).

We can now outline the household's problem. After choosing θ the state of nature is realized and income from each enterprise is received. Households then choose consumption to maximize utility in each period, which is an increasing and strictly concave function of instantaneous consumption. The consumption path across the two periods depends on the state of nature, with a good state leading to a higher consumption path than a bad state. To recognize this instantaneous consumption in both periods is expressed as a function of the state realization.

In the first period households choose θ to maximize expected lifetime utility. Households do this after receiving skill and labor endowments and after viewing their idiosyncratic borrowing constraint[22]. The household's problem is:

$$\max\nolimits_{\theta} \ EU = p * [u(c_{1G}) + \beta u(c_{2G})] + (1 - p) * [u(c_{1B}) + \beta u(c_{2B})] \qquad (9)$$
$$\text{s.t.} \ \ c_{2G} \leq Y_2 + [Y_{1G} - c_{1G}]$$
$$c_{1B} \leq Y_{1B} + \varphi Y_2$$
$$c_{2B} \leq Y_2 + [Y_{1B} - c_{1B}]$$

To abstract from concerns about differing degrees of time preference I assume households weigh first and second period consumption equally, and that the coefficient of time preference, β, equals one. Incorporating this and rewriting Y_1 and Y_2 the problem becomes:

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[21] For credit, family and friends are listed as the second most important source of credit, behind suppliers, by households in the sample. Interest rates on these loans are typically zero (Dunn and Arbuckle 2001). For saving, most households report saving in the form of cash stashed in the house or through ROSCAS. Both of these savings vehicles pay no interest.
[22] If a good state is realized the borrowing constraint never binds since first period income is higher than second period income, so that households have no need to bring a portion of second period income forward through borrowing. Thus a constraint for first period consumption in a good state is not included.

$$\max{}_{\theta} \ EU = p*[u(c_{1G}) + \beta u(c_{2G})] + (1-p)*[u(c_{1B}) + \beta u(c_{2B})] \qquad (10)$$

$$\text{s.t. } c_{2G} \leq [(1-\theta)LS + \theta LG_T^1 - c_{1G}] + [p\theta LG_T^1 + (1-p)\theta LB_T^1 + (1-\theta)LS]$$

$$c_{1B} \leq [(1-\theta)LS + \theta LB_T^1 + \varphi[p\theta LG_T^1 + (1-p)\theta LB_T^1 + (1-\theta)LS]]$$

$$c_{2B} \leq [(1-\theta)LS + \theta LB_T^1 - c_{1B}] + [p\theta LG_T^1 + (1-p)\theta LB_T^1 + (1-\theta)LS]$$

The optimal allocation, $\theta*$, solves the following first order condition:

$$\frac{\partial EU}{\partial \theta} = pu'(c_{2G})[G_T^1 - S + Z] + (1-p)u'(c_{2B})[B_T^1 - S + Z] + \pi[B_T^1 - S + \varphi Z] = 0$$

$$\text{Where } Z = pG_T^1 + (1-p)B_T^1 - S > 0 \qquad \text{(from (5))} \qquad (11)$$

π is the shadow price on the first period borrowing constraint and its value varies across households depending on their level of vulnerability. For non vulnerable households the borrowing constraint does not bind, so $\pi = 0$. These households can perfectly smooth consumption in a bad state, such that c_{1B} is at its optimal level. For vulnerable households the borrowing constraint binds, so $\pi > 0$. These households cannot smooth consumption in a bad state, such that c_{1B} is below its optimum.

To assess how vulnerability impacts enterprise choice I compare the optimal allocation for non-vulnerable and vulnerable households. For non-vulnerable households $\theta^*_{\pi=0}$ solves:

$$pu'(c_{2G})[(G_T^1 - S + Z] = (1-p)u'(c_{2B})[S - B_T^1 - Z] \qquad (12)$$

For vulnerable households, $\theta^*_{\pi>0}$ solves:

$$pu'(c_{2G})[G_T^1 - S + Z] = (1-p)u'(c_{2B})[S - B_T^1 - Z] + \pi[S - B_T^1 - \varphi Z] \qquad (13)$$

By comparing (12) and (13) it is clear $\theta^*_{\pi=0} \neq \theta^*_{\pi>0}$; the same allocation cannot solve both first order conditions. Comparing (12) and (13) also indicates that the allocation to the risky enterprise must be less for vulnerable entrepreneurs than for non vulnerable entrepreneurs ($\theta^*_{\pi>0} < \theta^*_{\pi=0}$). Consider $\theta^*_{\pi=0}$, the solution for (12), as a solution for (13). Under this scenario

the left hand side of (13) is too low and we have disequilibrium. The only factors that can change to regain equilibrium are $u'(c_{2G})$ and $u'(c_{2B})$, which are functions of θ. Thus for the left hand side to rise, $u'(c_{2G})$ must rise, since the other variables are fixed. Given concave utility this means c_{2G} must fall, which can only occur if total lifetime income declines. The only w ay for lifetime utility to decline is if θ *declines*. Lower θ also yields higher income in a bad state, leading to higher c_{2B}, and lower $u'(c_{2B})$, further pushing (13) into equilibrium. Thus the value of $\theta = \theta_{\pi>0}$ that solves (13) must be lower than the value of $\theta = \theta_{\pi=0}$ that solves (12); the optimal allocation to the risky enterprise must be lower for vulnerable households than for non-vulnerable households.

Performing comparative statics on $\theta^*_{\pi>0}$ (13) further illustrates how the optimal allocation of resources is impacted by vulnerability. Total differentiation of (13) with respect to θ^* and φ yields equation (14), which illustrates how allocation to the risky enterprise changes with φ, the inverse of vulnerability:

$$\frac{d\theta^*}{d\varphi} = \frac{-\pi Z}{pu''(c_{2G})[(G_T^1 - S + Z)]^2 L + (1-p)u''(c_{2B})[B_T^1 - S + Z]^2 L} \qquad (14)$$

It is possible to sign the right hand side of equation (14). From strict concavity and the fact that L>0 it is easily determined that the denominator is negative. From (5), which says that Z>0, it is determined that the numerator is negative. The result is the key conclusion of the

model: $\quad \dfrac{d\theta^*}{d\varphi} > 0 \qquad (15)$

This is the key prediction of the model; the portion of resources dedicated to the risky project increases as the level of vulnerability of the household decreases. Due to restricted ability to

smooth consumption in a bad state, more vulnerable households are less willing to engage in

the high yield/high risk enterprise and devote more resources to the safe choice.

2.2 Testable Predictions

There is a difficulty with empirically testing the prediction that θ decreases in vulnerability,

which is that θ is unobservable. As the next section outlines, it is impossible to identify

"risky" and "safe" enterprises, eliminating the option of directly discerning the allocation of

resources. It is possible, however, to derive more testable implications by looking at the

consequences of θ for certain observables. The most salient observables are the expected

income and variance of income of the enterprise portfolio (all of the enterprises managed by

the household). The logic of the link stems from basic financial portfolio theory, which

demonstrates that the expected return and variance of returns of a portfolio increases when

the weight in a risky security rises relative to the weight in a safe security[23]. The explicit

relationship between θ and the expected income and variance of income of the enterprise

portfolio, both of which are observable in the data, is described below.

Total lifetime expected income and actual income of the enterprise portfolio are:

$$E(Income_P) = 2[p\theta LG_T^1 + (1-p)\theta LB_T^1 + (1-\theta)LS] \tag{16}$$

$$ActualIncome = \begin{cases} \theta LG_T^1 + p\theta LG_T^1 + (1-p)\theta LB_T^1 + 2(1-\theta)LS \rightarrow ifState = G \\ \theta LB_T^1 + p\theta LG_T^1 + (1-p)\theta LB_T^1 + 2(1-\theta)LS \rightarrow ifState = B \end{cases} \tag{17}$$

The variance is thus:

$$\sigma_P^2 = p[(1-p)\theta LG_T^1 - (1-p)\theta LB_T^1]^2 + (1-p)[p\theta LB_T^1 - p\theta LG_T^1]^2 \tag{18}$$

First derivatives reveal how the expected income and variance change with θ.

$$\frac{dE(Income_P)}{d\theta} = 2L(pG_T^1 + (1-p)B_T^1 - S) > 0 \tag{19}$$

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[23] Bodie, Kane and Marcus 2006

From (5) it is determined that (21)>0.

$$\frac{d\sigma_P^2}{d\theta} = 2p\theta[(1-p)LG_T^1 - (1-p)LB_T^1]^2 + 2(1-p)\theta[pLB_T^1 - pLG_T^1]^2 > 0 \qquad (20)$$

From positive p and θ values it is determined that (20) >0. In line with standard financial portfolio theory the expected income and variance of households' enterprise portfolios increase with θ. Therefore to perceive how θ varies, we can consider expected income and the variance of income. The following equations guide the empirical analysis:

$$\frac{dE(Inc_p)}{d\theta} * \frac{\partial \theta}{\partial \varphi} \Rightarrow \text{Expected income predicted to decrease in vulnerability}$$

$$\frac{d\sigma_p}{d\theta} * \frac{\partial \theta}{\partial \varphi} \Rightarrow \text{Standard deviation predicted to decrease in vulnerability}$$

The theory predicts that more vulnerable entrepreneurs have enterprise portfolios with lower expected income and lower standard deviation than their less vulnerable counterparts. I now turn to the data for an empirical test of this theoretical prediction.

3. Description of the Data

The data set used in this paper comes from an impact evaluation of a Peruvian microfinance institution that was part of USAID's Assessing the Impact of Microfinance Services Project (AIMS)[24]. The Peruvian portion of the project was carried out with Accion Comunitaria del Peru (ACP, which became MiBanco in 1998), a large, profit-oriented microfinance institution with operations in Lima[25], Peru's capital and largest city. Data on clients of ACP and a comparison group, microentrepreneurs in the same neighborhoods and with similar observable enterprise and household characteristics but with no microfinance credit, was

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[24] The goal of the AIMS Project was to gather more quantitative and qualitative information on the impact of microfinance services at the household, enterprise and individual level and to promote the institutionalization of impact studies among practitioners. Elizabeth Dunn, Assistant Professor of Agricultural Economics at the University of Missouri-Columbia, was the primary researcher.

[25] In 2000 Mibanco opened its first office outside of Lima, in Chincha

collected in two periods, August of 1997 and again in July/August of 1999. The 1997 survey

includes 701 households. Due to attrition by 1999 the original respondents are whittled

down to 520 respondents. In all of the subsequent analysis in this chapter I focus on the

balanced panel of 520 households.

Although this paper does not address the impact of microfinance, the ACP data set is

useful because it is one of the few that provides panel information on urban

microentrepreneurs. The data also allow for moderate control for access to credit, one of the

main hypothesized barriers to highly productive enterprises, as 71% of the entrepreneurs in

the sample have microfinance loans at some point in the two year survey period (not

necessarily from ACP) and the remaining 29% meet the qualifications for ACP loans[26]. In

addition to microfinance credit, 54% of the sample report having loans from other formal and

informal sources in 1997[27]. While the existence of outstanding loans does not imply an

absence of credit constraints, the fact that only 12% of the balanced sample utilizes no credit

whatsoever implies that these households have at least some access. A comprehensive list of

credit sources and the number of households reporting using them is outlined in table III.1.

The ACP data are also useful because enterprise choice has important implications for

microfinance selection. If the expected returns on the projects have a direct impact on

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[26] During the survey period ACP offered group and individual loans. For individual loans the borrower must
have title to their home or a guarantor with title to their home. For group loans anywhere between 2-5
individuals can jointly take out the loan, with the requirement that at least one group member have title to their
home. For both loan types ACP requires the enterprises on which the loan is taken to have at least 6 months of
operating history and allows only one loan per household. ACP also requires borrowers to put up household
durables, usually appliances, as collateral. (Dunn and Arbuckle 2001). Whether or not the group without
microfinance would be approved for a loan from ACP is unknowable, since they never apply. Based on
observable information, however, they would be approved.
[27] Unfortunately 60 households did not respond to this portion of the 1997 questionnaire and the questions for
non microfinance credit were not repeated in the 1999 round.   Comparisons of the non-respondents to those
who respond are presented below table 1.

borrowers' ability to repay microfinance loans[28], project choice will determine whether or not borrowers seek out these loans. Entrepreneurs who choose low yield/low risk projects might generate insufficient surpluses to repay microfinance loans and avoid this type of credit. This scenario could explain one of the less publicized puzzles about microfinance, which is that many microfinance institutions (MFIs) face low penetration rates. Despite significant expansion of microfinance services in the past few decades, a significant number of potential borrowers never seek out these loans[29]. Low penetration threatens MFIs' mandate to expand credit access and improve the well-being of poor households. If the seeds lie in enterprise choice, exploring the determinants of these decisions will help explain why so many households don't avail themselves of a service that would potentially make them better off.

3.1 Measuring Allocation to the Risky Enterprise

In 1997 there were a total of 786 enterprises (for 520 households) and in 1999 there were 759 enterprises (for 491 households)[30]. Of these, 612 enterprises can be positively identified as showing up in both periods. The difference is comprised of enterprises that close (estimated to be at least 94), new enterprises (estimated at 162), and misclassified enterprises that actually exist in both periods. Table II.2 presents enterprise level information, including mean values for the number of enterprises, formality status, sales, employees, net assets, and category of business. Graph II.1 shows the breakdown of enterprises across 9 broad categories in both years. The information demonstrates that despite some churn, the characteristics of the sector do not change dramatically from 1997 to 1999.

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[28] ACP charges market determined, unsubsidized interest rates. At the time of the survey they were 50% annually. These rates are on par with other sources of formal finance such as banks, but higher than explicit rates for many informal sources, such as loans from family and friends and ROSCAS. (Dunn and Arbuckle)
[29] CGAP (2000), Berger (2003)
[30] 29 households in the balanced panel do not report enterprise level information in 1999

To discern θ, the allocation of resources to high yield/high risk projects, it would be optimal to know which enterprises are "risky" and which are "safe" and then assess how much of each entrepreneur's portfolio is comprised of each type. Unfortunately dividing urban entrepreneurial activities into risk/return categories is not straightforward and there is limited guidance in either the academic or practitioner literature on appropriate assignment[31]. The first problem is that broad enterprise categories, as defined by four digit codes in the ACP data[32], do not reveal much about risk and return characteristics. For example, it is likely that some enterprise categories, such as car repair or carpentry, require higher levels of entrepreneurial skill than others, such as house cleaning or a corner kiosk. It is unclear, however, if these skill requirements, once established, map into different return and risk profiles. From the current level of understanding it cannot be conclusively stated that carpentry shops have greater return and risk than corner kiosks. Additionally, in the ACP data there are insufficient observations in either category to establish one as more risky than another[33]. A secondary concern is that the division between "safe" and "risky" enterprises likely exists within categories as well. For example, the largest category in the ACP dataset is retail trade in a market location[34]. The four digit code for this category bundles together retailers that sell vegetables, retailers that sell toys, and retailers that sell appliances, among other options, and it is plausible that risk/return profiles vary across each subcategory. Unfortunately more detailed information on products is not provided, further complicating

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[31] ADB (1997) and Shaw (2004) do define some enterprise categories as "survival" or "safe" and others as "entrepreneurial" or "risky", but their samples are either rural or semi-rural and the assignments do not translate well to the ACP data.

[32] In 1997 there were 786 enterprises in 58 different four digit categories.

[33] To attempt to categorize enterprises I analyzed the mean income and standard deviation of income across businesses based on four digit codes. However, the observations in some categories are so small (in many cases there is only one enterprise under a particular code) that it is impossible to discern which categories are more or less risky from the data.

[34] 197 out of 786 enterprises in 1997, or 25%, are in the category of retail in a market location

assignment. In sum, given the limited sample size, limited level of detail, and limited

understanding of microenterprise types, it is impossible to divide microenterprises into "safe"

or "risky" categories and thus directly view the allocation of resources to the risky enterprise.

It therefore is necessary to obtain indirect, observable measures of θ. The theoretical

model established the expected income and variance of income of the enterprise portfolio as

appropriate proxy variables. These too are unobservable due to the lack of numerous panel

periods needed to estimate a probability distribution for different states of the world and

associated outcomes. The ACP data only provides two realizations of income, one in 1997

and in 1999. Thus the best approximation of expected income is the average value across the

two periods[35], where each year's outcome is assigned equal probability.

$$ExpectedIncome = \frac{EnterpriseIncome_{1997} + EnterpriseIncome_{1999}}{2}$$

The best approximation of the variance of the enterprise portfolio is the standard

deviation of microenterprise income around the mean. For the purpose of this analysis the

standard deviation is preferable to measures of dispersion that control for scale, such as the

coefficient of variation[36]. One concern over using the standard deviation is that distributions

with greater means may exhibit greater standard deviations simply because the range over

which the distribution lies is higher. Thus some portion of standard deviation values may

reflect differences in the range rather than differences in dispersion. The problem with

correcting for this by using the coefficient of variation, however, is that the ratio of the

standard deviation to the mean may not capture the proposed positive correlation between the

two variables. According to the theory higher means are associated with higher standard

deviations, but the coefficient of variation does not necessarily reflect this. For example, a

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[35] 1997 income is inflated to 1999 prices
[36] The coefficient of variation= standard deviation/mean.

distribution with a high mean and high standard deviation (risky enterprise returns) and a distribution with a low mean and low standard deviation (safe enterprise returns) can have the same coefficient of variation. Furthermore, for poor households making income choices, the absolute fluctuation in income matters more than the relative fluctuation. This makes the standard deviation a superior measure. Mean and median values for both θ measures are presented in table II.4.

For robustness I also consider monthly sales from the primary enterprise as an additional measure of θ. The primary enterprise is the one listed as the most important by each household, and in most cases it is the longest running and most stable enterprise in the income portfolio. For ACP borrowers it is the enterprise on which the loan is taken. One nice feature of primary enterprises is that they are possible to track across the two periods, which is not always true of other enterprises listed by households[37]. 421 primary enterprises survive through both periods. I use average monthly sales across 1997 and 1999 and the standard deviation of monthly sales for these 421 primary enterprises as additional measures of θ. Overall primary enterprise monthly sales provide weaker measures of θ than microenterprise income. This is because households are predicted to make decisions about risk/return tradeoffs at the level of the enterprise portfolio rather than at the level individual enterprises. Thus primary enterprises do not provide as complete of a picture of enterprise choice. Nevertheless, considering primary enterprise sales as a secondary θ measure enhances the analysis. Average values are presented in table II.4.

3.2 Measuring Vulnerability

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[37] While households were asked about up to three microenterprises in the enterprise questionnaire, and due to reporting error, the only ones that can be effectively linked in 1997 and 1999 are the primary enterprises.

To measure vulnerability it is necessary to find a proxy for φ, the degree of credit constraints a household faces in the theoretical model. Portions of the consumption literature (Deaton 1997, Paxson 1992, 1993, Zeldes 1989) note the elusive nature of such a measure given that credit constraints are unobservable. A standard second best approach is to derive "ex-post" measures by comparing changes in consumption to unexpected changes in income and deeming vulnerable households that register a response. In a two period panel, however, this strategy is fraught with problems and largely unusable[38]. I therefore rely on "ex-ante" vulnerability measures; variables that gauge a household's ability to access funds, mostly consumption credit, in times of needs[39].

I start with measures of wealth, both financial and non-financial, as these indicate an ability to internally manage negative shocks as well as a degree of credit access if wealthier households are deemed better borrowers. The ACP data provide information on four types of wealth. For liquid wealth we know if a household has savings and the net value of household durables and vehicles[40]. For property wealth we know if a household has title to their home and if they have any other property beyond the primary residence[41]. Combined, these

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[38] The first concern is the inability to identify temporary from permanent changes in income in a short panel. Failure to disentangle the two can lead to false identification of vulnerable households. The second concern is the limited number of states of the world observed in a short panel. Kamanou and Morduch (2002) point out that households facing the same distribution of shocks will have different draws over a short time frame. Only a limited portion of the sample will receive bad draws and thus be tested on their ability to smooth consumption across adverse shocks. The remaining households could be equally or more vulnerable as those hit with negative shocks but simply won't appear so in this snapshot. These households will thus be falsely labeled as not vulnerable, biasing any further analysis.

[39] Analyzing which household fell into poverty over the period, faces the same problems. This is broadly referred to as vulnerability to becoming poor, and movements across the poverty line in both directions have been examined by Jalan and Ravallion (2000), Dercon and Krishnan (2000), and Kamanou and Morduch (2002). In this sample, over the two year period 17.4% of households became poor while 8.9% escaped poverty. Poverty lines based on a $2/day measure.

[40] The majority of households held savings as cash at home (over 50%) or with ROSCAS. Relatively few households held savings in the form of demand deposits with banks or cooperatives (less than 12%).

[41] Households were asked if they had homes or residential locations in addition to the principal residence. Due to lack of formal savings options many households save in the form of real estate, even in invasion communities with informal property rights. In 1997, 70 households, or 14% of the sample, reported having additional properties. These were used as rental properties, for a business, or to receive family members or guests. Of

measures likely capture some ability of households to smooth consumption via internal or

external funds. Considering credit access specifically, while the extent of this is

unobservable, it is plausible that households with savings, higher liquid wealth and home title

are deemed better borrowers and therefore have more options. Of the four wealth measures,

net durable goods and vehicles might best capture credit access for households in the ACP

sample. Perhaps due to difficulties in repossessing other assets, durable goods are typically

the collateral offered by households for many informal and formal loans. Microfinance

institutions are no exception, and ACP requires durable goods to be placed as collateral for

loans[42].

Finally, it is crucial to consider the extent of informal networks, which are the main

source of consumption credit for households in the sample. Family and friends are cited as

the second most used source of credit and, of households that report borrowing funds to

manage negative shocks, over 60% say these funds came from family or friends. Overall

households list loans from family and friends as the second most important mechanism for

managing negative shocks. Liquid assets and property may fail to capture this key

component of vulnerability if an entrepreneur's network of friends and family is unrelated to

wealth, which is quite plausible[43]. This means a more direct measure is required. To capture

informal networks it would be ideal to have information on the quantity (number of family

and friends living nearby) and quality (ability of these contacts to help in times of need) of

social contacts, but this information is not available in the ACP data. In its absence I rely

these 70 HHs, 23.5% are below the poverty line, indicating that additional property is not limited to the better
off portion of the sample.

[42] As part of the loan application applicants submit a list of appliances to be used as collateral. Mibanco credit
agents verify the status and value of these appliances before approval. (Dunn and Arbuckle 2001)

[43] Correlation between measures of informal networks and wealth is low. The correlation between marital
status and net HH assets is 0.09 (1997) and 0.15 (1999), while the correlation with total income is -0.01 (1997)
and 0.10 (1999). The correlation between TimeInLima and net HH assets is 0.20 (1997) and 0.12 (1999), while
the correlation with annual income is 0.12 (1997) and 0.02 (1999).

upon two variables related to the extent of informal networks; marital status, as measured by a dummy variable that equals one if an entrepreneur has a spouse or partner, and tenure in Lima, as measured in years. In the case of marital status a spouse or partner may provide access to a wider network of family and friends[44]. In the case of tenure in Lima a longer tenure means the household has had greater opportunity to develop informal networks.

There are some concerns that the informal network measures proxy for household characteristics besides vulnerability that impact enterprise choice. For marital status the concern is that the variable simply captures the effect of having another working adult in the household. To control for this I include the total number of household members that currently work. The concerns for tenure in Lima are that it captures entrepreneurial experience and/or increased knowledge of better projects rather than reduced vulnerability. To control for the first concern I use age and entrepreneurial experience, as measured by the longest tenure in operation any of the household's microenterprises. To control for better knowledge of good projects I use measures of entrepreneurial skill, outlined below.

Finally, it is important to note that including wealth in the estimation may control for differences in risk preferences, which play a role in the determination of project choice. *Ceteris paribus,* more risk averse households achieve lower expected utility under the risky enterprise than their less risk averse counterparts. Knowing risk preferences is impossible, but to the extent that risk aversion is a function of wealth, the inclusion of wealth may partially control for disparate levels of risk aversion and help distinguish between risk preferences and vulnerability as drivers of behavior.

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[44] A spouse or partner may also provide income that can be used in times of need. For example, Van Tassel (2004) presents a model of microfinance and household bargaining in which a male spouse decides whether or not to use his income to repay a portion of his wife's microfinance loan if a negative shock is realized.

In sum, in the empirical estimation marital status and Time in Lima, the net value of durable goods and vehicles, savings status, home ownership, and additional property are used to measure vulnerability. Positive values for the binary variables and higher values for the continuous variables indicate lower vulnerability. Table II.2 presents average values.

3.3 Measuring Skill

The most viable alternative theory to the one offered by this paper is that entrepreneurial skill drives selection into high yield/ high risk projects. According to this hypothesis, after holding credit access constant, entrepreneurs engage less in the high yield/ high risk project because they are less skilled. It is difficult to prove or disprove this claim given that entrepreneurial skill is unobservable to the researcher and perhaps even to the entrepreneur (Jovanovic 1982)[45]. Nonetheless, without controlling for skill and attempting to extract this component of the error term, it is difficult to claim the vulnerability variables are uncorrelated with the error term and that their coefficients are unbiased. Given the likely correlation between skill and enterprise choice and skill and several vulnerability measures, controlling for skill is essential to derive clean statements about vulnerability as a factor in entrepreneurial choice.

The most standard observable proxy measures for skill are education and experience (Paulson, Townsend and Karaivanov 2006, Gine and Townsend 2004). For education I use dummy variables for three categories of educational attainment by the entrepreneur in 1997; primary school or less[46], between primary and secondary school, and anything higher than secondary school. For experience I use the maximum amount of time, in years, any

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[45] Jovanovic (1982) presents a model in which individual entrepreneurs do not know their actual skill endowment and receive noisy signals of their skill endowment based on the cost of operating the enterprise.
[46] This is the left out group

enterprise owned by the household has been in operation as of 1997. Average education and experience values are presented in table II.2.

4. Determinants of Project Choice

I now use the ACP data to test the theoretical prediction of a negative relationship between the amount of resources dedicated to the risky enterprise (θ) and vulnerability (φ).

4.1 Microenterprise Income

Average microenterprise income and the standard deviation of microenterprise income are the main measures of θ, and both are estimated as linear functions of household characteristics, enterprise characteristics, skill and vulnerability, which are outlined below. Average values are presented in table II.2.

1) Household controls (*HC*) include: a dummy variable if informant is a woman, the age of the key informant, as measured in bins[47], the dependency ratio, the total number of working adults in the household, and whether or not the entrepreneur was hit with a shock in the past two years[48].

2) Enterprise controls (*EC*) include: the number of enterprises operated by the household, a dummy if any enterprise is informal, and the type of enterprises based on nine different categories, measured by dummy variables if a household has an enterprise in a certain category.

3) Vulnerability measures include; a dummy variable if the household has title to their home, a dummy if the household has property in addition to the main residence, a dummy

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[47] Entrepreneurs were divided into four age categories: less than 25, between 25 and 40, between 40 and 60, and older than 60. The 25-40 group is the left out category, as the goal is to see if younger and older cohorts behave differently than entrepreneurs in the "middle age" category.

[48] A shock is defined as "any unexpected or unforeseen event that that occurred in the previous 2 years and that had significant negative economic or financial repercussions for the household." (Dunn and Arbuckle) Shocks include robbery, death or severe illness, job loss, and reduction or loss of income.

if the household has savings, a dummy if the household is occupied by a married or cohabitating couple, and tenure in Lima.

4) Skill measures include: a dummy variable if the entrepreneur has secondary education, a dummy variable if the entrepreneur has beyond a secondary education[49], and the maximum number of years any enterprise of the household has been in operation.

The first θ measure, average enterprise income, is estimated as a linear function of the variables outlined above:

$$AverageEnterpriseIncome_i = a + \beta_1 EC_{ti} + \beta_2 HC_{ti} + \beta_3 Vu\ln erability_{ti} + \beta_4 Skill_{ti} + \varepsilon_i \qquad (1)$$

where t=1997 or 1999.

Results of OLS estimation of (1) are presented in the first two columns of table II.5. Column (1) contains results using 1997 values of the explanatory variables, while column (2) contains results using 1999 values of the explanatory variables, with the exception of age, education and experience, which do not change meaningfully over the two year period. Of the two sets of explanatory variables the 1997 values are preferable because they may better control for endogeneity stemming from reverse causality (enterprise income may impact vulnerability and skill measures). While the 1997 values do not eliminate all endogeneity problems, they are preferable to the 1999 values. In the estimations 1999 values are presented for comparison purposes only.

Estimation of (1) using the 1997 values finds, in line with the theoretical prediction, a negative relationship between the vulnerability variables and average microenterprise income. All of estimated coefficients for the vulnerability measures are positive, meaning that households that are less vulnerable, because they have savings, home ownership, other

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[49] Having a primary education or less is the left out group

property, a spouse or partner, more time in Lima and higher wealth, have higher average enterprise income. Of these measures, other property and savings have the highest estimated coefficients, with other property and savings associated with a 3,347 soles and 1,947 soles increase, respectively, in enterprise income. Two vulnerability measures, other property and net household wealth, are significant at the 5% level. It is important to note that while I attempt to control for skill using observable measures, it is still possible the coefficients on the vulnerability measures are upwardly biased due to unobservable factors, principally the portion of skill not picked up by education and experience. However, to the extent the observables capture skill and the vulnerability measures capture vulnerability over other factors, the results provide positive evidence that lower vulnerability is associated with higher average microenterprise income.

For robustness I re-estimate (1) using only 1999 enterprise income as the dependent variable. This is done to address concerns that 1997 income might have a causal impact on or be jointly determined with many of the right hand side variables, principally several of the vulnerability measures. If this is the case removing 1997 income from the left hand side might eliminate some of the endogeneity bias.

$$EnterpriseIncome_{i,1999} = a + \beta_1 EC_{1997,i} + \beta_2 HC_{1997,i} + \beta_3 Vu\ln erability_{1997,i} + \beta_4 Skill_{1997,i} + \varepsilon_i \qquad (2)$$

Results of OLS estimation are presented in columns (3) and (4) of table II.5. Column (3) corresponds to 1997 values of the explanatory variables and column (4) corresponds to 1999 values.

The general results do not change significantly when 1999 enterprise income is used instead of the average value over 1997 and 1999. The coefficients on all of the vulnerability measures except Time in Lima remain positive, and wealth remains significant at the 1%

level. In most cases the size of the coefficients on the vulnerability measures increases,

suggesting that simultaneity bias, if anything runs in the opposite direction. The key

differences are that the coefficient on Time in Lima becomes negative and other property

ceases to be significant at the 10% level. After trying to control for potential reverse

causality bias by using 1999 income as the dependent variable, there is still a positive

relationship between all but one of the vulnerability measures and enterprise income, and in

most cases, the estimated coefficients increase. Overall these results are weaker, but to the

extent I've controlled for the confounding effects of skill, they still support the hypothesis a

positive link between vulnerability and enterprise choice.

The second proxy measure of θ, the standard deviation of microenterprise income, is

also estimated as a linear function of the observable characteristics outlined above.

$$S \tan dardDeviationEntIncome_i = a + \beta_1 EC_{ti} + \beta_2 HC_{ti} + \beta_3 Vu\ln erability_{ti} + \beta_4 Skill_{ti} + \varepsilon_i \qquad (3)$$

Results of OLS estimation are presented in columns (5) and (6) of table II.5. Column (5)

corresponds to estimation using 1997 values of the explanatory variables, while column (6)

corresponds to estimation using 1999 values.

The estimation results are less strong that those for average enterprise income. The

predictive power, as evidenced by adjusted R^2 values, declines and the coefficients on only

three of the vulnerability measures, other property, savings, and net wealth, remain positive.

Of the vulnerability measures only net wealth remains significant at the 5% level. The

negative coefficients on home ownership and marital status are interesting given that both

were positively correlated with enterprise income. The negative correlation with standard

deviation may stem from greater income diversification, if households occupied by a couple

or with home ownership have more diversified income portfolios[50]. With efficient income diversification households can increase expected income while decreasing the variance, thereby explaining the changed signs. Overall, the estimation of the standard deviation of enterprise income provides only weak evidence supporting the prediction of a negative relationship between vulnerability and θ. Only half of the vulnerability measures have positive estimated coefficients and only one, net wealth, is significant at the 10% level.

In sum, estimation of the two principle proxy measures of θ, average microenterprise income and the standard deviation of enterprise income, yields weak support of the theoretical prediction of a negative relationship between vulnerability and the portion of resources households dedicate to the risky enterprise. It is probable the lack of more compelling results stems from weakness in the proxy measures of θ. The expected income and standard deviation of the enterprise portfolio are excellent, intuitive proxies of the unobservable θ variable given basic portfolio theory. The calculation of these measures, however, is less than perfect when using only two periods of information across the wide expanse of two years. More robust measures of the enterprise portfolio would be derived from longer panel data, and such measures may yield more conclusive evidence on the determinants of enterprise choice. Until such data become available, however, the ACP data provide some evidence of a relationship between vulnerability and enterprise choice.

4.2 Primary Enterprise Sales

For completeness I repeat the above analysis using average monthly sales and the standard deviation of monthy primary enterprise sales as alternative measures of θ. I estimate both as linear functions of the same observables outlined above. Results of OLS estimation are

---

[50] A positive link between home ownership and income diversification follows empirical evidence from Field (2003), who finds that the titling program in Peru enabled household members to move into the workforce outside the home.

presented in table II.6. Columns (1) and (2) contain results for average monthly sales. Columns (3) and (4) contain results for the standard deviation of monthly sales.

One notable difference is the reduction in explanatory power when considering monthly primary enterprise sales. The adjusted R^2 falls to the range of 0.04, as opposed to 0.17 for average microenterprise income. Beyond this the results are similar to and more supportive of the theoretical predictions than those from microenterprise income. For average month sales all of the 1997 vulnerability measures have positive coefficients and other property remains significant at the 1% level. For the standard deviation of month sales, all of the estimated coefficients for the 1997 vulnerability measures are positive and other property is significant at the 5% level. If I have effectively controlled for entrepreneurial skill, the results mean lower vulnerability is positively associated with higher average sales and variance of sales for the primary enterprise. If monthly sales of the primary enterprise provide good proxy measures for θ, these results provide some evidence of a negative relationship between vulnerability and the allocation to a risky enterprise.

5. Implications for Microfinance

The results on the determinants of enterprise choice have strong implications for microfinance selection, if the choice of low yield/low risk projects means entrepreneurs generate insufficient surpluses to repay microfinance loans. In this case the determinants of enterprise choice are also the determinants of microfinance selection, and can help explain why many microfinance institutions face low penetration rates, especially amongst poorer households[51]. The prevailing assumption is that entrepreneurial skill drives microfinance selection[52]; only talented entrepreneurs apply for and are approved for microfinance loans.

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[51] Shaw 2004, CGAP 2000
[52] Armendariz and Morduch 2005

However vulnerability also may be an important factor in enterprise choice and of microfinance selection. If entrepreneurs choose lower yield projects because they cannot take on the risk associated with higher yield projects, vulnerability may be an important determinant of non-participation in microfinance programs.

I explore this possibility by comparing the enterprise profiles of groups in the ACP data based on their microfinance status. Four groups emerge over the two year panel; those who have microcredit in 1997 and in 1999 (Still Have), those who had microcredit in 1997 but do not in 1999 (Dropouts), those who did not have microcredit in 1997 but do in 1999 (Join MFI) and those who do not have microcredit in either 1997 or 1999 (Never Join).

Table II.1: Breakdown of 1999 Sample into Four Groups

	Have Microcredit in '99	Do Not Have Microcredit in '99
Have Microcredit in '97	219 HHs (Still Have)	87 HHs (Dropouts)
Do Not Have Microcredit in '97	64 HHs (Join MFI)	150 HHs (Never Join)

From the standpoint of selection the most interesting group is the Never Join; entrepreneurs who qualify for ACP loans but who choose not to seek out these loans[53]. In the subsequent analysis I focus on comparisons between the Still Have and the Never Join groups, the most extreme groups in the sample. Not only are these groups larger, they also should demonstrate the greatest differences in behavior. Additionally, by restricting the comparison to households whose microfinance status does not change, we eliminate the potential confounding effects of acquiring or losing microfinance credit over the two year period.

5.1 Differences in Microenterprise Income

To discern if enterprise choice varies across households with and without microfinance I compare the principal proxy measures for θ; average microenterprise income and the

---

[53] Lack of knowledge about microfinance or ACP is not the driver of no-show behavior as 80% of the Never Join group says they are familiar with ACP specifically.

standard deviation of microenterprise income. If enterprise choice varies we should find

significant differences in both measures across the Still Have and Never Join groups.

I start with simple mean comparisons of average enterprise income and standard

deviation of enterprise income, presented in table II.7. Mean values for both are noticeably

higher for the Still Have group, and robust t-tests[54] (p-values for which are shown in table

II.8) reveal the difference to be significant at the 1% level. This suggests significant

differences in enterprise choice exist. To take the analysis further I compare the distributions

of the θ measures for each group. While mean comparisons are useful and necessary, they

only tell us about one moment of the distribution. More conclusive statements can be

derived by tests of the entire distribution of θ measures across the two groups. The first step

is to determine if the distributions significantly differ from one another, which is done using

the Kolmogorov Smirnov test. The Kolmogorov Smirnov test constructs a statistic based on

the largest vertical difference between the cumulative density functions of the two

distributions, which is then used to test the null hypothesis of no difference in the

distributions. P-values for Kolmogorov Smirnov tests of average enterprise income and the

standard deviation of enterprise income are in table II.8. In all cases the null hypothesis of

equality can be rejected at the 1% level. The distributions of both θ measures differ

significantly across the Still Have and Never Join groups.

The final step is to assess if the distribution of the θ measures for the Still Have group

first order dominates the distribution for the Never Join group. A distribution A is said to

first order dominate a distribution B if the cumulative density function for A (G_A) is less than

the cumulative density function for B (G_B) at every point along the support [0, b]. That is,

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[54] Robust t-test used because variance of the distributions of microenterprise income differs across the two
groups.

$G_A(x) \le G_B(x)$ for $\forall x \in [0, b]$. Graphically this means the CDF for A always lies to the right

of the CDF for B; at every x the percentage of distribution A that lies below value x is lower

than the percentage of distribution B. If the Still Have distribution exhibits first order

stochastic dominance over the Never Join distribution, at every possible θ a lower percentage

of the Still Have group has an actual θ less than or equal to that amount than the Never Join

group. For example, if the Still Have distribution of average income first order dominates

that of the Never Join group, a larger percentage of the Never Join group has average

incomes below a given threshold than the Still Have group, for every possible threshold.

This means the distribution of average income for the Still Have group is shifted to the right

and that θ values are significantly higher not just at the mean or the median, but along the

entire range. First order stochastic dominance thus provides the strongest evidence of

differences in enterprise choice across groups.

Comparisons of cumulative density functions for the Still Have and Never Join groups

are shown in Graph II.2.A. The left hand panel shows CDFs for average enterprise income

and the right hand panel shows CDFs for the standard deviation of enterprise income. For

both there is clear evidence of first order stochastic dominance. The distribution for the Still

Have group lies below that for the Never Join group at every point along the support. This

result clearly indicates average and standard deviation of microenterprise income is

significantly lower for the Never Join group, which implies these entrepreneurs dedicate

fewer resources to risky entrepreneurial activities than their counterparts with microfinance.

5.2 Differences in Monthly Sales for the Primary Enterprise

To complete the analysis I repeat the exercises above using monthly sales for the primary

enterprise as the basis for θ. Results of robust t-test for mean equality and Kolmogorov

Smirnov test for equality of the distribution are shown in the lower half of table II.8. Graphic tests of first order stochastic dominance are shown in graph II.2.B.

The results using monthly sales for the primary enterprise are not as strong as those from total microenterprise income. For average monthly sales both the mean and the entire distribution are significantly different at the 1% level across the Still Have and Never Join groups. For the standard deviation of monthly sales, however, mean values do not significantly differ at any level. Furthermore there is no evidence of first order stochastic dominance for either average monthly sales or the standard deviation of monthly sales. The CDFs for the Still Have and Never Join group cross at points, making it impossible for one distribution to first order dominate the other. The Still Have distributions may exhibit second order dominance, but this is a weaker condition that provides less compelling evidence of significant differences in enterprise choice. Overall, there is less evidence that primary enterprise monthly sales differ across groups with and without microfinance. Given that enterprise choice likely occurs at the level of the enterprise portfolio as a whole, however, these results do not refute claims that enterprise choice varies across households based on their microfinance status.

It is important to note that comparison of the θ measures only attempts to show that enterprise choice differs across groups with and without microfinance. The analysis does not attempt to ascribe differences to a particular factor, such as credit access, skill or vulnerability. Given the difficulties in disentangling these effects and appropriately addressing endogeneity concerns, doing so is outside the scope of this paper. Nevertheless, establishing differences in enterprise choice is an important step in understanding the use of microfinance by poor microentrepreneurs. The differences in enterprise choice between the

Still Have and Never Join group may be a function of factors other than the credit itself, in which case identifying these factors are pivotal in understanding credit use, or lack thereof.

6. Conclusion

This chapter proposes consideration of vulnerability as a critical determinant of enterprise choice for poor, urban households. It argues that lack of entrepreneurial skill and credit may be insufficient to explain low productivity of many microenterprises because neither factor incorporates risk, a key consideration for poor households. Using a simple theoretical model I show that even after controlling for entrepreneurial skill, more vulnerable households are less willing to devote resources to high yield, high risk enterprises over low yield, safe alternatives. Using data from ACP, a large microfinance institution in Peru, I also find empirical evidence that more vulnerable households engage in lower yield and lower risk projects than their less vulnerable counterparts. I also argue vulnerability may play an important role in determining who seeks out microfinance loans and who does not. Comparisons of enterprise choice across groups with and without microfinance find significant differences, in particular that households with microfinance engage more in high yield, high risk enterprises than households without microfinance. Given the link between vulnerability and enterprise choice, this implies vulnerability also may play a role in microfinance selection.

From a policy perspective distinguishing between drivers of enterprise choice is important if adoption of different enterprises determines where a household lies relative to the poverty line. If the path out of poverty lies in adopting high yield projects, it is crucial to understand why some households are unable to engage in opportunities that would increase expected income. Identification of the main barrier to high yield projects also helps guide an

appropriate use for poverty reduction funds, with policy recommendations varying greatly across candidate explanations. Under a skill based model of enterprise choice the best use of funds is business development services, aimed at improving microentrepreneurs' business acumen. Under a vulnerability based model of enterprise choice the best use of funds is projects that improve households' ability to smooth consumption across adverse income shocks, through increased provision of consumption credit and insurance. Improved understanding of the barriers to entry into high yield projects is important for development practitioners and policy makers searching for the best way integrate credit access and skill training programs into poverty reduction agendas.

Within the literature on poor, urban households this analysis represents an important first step in better understanding the determinants of enterprise choice. The analysis, however, is hindered by the limitations of the ACP data, specifically the small number of panel periods. More observations across time are needed to better estimate the expected income and standard deviation of households' enterprise portfolios, the variables used to reveal enterprise choice in the absence of information on "safe" and "risky" projects. The measures from the ACP sample are decidedly imperfect and more comprehensive data would bolster the analysis of links between vulnerability and enterprise choice. Unfortunately long panel data on urban microentrepreneurs are not currently available, but in their absence the ACP data provide evidence that vulnerability plays an important role in enterprise choice.

Chapter III

Vulnerability as a Determinant of Microfinance Selection

I. Introduction

Roughly 30 years after its inception microfinance has become an increasingly popular part of

poverty reduction agendas of multilateral organizations, national policy makers, and NGOs.

An industry that began with the premise of providing working capital loans to poor

entrepreneurs continues to capture attention and garner proponents. The industry also draws

increasing amounts of donor funding, thanks in part to theories about how credit access

improves welfare, (Eswaran and Kotwal 1990, Morduch 1994, Banerjee 2004), limited

empirical evidence that expansion of credit reduces poverty (Burgess and Pande 2005,

Khandker 2003), and a large body of anecdotal evidence[55] that microfinance in particular has

helped some households navigate the road out of poverty. With the help of significant

enthusiasm and billions of dollars in donor support the microfinance model has spread

around the world, and an estimated 3100 microfinance institutions (MFIs) currently operate

in countries as diverse as Indonesia, Bosnia, Peru and the U.S. Collectively these institutions

serve over 92 million clients worldwide, and the numbers continue to grow as many MFIs

migrate into new services such as savings accounts, remittance management, housing finance

and microinsurance[56].

Despite dramatic growth, however, there is an infrequently cited phenomenon about

microfinance which is that many institutions face low penetration rates. It turns out a

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[55] Despite much anecdotal evidence of positive impacts of microcredit, there is little undisputed empirical evidence, mostly due to lack of data that can appropriately address the problem of selection bias. See Armendariz and Morduch (2005) for an overview of the debate over impact studies.

[56] Figures as of Dec. 31, 2004. Microcredit Summit Campaign Report 2005 (*www.microcreditsummit.org*)

significant number of potential borrowers never seek out microfinance loans[57]. In the case of

Peru, the country of focus of this analysis, it is estimated that only 5% of all

microentrepreneurs access credit from MFIs (Berger 2003)[58]. This is curious, because if

microfinance fills an important void in the lives of the poor, as is argued by MFI's numerous

proponents, why are so many households not availing themselves of a service that would

potentially make them better off? Candidate explanations such as a limited supply of

microfinance funds, limited demand due the availability of other funding options, or limited

need for working capital finance generally fall flat when put to the data. Something else

must help explain the extent of non participation behavior.

The standard argument is that differential endowments of entrepreneurial skill explain

the puzzle of microfinance selection. High skill entrepreneurs generate sufficient returns on

entrepreneurial projects to service microfinance loans and therefore seek out this credit,

while low skill entrepreneurs generate insufficient returns and decide to stay away. While

skill likely plays a role, the flaw in this argument is that it ignores risk altogether, a

fundamental driver of poor households' behavior. Only if the level of risk is constant across

projects and tolerance for risk constant across entrepreneurs can skill represent the only

barrier to high yield projects and microfinance. It is highly unlikely, however, that high and

low yield projects have the same level of risk or that tolerance for risk is constant given

different levels of wealth and access to credit and insurance. Risk is so significant a

consideration for many poor households, in fact, that even after removing the skill barrier

---

[57] Studies of Kenya and Tanzania estimate penetration rates of 1% (CGAP 2000), while studies in Brazil estimate penetration rates of 2% (BNDES 2002). In Bolivia, the most penetrated microfinance market in Latin America, it is estimated only 28% of potential borrowers are reached (IDB 2004).

[58] In 1997 ACP had roughly 30,000 clients. It is estimated there were 600,000 microentrepreneurs in Lima at the time, meaning ACP reached only 5% of the Lima market (Campion, Dunn and Arbuckle 2001). Although this estimate, along with others, overstates the extent of underpenetration by classifying all microentrepreneurs as potential clients, the client base is sufficiently low relative to the universe of micro-entrepreneurs to indicate a substantial number of households remain untouched by the "microfinance revolution".

many entrepreneurs likely would continue to avoid high yield projects and microfinance. Perhaps, then, the something else driving microfinance selection is the ability to manage risk.

This chapter argues that vulnerability, defined as the inability to smooth consumption across adverse income shocks, is an additional factor that drives microfinance selection and partially explains low participation rates[59]. Households with greater ability to manage risk might choose to engage in higher yield projects and seek microfinance credit, while those less able to manage risk opt out of both. As mentioned in the previous chapter, while the idea that vulnerability to risk is linked to income choice is not novel, the extension of this rationale to an urban setting and exploration of the implications for microfinance programs is unique. These extensions are important given the increasing recognition of the size of the urban, microenterprise sector in generating employment and income in the developing world, and new questions about whether or not access to credit, particularly microfinance, is sufficient to achieve poverty reduction goals. By examining potential links between vulnerability, project choice and microfinance it might be possible to better understand how urban households successfully exit poverty and the importance of microfinance, and formal credit in general, in this process.

The chapter provides a theoretical and empirical investigation into the impact of vulnerability on microfinance selection. It first explores the theoretical dimension, developing a model in which entrepreneurs choose between a high yield/high risk enterprise and microfinance and a low yield/low risk enterprise and no microfinance. The model finds that even after controlling for skill and wealth, at higher levels of vulnerability entrepreneurs

---

[59] Other definitions of vulnerability include: the "the likelihood that a shock will result in a decline in well-being" (2000/2001 World Development Report); or "the existence and extent of a threat of poverty and destitution" (Dercon 2005). See Dercon 2005 for further discussion of vulnerability.

reject the high yield enterprise and microfinance for the safe option. The model also predicts that while vulnerability is a determinant of microfinance selection, it matters less for high skill and high wealth entrepreneurs.

I then test the theoretical predictions using the ACP data on microentrepreneurs in Lima, Peru used in the first chapter. In logit estimations of microfinance selection I find positive evidence that vulnerability negatively impacts microfinance selection. More vulnerable entrepreneurs are found to be anywhere from 7% to 35% less likely than their less vulnerable counterparts to select into microfinance programs. These findings suggest vulnerability to risk is an important determinant of behavior for potential microfinance borrowers and may help explain low participation rates.

The chapter proceeds as follows. Section 2 develops a theoretical model that predicts vulnerability negatively impacts microfinance selection. Section 3 describes the data, including information on ACP, the loans offered by this institution, alternative sources of financing, and discussion of concerns about the vulnerability measures particular to the analysis of microfinance selection. Section 4 estimates the determinants of microfinance participation using the full sample of households from the 1997 survey round. Section 5 estimates the determinants of microfinance selection using the balanced panel. Section 6 concludes

2. Theoretical Model

This section develops a model of microfinance selection that shows that even after controlling for skill and wealth, entrepreneurs with less ability to smooth consumption across negative income shocks do not select microfinance credit. It also shows that vulnerability is less of a concern for selection at higher levels of skill and wealth.

2.1 Setup

Consider a two period model in which risk-averse entrepreneurial households (referred to as entrepreneurs) make decisions to maximize expected lifetime utility. Entrepreneurs begin period 1 with an exogenous skill endowment that can take one of two values: T_H=high skill, or T_L=low skill. Entrepreneurs also being period 1 with an exogenous endowment of liquid wealth, which is randomly drawn from a uniform distribution over the range $[\underline{W}, \overline{W}]$. Liquid wealth can be thought of as household durables or low yielding savings, such as cash stashed at home. All values earn zero interest. It is important to include wealth in the model to distinguish between risk preferences and vulnerability as drivers of behavior. The willingness to take on risky projects is negatively related to a household's level of risk aversion, which, depending on the utility function, declines in wealth. Vulnerability, meanwhile, encompasses the ability to manage risk, which is distinct from risk aversion. Wealth plays a role in vulnerability, but so do other factors like access to consumption credit and insurance. As such, households with equal levels of wealth and risk aversion might make very different choices if their ability to manage negative income shocks varies[60].

Entrepreneurs can choose one of two entrepreneurial projects; a risky enterprise (*RE*) and a safe enterprise (*SE*). The risky enterprise requires working capital to operate, which must come from borrowing since liquid wealth is insufficient to meet these needs. Microfinance is the only source of external working capital finance in the model, such that entrepreneurs wishing to engage in the risky enterprise must take out a microfinance loan. The microfinance institution (MFI), on the other hand, cannot view skill and distinguish entrepreneurial types and therefore lends the same amount (*MF*) and charges the same

---

[60] See Dercon (2005) for a more detailed discussion of risk preferences and vulnerability.

interest rate (b) to all borrowers who meet the collateral requirement equal to $\underline{W}$. Since all entrepreneurs meet the collateral requirements, supply concerns are irrelevant in the model[61].

Entrepreneurs choose an enterprise at the beginning of period 1. For the safe enterprise returns are constant across skill and state realizations. For the risky enterprise returns are uncertain and depend on the state of nature, realized immediately after the enterprise is chosen. There are two possible realizations, a good state and a bad state, and the probability of each depends on skill. The probability of a good state is p_H for a high skill entrepreneur and p_L for a low skill entrepreneur, where $p_H > p_L$. Gross returns are:

$$
\begin{aligned}
&= R_{RE}^{G} \quad \text{w/probability} = p_T \\
&= R_{RE}^{B} \quad \text{w/probability} = (1 - p_T)
\end{aligned}
\tag{1}
$$

$$
= R_{SE}^{G} \quad \text{w/ probability} = 1
\tag{2}
$$

The risky enterprise has a higher return than the safe enterprise in a good state but a lower return in a bad state: $R_{RE}^{G} > R_{SE} > R_{RE}^{B}$. The expected return from the risky enterprise is:

$E(R_{RE}) = p_T R_{RE}^{G} + (1 - p_T) R_{RE}^{B}$. p_T and the returns are such that the expected return of the risky enterprise is greater than that for the safe enterprise for both skill types.

$$
E(R_{RE}^{HighSkill}) > E(R_{RE}^{LowSkill}) > R_{SE}
\tag{3}
$$

To ensure households find it optimal to engage in entrepreneurial activity rather than to live off of wealth I assume the safe enterprise return is greater than all levels of liquid wealth:

$$
R_{SE} > \overline{W} > \underline{W}
\tag{4}
$$

After gross returns from each enterprise are realized entrepreneurs make decisions about loan repayment. The microfinance institution offers no repayment flexibility and if a borrower fails to repay $(1 + b)MF$ at the end of the first period, two things occur. First, the

---

[61] This assumption is necessary because the goal is to explain why entrepreneurs who qualify for loans choose not to participate, not why access might differ.

borrower is barred from any future loans from the microfinance institution, which means she must abandon the risky enterprise in the second period. Second, the microfinance institution seizes liquid wealth ($\underline{W}$) placed as collateral. Although collateral seizure is not standard practice for many microfinance institutions, with only two periods it is difficult to generate the dynamic incentives that usually ensure no strategic default (Armendariz and Morduch 2005, Alexander 2006).

Net returns from the risky enterprise at the end of the first period depend on repayment decisions. If a good state is realized the net return from the risky enterprise is positive. If a bad state is realized the net return from the risky enterprise is zero.

$$
\begin{aligned}
R_{RE}^{G} - (1+b)MF > 0 \qquad & \text{w/ prob } p_T \\
R_{RE}^{B} - (1+b)MF = 0 \qquad & \text{w/ prob } (1 - p_T)
\end{aligned}
\qquad (5)
$$

At the beginning of the second period entrepreneurs again choose projects. Similar to several models of vulnerability and crop choice I assume certain second period income from both enterprises (Eswaran and Kotwal 1989, Morduch 1994). For the risky enterprise certain second period income equals expected first period income. This generates the incentive for entrepreneurs to continue with the risky enterprise if a bad state is realized, as it leads to higher, certain second period income. Finally, an entrepreneur cannot take out a microfinance loan in the second period if she did not do so in the first period. This assumption allows us to focus on only one period of decision making.

Net income under different scenarios is outlined in the following tree:

Y1=First Period Income **Y2=Second Period Income**

Risky

- Good State Prob. $= p_T$
  - Repay: $R^G_{RE} - (1+b)MF > 0 \longrightarrow E(R^T_{RE}) - (1+b)MF$
  - Default: $R^G_{RE} > 0 \longrightarrow R_{SE}$
- Bad State Prob. $= (1-p_T)$
  - Repay: $R^B_{RE} - (1+b)MF = 0 \longrightarrow E(R^T_{RE}) - (1+b)MF$
  - Default: $R^B_{RE} > 0 \longrightarrow R_{SE}$

Safe

- $R_{SE} > 0 \longrightarrow R_{SE}$
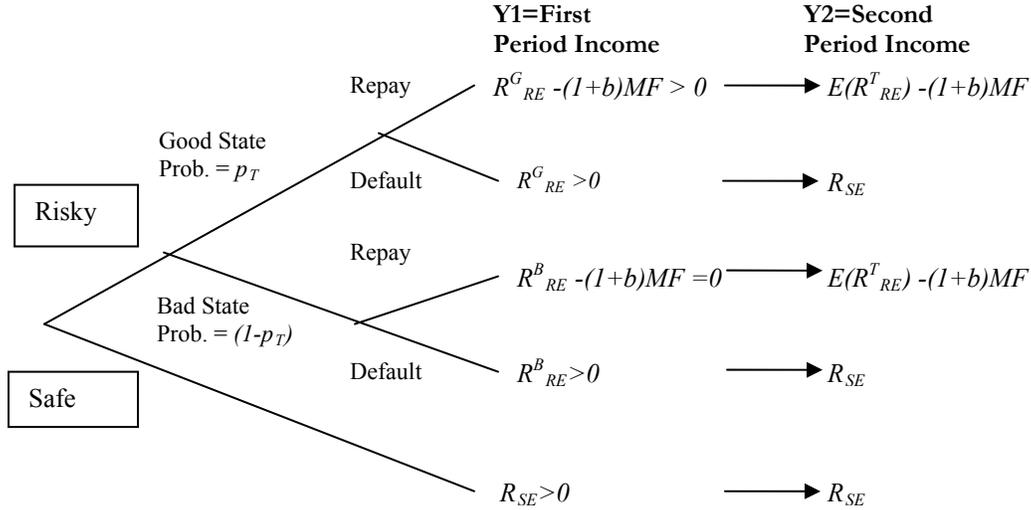
where $E(R^H_{RE}) - (1+b)MF > E(R^L_{RE}) - (1+b)MF > R_{SE} > 0.5[E(R^T_{RE}) - (1+b)MF]$ (6)

(6) says that certain second period income from the risky enterprise is greater for high skill entrepreneurs than for low skill entrepreneurs, and both are greater than income from the safe enterprise. It also says the difference between second period safe and risky income is such that the return from the safe enterprise is greater than half the return from the risky enterprise. This ensures the difference between the safe and risky enterprise is not overly large. Finally, I assume interest and return realizations are such that the difference between net income of the risky and safe enterprise is greater than the difference between loan repayment and the value of seized collateral. This generates a no-default equilibrium and is necessary due to the inability to generate dynamic repayment incentives over two periods.

$$(E(R^T_{RE}) - (1+b)MF) - R_{SE} > (1+b)MF - \underline{W} \qquad (7)$$

2.2 Vulnerability, Consumption Credit and No Default

Up until this point entrepreneurs have no direct source of consumption credit in the case of a bad state realization. This is due to the fact that the microfinance loan cannot be used to

cover consumption, as diversion of loan funds to consumption leaves entrepreneurs with insufficient working capital to operate the risky enterprise and zero income. Explicitly outlining consumption credit is important because if a bad state is realized and an entrepreneur engaged in the risky enterprise repays the microfinance loan, she will not have any income in the first period. Without consumption credit the entrepreneur must use liquid wealth to cover first period consumption. While this is a realistic scenario, it yields the unsatisfactory conclusion that the ability to smooth consumption across an adverse income shock depends only on wealth. In reality, however, the ability to smooth consumption also depends on access to consumption credit and insurance, which may be uncorrelated with wealth. For example, informal credit and insurance networks may be a function of the number of family and friends nearby, which may be unrelated to wealth[62]. To further our understanding of vulnerability's impact on microfinance selection I assume no correlation between access to consumption credit and wealth.

Consumption credit is defined as: $\gamma(E(R_{RE}^T) - (1+b)MF)$, where $\gamma \in [0,1]$ (8)

γ comes from informal sources, such as a spouse or partner, family and friends, or moneylenders, and carries no interest[63]. γ is the measure of vulnerability, as it dictates the portion of certain second period income an entrepreneur can borrow in the first period. Higher values of γ mean an entrepreneur has greater ability to smooth consumption and is less vulnerable. Lower values of γ mean an entrepreneur has less ability to smooth consumption and is more vulnerable.

---

[62] In the data informal networks are the principal source of consumption credit. Also, the correlation between measures of informal networks and household wealth are very low, supporting the theoretical prediction of no correlation.

[63] In practice we usually observe zero interest rates on loans from family, friends and ROSCAs. The implicit costs usually come from the expectation of reciprocal lending in the future (Dunn and Arbuckle 2001).

Prior to assessing optimal enterprise and financing choices it is necessary to establish that default never prevails in the first period[64]. This is done through comparison of intertemporal budget constraints. In the case of a good state realization, if an entrepreneur does not default, the intertemporal budget constraint is:

$$c_{1G} + c_{2G} = (R_{RE}^G + E(R_{RE}^T) - 2(1+b)MF) + W \qquad (9)$$

If an entrepreneur defaults wealth placed as collateral is seized and the entrepreneur cannot engage in the risky enterprise in the second period. The intertemporal budget constraint is:

$$c_{1G} + c_{2G} = R_{RE}^G + R_{SE} + W - \underline{W} \qquad (10)$$

No default prevails if $(E(R_{RE}^T) - (1+b)MF) - R_{SE} + \underline{W} > (1+b)MF$ \qquad (11)

which always holds according to assumption (7). Second period income from the risky enterprise is sufficiently greater than that from the safe enterprise such that defaulting is always suboptimal.

In the case of a bad state realization first period income equals zero. If the entrepreneur does not default, the intertemporal budget constraint is:

$$c_{1G} + c_{2G} = (R_{RE}^B + E(R_{RE}^T) - 2(1+b)MF) + W \qquad (12)$$

If the entrepreneur defaults, the intertemporal budget constraint is:

$$c_{1G} + c_{2G} = R_{RE}^B + R_{SE} + W - \underline{W} \qquad (13)$$

No-default prevails if $(E(R_{RE}^T) - (1+b)MF) - R_{SE} + \underline{W} > (1+b)MF$ \qquad (14)

which again holds because of (7). In all cases entrepreneurs who choose the risky enterprise in the first period prefer to do so in the second period, making default suboptimal.

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[64] There is no penalty beyond collateral seizure for default in the second period, which means many microfinance borrowers might find second period default optimal. To avoid this it is possible to introduce an additional sanction, such as profit seizure. However, since second period default does not change the dynamics of the model, introducing additional assumptions to ensure it doesn't happen is not necessary.

2.3 Entrepreneur's Decisions

We can now analyze optimal enterprise and financing choices for entrepreneurs. In each period, after income from the enterprise is received, entrepreneurs choose consumption to maximize expected lifetime utility, which is additively separable in each component, and expressed as: $EU = Eu(c_1) + \delta Eu(c_2)$ (15)

Atemporal utility is increasing and strictly concave in that period's consumption and δ is the degree time preference. To abstract from concerns about differing degrees of time preference I assume all entrepreneurs weigh first and second period consumption equally, and that the degree of time preference equals one.

I start by analyzing utility under the safe enterprise. If an entrepreneur selects the safe enterprise, she chooses consumption in each period to maximize the problem:

$$\max_c EU = u(c_1) + u(c_2)$$ (16)
$$\text{st. } c_1 \le R_{SE} + W$$
$$c_2 \le R_{SE} + (W - c_1 + R_{SE})$$

It is easy to show that $c_1 = c_2 = R_{SE} + 0.5W$ solves the maximization problem and that total lifetime utility equals $2u(R_{SE} + 0.5W)$. (17)

Lifetime utility under the risky enterprise, unlike the safe enterprise, depends on skill (T) and vulnerability (γ). I start by analyzing utility in a bad state and consider a "non-vulnerable" entrepreneur; an entrepreneur whose $\gamma = 1$. This entrepreneur can borrow all of second period income and can perfectly smooth consumption across a negative income shock. This household maximizes:

$$\max_c EU = u(c_1) + u(c_2)$$ (18)
$$\text{st. } c_1 \le W + \gamma(E(R_{RE}^T) - (1+b)MF), \qquad \text{where } \gamma = 1$$
$$c_2 \le (1-\gamma)(E(R_{RE}^T) - (1+b)MF) + W - c_1, \qquad \text{where } \gamma = 1$$

It is easy to show lifetime utility equals $2u(0.5(E(R_{RE}^T) - (1+b)MF) + 0.5W)$ (19)

From (8) this is lower than lifetime utility under the safe enterprise (17). Since this is the case for non-vulnerable entrepreneurs, it is also true of vulnerable entrepreneurs as lifetime utility declines further as γ falls below 1. In a bad state all households, regardless of their level of vulnerability, wealth or skill are better off under the safe enterprise.

If a good state households maximize:

$$\max_c EU = u(c_1) + u(c_2)$$ (20)
$$\text{st. } c_1 \leq (R_{RE}^G - (1+b)MF) + W$$
$$c_2 \leq (E(R_{RE}^T) - (1+b)MF) + (W - c_1 + (R_{RE}^G - (1+b)MF))$$

Lifetime utility in this case equals $2u(0.5(E(R_{RE}^T) + R_{RE}^G - 2(1+b)MF) + 0.5W)$ (21)

It is easy to confirm that (21) is greater than lifetime utility under the safe enterprise (17). In a good state all households are better off under the risky enterprise.

To establish the connection between vulnerability and microfinance selection (entrepreneurs only select microfinance if they choose the risky enterprise) I compare expected lifetime utility under the risky option for non-vulnerable and vulnerable entrepreneurs. Under the risky enterprise entrepreneurs solve:

$$\max_c EU = p_T[u(c_{1G}) + u(c_{2G})] + (1 - p_T)[u(c_{1B}) + u(c_{2B})]$$ (22)
$$\text{s.t. } c_{2G} \leq (E(R_{RE}^T) - (1+b)MF) + (W - c_{1G} + (R_{RE}^G - (1+b)MF))$$
$$c_{1B} \leq W - \underline{W} + \gamma[E(R_{RE}^T) - (1+b)MF]$$
$$c_{2B} \leq (E(R_{RE}^T) - (1+b)MF) + W - c_{1B}$$

For non-vulnerable entrepreneurs, γ is sufficiently high such that the borrowing constraint does not bind. For these entrepreneurs expected lifetime utility under the risky enterprise is:

$$p_T[2u(0.5(E(R_{RE}^T) + R_{RE}^G - 2(1+b)MF + W)]$$
$$+ (1 - p_T)[2u(0.5(E(R_{RE}^T) - (1+b)MF + W)]$$ (23)

Non-vulnerable entrepreneurs are indifferent between the safe and risky enterprise when (23)

equals (17). The probability of a good state, $p_T = \hat{p}_T$, that solves indifference equals:

$$\hat{p}_T = \frac{u(R_{SE} + 0.5W) - u(0.5(E(R_{RE}^T) - (1+b)MF + W))}{u(0.5(E(R_{RE}^T) + R_{Re}^G - 2(1+b)MF + W)) - u(0.5(E(R_{RE}^T) - (1+b)MF + W))} \quad (24)$$

$$\Rightarrow \hat{p}_T = \frac{u(safe) - u(risky_{bad})}{u(risky_{good}) - u(risky_{bad})}$$

(24) says that non-vulnerable entrepreneurs are indifferent between the safe and risky

enterprises when the probability of a good state equals the ratio of the difference between

utility under the safe and the risky enterprise in a bad state and the difference between utility

under the risky enterprise in a good and bad state. The value of $\hat{p}_T$ depends on the degree of

curvature in the utility function, but for any strictly concave function $\hat{p}_T \in (0,1)$. While it is

not necessary to find an explicit value, it is necessary to establish an acceptable range

because for $p_T < \hat{p}_T$, all entrepreneurs prefer the safe enterprise and no microfinance loans.

In order for the model to generate any predictions about the impact of vulnerability on

microfinance selection $p_T > \hat{p}_T$. This says that for any entrepreneur to choose the risky

enterprise, the probability of a good state must be sufficiently high.

In the case of vulnerable entrepreneurs γ is low enough such that the borrowing

constraint binds. Lifetime expected utility under the risky option for these entrepreneurs is:

$$\begin{aligned} &p_T[2u(0.5(E(R_{RE}^T) + R_{RE}^G - 2(1+b)MF + W)] \\ &+ (1 - p_T)[u(\gamma E(R_{RE}^T) - (1+b)MF + W) + u((1-\gamma)E(R_{RE}^T) - (1+b)MF] \end{aligned} \quad (25)$$

By assuming a value $p_T > \hat{p}_T$ it is possible to solve for the level of vulnerability, $\gamma = \hat{\gamma}$, at

which a vulnerable entrepreneur is indifferent between the safe and risky enterprise. $\hat{\gamma}$ solves:

$$(1 - p_T)[u(\hat{\gamma}(E(R_{RE}^T) - (1+b)MF) + W) + u((1-\hat{\gamma})(E(R_{RE}^T) - (1+b)MF)) =$$
$$2u(R_{SE} + 0.5W) - p_T[2u(0.5(E(R_{RE}^T) + R_{Re}^G - 2(1+b)MF + W))]$$

(26)

To show vulnerability negatively impacts microfinance selection it is sufficient to show $\hat{\gamma}$ exists and lies between zero and one. This is simple given the assumptions about p_T and the differences between safe and risky enterprise income. $\hat{\gamma}$ determines the critical level of vulnerability below which entrepreneurs are better off with safe enterprise and no microfinance. Entrepreneurs with $\gamma < \hat{\gamma}$ are too vulnerable to manage the risky enterprise and do not select microfinance. Entrepreneurs with $\gamma \geq \hat{\gamma}$ are better able to manage the risky enterprise and select microfinance. This produces the key result of the model: Even after controlling for skill and wealth, vulnerability negatively impacts the probability an entrepreneur selects microfinance.

Equation (26) also has important implications for the relationship between vulnerability, skill and wealth. For skill, since the probability of a good state is greater for high skill entrepreneurs ($p_H > p_L$) the threshold level of vulnerability is lower for high skill entrepreneurs as well ($\hat{\gamma}_{T=H} < \hat{\gamma}_{T=L}$). For an equal level of vulnerability high skill entrepreneurs are more likely to select microfinance than low skill entrepreneurs. This is the second result of the model: Vulnerability weighs less heavily in the microfinance selection decision for low skill entrepreneurs than for high skill entrepreneurs.

For wealth, total differentiation of (26) illustrates how the threshold level of vulnerability changes in wealth.

$$\frac{d\hat{\gamma}}{dW} = \frac{p_T u'(c_{RE,G}) + (1 - p_T)u'(c_{RE,B}^1) + u'(c_{SE})}{(1 - p_T)(E(R_{RE}^T) - (1+b)MF)[u'(c_{RE,B}^1) - u'(c_{RE,B}^2)]}$$

(28)

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The sign of (28) depends only on the last term, $[u'(c_{RE,B}^1) - u'(c_{RE,B}^2)]$, as all of the other terms are positive. If households are vulnerable they cannot smooth consumption across a negative income shock, and first period consumption is greater than second period consumption ($c_{RE,B}^1 > c_{RE,B}^2$). Given concave utility this implies $u'(c_{RE,B}^1) < u'(c_{RE,B}^2)$, which means $\frac{d\hat{y}}{dW} < 0$. This is the third key result of the model: While vulnerability matters for all wealth types, it matters less for high wealth entrepreneurs than for low wealth entrepreneurs. For equal levels of vulnerability more wealthy entrepreneurs are more likely to select microfinance than less wealthy entrepreneurs. However, even entrepreneurs with the highest level of wealth, $\overline{W}$, will reject the risky enterprise and microfinance if their vulnerability is sufficiently high.

In sum the model predicts: 1) Even after controlling for skill and wealth, if vulnerability is sufficiently high entrepreneurs do not choose microfinance loans; 2) Vulnerability plays less of a role in microfinance selection as entrepreneurial skill increases; and 3) Vulnerability plays less of a role in microfinance selection as wealth increases. I empirically test these predictions in the subsequent sections.

3. Description of the Data

To test the theoretical predictions I employ the same Peruvian data used in the first chapter. To re-iterate, the data come from a USAID sponsored program to assess the impact of microfinance services, carried out with Accion Comunitaria del Peru (ACP, which became MiBanco in 1998[65]), a large, profit-oriented microfinance institution with operations exclusively in Lima[66]. Data on clients of ACP and a comparison group was collected in two

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[65] For discussion of the transformation of ACP to Mibanco see Campion, Dunn and Arbuckle (2001)
[66] In 2000 Mibanco opened its first office outside of Lima, in Chincha

periods, August of 1997 and again in July/August of 1999. The 1997 survey includes 401 clients and 300 non clients, and the 1999 survey includes 306 clients and 214 non clients.

An important feature of the data set is the way the comparison group was collected. A pool of non-clients was randomly drawn from a sample of microentrepreneurs in the same neighborhoods, with similar enterprise and household characteristics as their microfinance counterparts. Two prerequisites for the comparison sample were made: 1) no member of the household could have microfinance credit from any source and 2) at least one of the enterprises of the household must have been in operation for at least six months. The latter prerequisite ensures the comparison group qualifies as potential clients, as ACP requires that the enterprise on which the loan is taken out have at least six months of operating history. Thus all of the non-clients meet eligibility requirements for ACP loans.

Given this paper focuses on a particular type of credit offered to poor entrepreneurs, it is critical to understand the terms of ACP loans and how they vary from other types of credit. Looking first at ACP loans; at the time of the survey the principal product offered by ACP is a working capital loan, with typical loan lengths ranging from 6 weeks to 6 months. Average loan size in 1997 is 1,021 soles (approximately $384) and loans are paid back over short term intervals, typically on a bi-weekly or monthly basis[67]. Loans are granted either to a group or to an individual, the requirement for the latter being home ownership or a guarantor with proof of home ownership[68]. Loans could be taken out by only one household member and for the purpose of only one existing microenterprise[69]. To meet the requirement of a 6 month

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[67] For ACP clients in the sample 30% re-paid loans on a bi-weekly basis while 58% re-paid on a monthly basis.
[68] For group loans at least one group member must own their home. In 1997 incidence of home ownership amongst group loan borrowers is 84%, while incidence amongst individual borrowers with a guarantor is 81%. ANOVA estimates show no significant difference in home ownership, savings incidence or marital status across different microfinance loan types in 1997.
[69] By 1999 80% of entrepreneurs without microfinance have heard not just of microfinance, but of ACP.

minimum operating history, borrowers must provide proof of enterprise duration, including

electricity or telephone bills, receipts from suppliers, or registration certificates with the

municipality or tax authority. (Dunn and Arbuckle 2001)

While loan use is not monitored by the MFI and a great deal of fungibility has been

documented[70], the short maturity lengths combined with frequent payback intervals generally

mean microfinance loans are directed to short-term business needs[71]. ACP client interviews

confirm this. When asked about loan use, one respondent replied:

> "I don't know what we bought (with the last loan), but it has always been inventory,
> you know? Because you can't spend it on your house or you can't take it and go
> spend it on furniture… You have to make the money produce, because they are going
> to charge interest too, you know?" (Dunn and Arbuckle 2001)

Microfinance is not the only source of credit for entrepreneurs in the sample[72]. The

other sources, outlined it table III.1, include formal lenders, such as commercial banks, credit

unions, credit cooperatives, and construction banks, as well as informal lenders, such as

suppliers, friends, family, moneylenders, and ROSCAS[73]. The most frequently cited sources

are suppliers and family and friends. A comparison of the terms of these other types of credit

to those of ACP loans helps elucidate the demand for microfinance, and a discussion of

interest rates, repayment terms and loan size follows.

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[70] Fungibility is the use of loan funds for purposes other than those laid out in the loan contract, such as for consumption or household investment purposes. See Gaile and Foster (1996) for evidence of fungibility.

[71] Armendariz and Morduch (2005) explain that this type of payback structure can improve loan repayment as the timing of payments better matches that of income flows into the household. This matching can be important if borrowers have difficulty saving, due to household demands, pilfering of funds by other household members (women keeping funds away from their husbands) or the absence of saving vehicles.

[72] The most important type of credit for entrepreneurs is working capital finance. Working capital is defined as the difference between current assets and liabilities and this difference is negative if a firm has a gap between payments for goods produced and payments on inputs. A germane example is a small grocer who must purchase inventory in advance of sale. If working capital is negative the firm can finance the difference internally, with retained profits, or externally, with formal or informal loans. Although retained profits carries fewer explicit costs, dependence on this to finance working capital limits everyday operations and restricts enterprise growth, leading many businesses to seek external finance.

[73] Rotation Savings and Credit Associations. See Armendariz and Morduch (2005) and Besley, Coate and Loury (1993). The latter note that ROSCAS are predominantly used to save for large, indivisible durable goods, rather than to finance ongoing business expenses.

In the case of interest rates, ACP, dissimilar to many microfinance institutions, charges unsubsidized and market determined interest rates. At the time of the survey nominal, annual rates were close to 50%, which translates into estimated real interest rates of 42.5% in 1997 and 47.5% in 1999.[74] According to Dunn and Arbuckle (2001) ACP's interest rates are comparable to those charged by other financial institutions engaged in microlending[75] such as banks, credit unions and other microfinance institutions, lower than those charged by moneylenders and pawnshops, and higher than those charged by family, friends and ROSCAs[76]. Although there is no information on the costs of supplier credit, the most cited source of external finance, data from small firms in several developed countries suggest ACP's rates equal or lie below those charged by suppliers. For example, Cuñat (2006) finds supplier credit rates in the range of 44% for small firms in the U.S. and U.K.

One concern may be that real rates above 40% are exorbitant and fully explain why many entrepreneurs do not seek microfinance loans. It turns out, however, that ACP's interest rates are consistent with those charged for similar types of short-term, working capital loans within Peru[77] and within some developed countries[78]. They are also consistent

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[74] According to the Central Bank of Peru, annual inflation was 8.5% in 1997, and 3.5% in 1999.
[75] "Microloans' refer to loans that are significantly smaller in size than those typically lent by banks and extended to borrowers with collateral that is insufficient to qualify for standard bank loans.
[76] Interest rates tend to be extremely low and in some instances zero for loans from family and friends and ROSCAS, although for both implicit costs partially mitigate the low rates. Loans from family and friends often carry the expectation of reciprocation while loans from ROSCAs depend on the order given and the timing of the distribution might not coincide with business needs (Dunn and Arbuckle 2001).
[77] According to the Central Bank of Peru (BCRP) nominal short-term rates for the general banking sector averaged 31.1% in 1997 and 27.6% in 1999. Unlike the banks included in these averages, microfinance institutions lend to borrowers with zero or very little collateral and extend loans of significantly smaller size. As a result they generally charge much higher interest rates (CGAP 2002, Armendariz and Morduch 2005).
[78] Research on the use of supplier credit in the U.S. and U.K. (Cuñat 2006) finds the implicit costs of standard contracts for manufacturers in these countries are close to 44% a year, and in some cases are as high as 358%. This is quite expensive for countries with deep and well functioning financial markets. Yet supplier credit continues to be a popular financing source for small and medium sized firms in the U.S. and U.K.

with the returns several microentrepreneurs likely generate from capital[79]. As a result, high

interest rates probably explain only a small portion of non participation behavior.

In the case of repayment terms, ACP is much more restrictive than the other sources,

principally informal ones. Similar to most microfinance institutions ACP has very strict

repayment terms for both group and individual loans. If a borrower is delinquent they are

charged a daily fee, and if a borrower defaults they are barred forever from future loans from

the institution. Not only is there no option for late repayment, there is a severe penalty for

doing so[80]. This compares to terms that likely are more flexible for supplier credit and loans

from family and friends, the two most cited credit sources[81].

Despite market interest rates and more restrictive terms, microfinance loans have two

key advantages over other credit sources, principally informal ones. The first is the ability to

provide larger and more frequent loans than informal sources. As with any financial

intermediary the pool of loanable funds is greater for an MFI than for informal lenders such

as suppliers, moneylenders, and family or friends. The information in table III.1 confirms

this: median loan sizes for ACP surpass those from all other sources except other financial

intermediaries. Additionally, in interviews several clients cite larger loan size as an

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[79] Using data on urban microentrepreneurs in Mexico, McKenzie and Woodruff (2006) find real monthly
returns that range from 10-15% for small to medium size investments and 2-3% for larger investments. Udry
and Anagol (2006) estimate returns to capital for the informal sector in Ghana and find real rates in the order of
60%.
[80] Most MFIs eternally bar borrowers from any future loans in the case of default. Alexander (2006) argues this
severe penalty is unnecessary to create the dynamic incentives that are thought to contribute to high repayment
rates. She presents a model in which the punishment phase for default can be less than infinity and still produce
repayment rates that allow microfinance institutions to break even.
[81] Although there is no information on the terms of either, in the case of loans from family and friends it is
likely repayment terms are more flexible. In the case of supplier credit, information from standard contracts in
the U.S. (Cuñat 2006) suggests these contracts also have more flexible repayment terms. In a representative
survey of small U.S. firms, 46% report paying back suppliers after the due date and 43% report no penalties for
late payment. The same firms report more inflexible repayment terms for banks loans. Translating this to the
ACP sample, the option of late payment may explain the high incidence of supplier finance for entrepreneurs,
even amongst those with multiple sources of bank and microfinance credit.

advantage of borrowing from ACP, while dropouts mention the difficulty in cobbling

together the same quantity of funds from other sources.

The second advantage is the guarantee of continual access to credit as long as

outstanding debts are serviced on time. Many microfinance institutions have renewable loan

contracts and, in the case of ACP, the client can receive a new loan the same day a previous

loan is repaid.[82] Furthermore, with prompt repayment many MFIs grant borrowers access to

an increasing pool of funds. The guarantee of access to continual and increasing credit likely

is not replicated by informal lenders due to limited and more variable sources of funds.

3.1 Microfinance and Project Choice

As a result of larger loans and more continual access, microfinance can finance projects,

particularly those with larger working capital requirements, which other credit sources

cannot. The theoretical model further assumes that projects with larger working capital

requirements have higher returns and risk than those with lower working capital

requirements. Several client interviews justify this assumption. For the microentrepreneurs

in this sample high yield/ high risk projects oftentimes translate into larger, more expensive

inventory items that have higher expected return but also more risk. A former ACP client

provides an example:

> "When Pepa was receiving loans… she would use them primarily to invest in high
> margin clothing for sale. She saw the loans as a separate credit for her mobile
> clothing business, and used them only for her (other home based retail business
> during peak sales seasons)… Credit helped Pepa invest in clothing, which while
> requiring larger investments, provided higher returns." (Dunn and Arbuckle 2001)

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[82] Armendariz and Morduch (2005), in summarizing their own and others' work, explain that this automatic roll
over generates the dynamic incentives that help explain high payback for many MFIs despite little or no
collateral. When funding is automatically extended and sometimes increased, the cost of defaulting rises for the
borrower. Alexander (2006) also presents a model of dynamic incentives in individual loan contracts.

Pepa is later forced to dropout of ACP due to her husband's payment delinquency. After

loosing access to the larger microfinance loans she must abandon her clothing business due

to an inability to procure the same quantity of funds from other sources (Dunn and Arbuckle

2001). Another ACP client provides a similar story. She comments:

> "With loans you can buy other things that take longer to move, but which leave you
> with more profit." (Dunn and Arbuckle 2001)

These quotes illustrate how microfinance, as a result of larger loan size, can be used to

fund high risk, high return projects. The specific example of bulky inventory also reveals

why microfinance borrowers might be limited to entrepreneurs with sufficient support to

cover loan repayments and consumption needs if an adverse shock, such as robbery or an

unanticipated sales decline, occurs.

3.2 Alternative Hypotheses for Microfinance Selection: Supply

This paper focuses on a demand side explanation for non participation in microfinance

programs and in so doing it implicitly assumes limited supply of microfinance loans is not

behind limited outreach. This assumption may be problematic if microfinance institutions

have limited sources of funds and are at full capacity in terms of loan extension or if the

entrepreneurs who don't participate are lower quality borrowers and would likely be rejected

if they applied for a loan. In both cases the assumption that entrepreneurs without

microfinance have access to this credit breaks down, jeopardizing the vulnerability

hypothesis. Additional information on ACP/Mibanco addresses both concerns. In the case

of the supply of loanable funds, in the year 2000, one year after the final survey round,

Mibanco reports using only 65% of an approved credit line and states this is an improvement

over previous years[83]. This clearly shows the institution has excess lending capacity and that limited supply of funds is not driving low penetration rates.

The case of high rejection rates is more difficult to address since we do not know if entrepreneurs without microfinance would be accepted for a loan if they applied. Anecdotal evidence suggests they would be. On paper all meet the requirements for ACP loans and the institution, similar to most microfinance institutions, has fairly low rejection rates[84]. Researchers involved with data collection believe most of the entrepreneurs without microfinance would be approved for a loan. Furthermore, comparisons of entrepreneurs who join microfinance programs by the second panel period to entrepreneurs who never join reveal few observable differences between the two. In logit analyses only other property and informality status in 1999 are significant in predicting which entrepreneurs join microfinance programs. While this indicates we have little information about factors leading one group to join microfinance programs, it also indicates that based on the same factors observable to the lender, entrepreneurs without microfinance are fairly indistinguishable from counterparts who join microfinance programs. This suggests that while rejection rates are a concern, they probably are not the major cause of low microfinance participation.

3.3. Vulnerability and Skill Measures

To measure vulnerability and skill I use the same variables outlined in chapter 2. The vulnerability measures include savings incidence, liquid wealth, home ownership, other property, marital status and Time in Lima. The skill measures include variables for secondary education and education above a secondary level, and experience, as measured by

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[83] Information from Mibanco's annual reports, available on www.themix.org. Conversations with practitioners reveal excess capacity is not an exclusive domain of ACP/Mibanco and that other large, microfinance institutions oftentimes have access to more funds than they can lend.
[84] See The Microfinance Gateway for discussion of rejection rates.

the maximum amount of time any business of the household has been in operation. Average

values for all variables are presented in tables III.2 and III.5.   Below I also address some

concerns about several of the vulnerability measures that are particular to the analysis of

microfinance selection.

The first concern about the vulnerability measures is that household wealth, savings,

home ownership, and other property are all bi-products of microfinance participation and

therefore endogenous[85]. If this is true reverse causality bias clouds any information about the

impact of vulnerability on microfinance selection. In the case of savings, home ownership

and other property, ACP's limited product offerings during the survey period quell most

endogeneity concerns. In 1997 and 1999 ACP only offered short-term, working capital

loans. It did not offer a savings product, nor did it offer mortgage loans or any type of long

term, high principal loan that would be needed to buy property. Furthermore, in the case of

savings, questions on saving behavior reveal that few entrepreneurs save through demand

deposits with financial intermediaries. The majority save by stashing money in their house

or through ROSCAs. It therefore is unlikely savings, home ownership, and other property

are simply weak proxies for microfinance status and that reverse causality bias is significant.

Unfortunately the same cannot be said of durables and vehicles, as microfinance

loans frequently are used to finance these purchases. This means microfinance participation

likely governs asset values and that endogenity concerns are quite valid. Instrumenting for

household wealth using a variable that determines assets but does not determine microfinance

selection would eliminate the reverse causality bias, but a valid instrument does not emerge

from the data. As a result, household wealth should be viewed as a control rather than an

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[85] Savings status is a particular concern since many microfinance programs not only offer savings products, but require borrowers to maintain positive savings with the institution during the duration of the loan (see Armendariz and Morduch 2005). ACP, however, does not a have forced savings component to its loans.

independent vulnerability measure. In particular its inclusion may control for differences in risk preferences, which also dictate project choice and microfinance selection. C*eteris paribus,* more risk averse households achieve lower expected utility under the risky enterprise and microfinance than their less risk averse counterparts. Knowing risk preferences is impossible, but to the extent that they are a function of wealth, the inclusion of wealth may partially control for disparate levels of risk aversion as a determinant of microfinance selection.

The second concern is that the informal network measures proxy for household characteristics besides vulnerability that impact microfinance selection. For marital status the concern is that it simply captures the effect of having another working adult in the household. To control for this I include the total number of household members that currently work. The concerns for tenure in Lima are that it captures entrepreneurial experience and/or increased knowledge of better projects rather than reduced vulnerability. To control for the first concern I use age and entrepreneurial experience, as measured by the longest tenure of the household's microenterprises. To control for better knowledge of good projects I use measures of entrepreneurial skill, outlined below.

The final concern involves the potential for the informal network measures to actually reduce the probability of microfinance selection if loans from family and friends are substitutes for enterprise credit from microfinance institutions. Given the large reliance on credit from family and friends, it is possible entrepreneurs with greater informal networks can finance their working capital needs via these channels, eliminating the need for microfinance credit. If this holds, and if the importance of informal networks lies more in providing substitutes for microfinance than in reducing vulnerability, we may see a negative

relationship between the informal network variables and microfinance participation. Thus there is potential for the empirical estimation to yield signs on marital status and Time in Lima opposite those predicted by the theory.

4. Empirical Estimation of Microfinance Selection: Complete Sample

I first analyze the determinants of microfinance selection using the complete 1997 sample, which includes 701 households. One benefit of exclusively considering the first survey round is a larger sample, as attrition whittles down the original households to 520 by 1999. The cost, however, is under-utilization of the additional information provided in the second survey round. This information may be helpful in understanding microfinance selection, and therefore I follow this section with a similar analysis using the balanced panel (Section 5).

To estimate the probability an entrepreneur has microfinance in 1997 I use a random utility framework, as suggested by the theoretical model. As of 1997 entrepreneurs have two choices; to select microfinance prior to 1997 (denoted as j) or not to select microfinance prior to 1997 (denoted as k). The probability an entrepreneur chooses j over k is the probability j yields higher utility than k. If utility from a given choice is a linear function of observable factors (X_i) and unobservable factors (ε_i), this probability is:

$$\Pr(Microfinance_{i,1997} = j) = \Pr(X_i\beta_j + \varepsilon_{ij} > X_i\beta_k + \varepsilon_{ik}) \qquad (1)$$

If the random components follow a generalized extreme value distribution the estimation of

(1) is: $\Pr(Microfinance_{i,1997} = j) = \dfrac{e^{X_i\beta}}{1 + e^{X_i\beta}}$, which is the simple logit model of binary choice.

The four types of observable components used in the estimation are outlined below. Mean values are presented in table III.2.

1) Household characteristics include: the entrepreneur's gender, the entrepreneur's age, as measured by four age bin dummy variables[86]; the dependency ratio (number of children under 16 to total household members); the total number of working adults in the household; and whether or not the entrepreneur was hit with a shock at the household or enterprise level in the past two years[87].

2) Enterprise characteristics include: the total number of enterprises run by the household; a dummy variable if all the enterprises of the household are informal[88]; and enterprise categories, as defined by eight dummy variables that equal one if a household has an enterprise in a certain category.

3) Vulnerability Measures include: household wealth, as measured by the net value of durable good and vehicles; a dummy variable for savings; a dummy variable for home ownership; a dummy for control over other property[89]; a dummy variable if the entrepreneur is married or has a partner; and an entrepreneur's tenure in Lima.

4) Skill Measures include: dummy variables for secondary or above secondary education and the maximum amount of time any enterprise of the household has been in operation.

Results of logit estimation of microfinance status in 1997 based on these observable characteristics are presented in Table III.3. Column (1) presents results including all vulnerability measures except wealth and column (2) presents results including wealth. Column (3) includes results with interaction terms. For comparison, results of a linear

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[86] Age bins are less than 25, between 40 and 60 and above 60. The left out comparison group is age between 25 and 40. The goal is to see if younger and older entrepreneurs behave differently than "middle age" ones.
[87] A shock is defined as "any unexpected or unforeseen event that that occurred in the previous 2 years and that had significant negative economic or financial repercussions for the household." (Dunn and Arbuckle)
[88] I consider two measures of informality. The first dummy variable takes a positive value if all of the enterprises of a household are informal. The second is less stringent and takes a positive value if at least one enterprise of the household is informal. The second is considered for robustness in the analysis.
[89] Respondents are asked if they or another household member have another residence in or near Lima.

probability model are presented in columns four (4) and five (5). Reported coefficients on all terms are average marginal effects, with the exception of the interaction terms, in which case average interaction effects are reported[90].

The results from logit estimations using 1997 data support the key theoretical prediction that vulnerability reduces the probability an entrepreneur seeks out microfinance. Four vulnerability measures, home ownership, savings, marital status and time in Lima, are significant predictors of microfinance status in 1997. Home ownership increases the probability an entrepreneur has microfinance in 1997 by 19%-25%; savings increases the probability by 7%-12%, having a spouse or partner increases the probability by 9-12%, and one more year of residence in Lima increases the probability by 0.3%, while 5 more years increase the probability by 1.8%. Taking the first three combined, if an entrepreneur goes from zero to positive values for savings, home ownership and marital status, the probability she has microfinance in 1997 increases by 35%. For marital status the results are robust to controlling for the number of working household members, implying the importance of marriage or partnership goes beyond having another adult in the household[91]. For Time in Lima, the results are robust to controlling for age and experience, implying tenure impacts microfinance selection through some other channel. Finally, the coefficients on the informal network measures are positive despite potential downward bias stemming from the substitution of loans from family and friends for microfinance credit. This further suggests the link between these variables and microfinance selection may lie in vulnerability.

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[90] See Ai and Norton (2003) for discussion of why the interaction effect differs from the marginal effect of the interaction term, and appropriate calculation of the former.

[91] In almost all cases the coefficient on marital status declines if it is defined more restrictively (cohabitation not included), implying the benefits indeed stem from partnership.

To ensure the positive and significant coefficients on home ownership, savings and marital status are not simply statements about wealth and risk aversion rather than vulnerability, I estimate the logit model with and without household wealth (columns (1) and (2)). If wealth fully drives the relationships between savings, home ownership, marital status and microfinance selection, the coefficients on these variables should change when wealth is included. Comparison of the results in columns 1 (wealth excluded) and 2 (wealth included) show this is not the case. While the estimated marginal effects slightly decline following the inclusion of wealth, the reduction is small and all three variables remain significant at the 10% level. Therefore it is unlikely the significance of these measures simply shows wealth's influence on microfinance selection.

To test the second and third theoretical predictions that vulnerability's role in selection declines in wealth and skill, I include two sets of interaction terms. The first set interacts household wealth with the four main vulnerability measures; home ownership, savings, marital status and Time in Lima. The second set interacts skill, as measured by the secondary education dummy, with the same four variables[92]. If the theoretical prediction holds the signs on these terms should be negative. Column (3) contains estimation results, which overall provide weak evidence supporting the second and third theoretical predictions. Consistent with the theory the signs on three of the four wealth and skill interaction interaction terms are negative. This implies wealth and skill reduce the impact of each vulnerability measure on microfinance selection. In all cases, however, the coefficients are insignificant, implying that the influence of wealth and skill on the impact of vulnerability is indistinguishable from zero. The lack of significance could stem from the limited sample

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[92] Given the small sample size I have an interest in limiting the number of interaction terms. I choose only one skill variable to interact and choose education because it seems a stronger proxy measure than experience.

size of the ACP data, and a larger data set would likely yield more conclusive results about the second order effects of skill and wealth.

In sum, in the full sample, home ownership, savings, marital status and time in Lima, have significant power in predicting microfinance participation in 1997. While I have tried to control for potential sources of bias, it is still possible there are unobservable factors, principally the portion of skill not picked up by education and experience, that jointly determine the vulnerability measures and microfinance participation. In the absence of sufficient panel periods to use individual fixed effects to better capture these unobserved factors, it is only possible to control for sources of bias using observable characteristics. To the degree the observables employed control for the confounding effects of skill, the logit results provide strong evidence that vulnerability negatively impacts microfinance selection.

Section 5: Empirical Model of Microfinance Selection, Balanced Panel

Although the balanced panel sample is smaller and may differ from the original due to attrition, incorporating the information from the second survey round provides a more comprehensive analysis of microfinance selection. This section and the appendix are devoted to investigating the determinants of microfinance selection using the balanced panel.

I first address concerns that the results from the full 1997 sample are driven by observations that drop out of the sample. I re-estimate the logit model of microfinance in 1997 on the sub-sample of households that appear in the 1999 estimation[93]. The results, presented in columns (4), (5) and (6) of table III.6, essentially match those from the estimation using the full sample, confirming that the results from the full sample are robust to exclusion of households that exit the sample.

5.1 Empirical Analysis of Microfinance Selection, 1999

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[93] This is less than 520 households due to non-response on some 1999 enterprise level variables

As mentioned in chapter 2, the inclusion of 1999 data yields a more complex breakdown of households based on microfinance status as several microfinance clients drop out and several non-microfinance clients become clients of Mibanco or another microfinance institution by 1999. By 1999 there are four groups of entrepreneurs; those who have microcredit in 1997 and in 1999 (Still Have), those who had microcredit in 1997 but do not in 1999 (Dropouts[94]), those who did not have microcredit in 1997 but do in 1999 (Join MFI) and those who do not have microcredit in either 1997 or 1999 (Never Join). The breakdown is presented in Table II.1 in the previous chapter.

With the sequential nature of the decision making process outlined in the panel data a nested logit becomes the natural model to estimate microfinance selection. The difficulty with the nested logit, however, is the small size of the Dropout and Join MFI groups. This is problematic because after dividing entrepreneurs into nests based on their 1997 microfinance status, within each nest there is insufficient variation to discern the differences between the group that has microfinance in 1999 and the group that does not. As a result the nested logit yields little information about the determinants of 1999 microfinance status. Details of the set-up and results of the nested logit estimation are provided in appendix 1.

To overcome the problem of limited sample size I turn to a simple logit estimation of microfinance status in 1999. I use the same observables as in the 1997 estimation, but employ 1999 values. Results are presented in Table III.6. Column (1) presents results without household wealth, column (2) presents results with household wealth, and column (3) presents results with interaction terms. Finally, because the Still Have and Never Join groups present the starkest contrasts regarding microfinance choice, I estimate a logit model

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[94] Dropouts are defined as entrepreneurs that have not taken out any microfinance loans since 1997; that is, in almost two years

of microfinance selection using these two groups. Results of this estimation are presented in table III.7. Columns (1), (2) and (3) contain results using 1997 variables and columns (4), (5) and (6) contain results using 1999 variables.

The most striking feature of the estimations of microfinance status using 1999 data is that the results are less conclusive those using 1997 data. In both sets of analyses 1999 values have significantly less power than their 1997 equivalents in predicting microfinance participation. This is specifically true of the vulnerability measures, of which only marital status remains positive and significant in all cases. Home ownership, savings and time in Lima, which were strong predictors of microfinance status in 1997, fail to remain so in 1999. The same pattern is observed in the Still Have and Never Join comparison. 1997 values of home ownership, savings, marital status and time in Lima are all significant in predicting which entrepreneurs have microfinance in both periods (Still Have) and which do not (Never Join). When 1999 values are used, however, only marital status remains significant in all cases. The limited power of 1999 vulnerability measures to predict microfinance status is curious, given strong evidence in the 1997 data to the contrary. Further investigation into the differences across the panel periods reveals a possible explanation for this change.

5.2 Increased Realization of Negative Shocks: The Environment in 1999 vs. 1997

An important feature of the vulnerability variables is that many are ex-ante measures; they largely capture the ability to smooth consumption prior to being hit with a shock. The degree to which the same variables capture vulnerability after a negative shock is realized, however, is unclear. For example, households list savings as the principal mechanism for managing adverse events (see Table III.8), which means many likely drain their savings in the wake of a negative shock. Based on savings alone all of these households look more vulnerable ex-

post than ex-ante. Some households, however, will have unchanged vulnerability status if they maintain the ability to take out consumption loans and thereby smooth consumption across a subsequent shock. So while a decline in savings likely indicates increased vulnerability, the extent to which this happens varies across households and remains unknown.

The difference between ex-ante and ex-post measures turns out to be a concern because the 1999 survey round portrays a significantly worse moment in the lives of the ACP households than the 1997 survey round. In 1998 the Peruvian economy entered into recession following El Niño, the Asian crisis and Russia's default and only began to emerge from it in the fourth quarter of 1999, after the second survey round[95]. According to the Central Bank of Peru, from the third quarter of 1997 to the third quarter of 1999 real GDP fell by 0.2%. This compares to an 8.7% increase in real GDP during the two year period leading up to September 1997. The brunt of this contraction came from real internal demand, a measure that better captures the situation of urban micro-entrepreneurs since few are engaged in export industries. Between the first and second survey rounds real internal demand fell by 6.4%, which compares to an 8.6% increase over the two years leading up to the first survey round.

Survey questions confirm that the deteriorating macroeconomic environment translated into increased negative shocks for ACP entrepreneurs. The percent of entrepreneurs in the balanced panel that report receiving a negative shock increases by 13%, from 44% in 1997 to 57% in 1999, while the percent living below the poverty line increases by almost 10%[96]. In

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[95]See BCRP Annual Reports for 1998 and 1999 and Dunn and Arbuckle (2001) for details on the recession, particularly further explanation on the impact of the Asian and Russian crises on Peruvian internal demand.
[96]Defined if a household's consumption per adult equivalent falls below a $2 measure, which is determined by the Peruvian statistical agency (INEI).

addition, as shown in table III.8, the ranking of most severe shocks changes. In 1997 only 17% of households report loss or reduction of income as the most severe shock. By 1999 this increases twofold, further indicating the recession had a direct impact on the entrepreneurs in the sample. There also is evidence that many households liquidated savings in the face of adverse events. In 1999 savings is listed as the main mechanism for managing a negative shock, and every group except Join MFI registers a decline in savings incidence over the two year period. The most severe decline occurs in the Still Have group, which largely explains why savings ceases to be a significant predictor of microfinance status in 1999. A similar channel to insignificance may be at work for home ownership, although there is weaker evidence for this in the data.

In light of the inherent difficulties of ex-ante vulnerability measures, it is compelling that martial status, one of the measures less likely to change following a negative shock, is the variable that remains significant in all cases. Martial status proves the most robust predictor of microfinance status, an interesting result given that I control for working household members and the weak correlation with both income and wealth. This implies having a spouse or partner influences microfinance selection through some other channel, potentially informal networks. Indeed, of the vulnerability measures, marital status likely best captures the unobservable characteristic that is a household's access to informal consumption credit. As such, despite the fact that home ownership and savings cease to be significant predictors of microfinance status in 1999, the empirical evidence supports the contention that vulnerability determines microfinance selection.

6. Conclusion

This paper argues that vulnerability, defined as the inability to smooth consumption across adverse income shocks, is a key determinant poor entrepreneurs' decision to seek microfinance loans and a potential explanation for low microfinance participation rates. In a simple theoretical model vulnerability is found to drive some entrepreneurs to reject high yield/high risk enterprises and microfinance, even after accounting for skill and wealth. Vulnerability is also predicted to weigh less heavily in microfinance decisions for high skill and high wealth entrepreneurs. Using data from ACP, a large microfinance institution in Lima, Peru, I find empirical support for the theory that vulnerability drives microfinance decisions. More vulnerable entrepreneurs are significantly less likely to seek microfinance than their less vulnerable counterparts.

The vulnerability theory outlined in this paper would benefit from further investigation using more expansive data sets. While the ACP data set is one of the few panel data sets on urban microentrepreneurs, it is imperfect due to the small sample size and limited number of panel periods. In order to make more conclusive statements about the importance of vulnerability it would be helpful to acquire evidence from larger or longer (in the sense of panel periods) data sets.

Finally, the results of this paper have important implications for microfinance institutions and general efforts to expand credit access for the poor. Despite enthusiasm surrounding these efforts, credit expansion has not proved a magic solution to poverty. Contrary to the claims of many microfinance proponents, most poor households do not appear to be one or two loans away from crossing the poverty line. Given the credit constraints many poor household face and the potential link between these constraints and poverty, it is curious that credit outreach programs have had less of an impact than

anticipated. Vulnerability may be one important explanation for this phenomenon. From a policy perspective this suggests efforts to improve risk management strategies should play a larger role in poverty reduction policies. Specifically, promotion of credit structures that can better be used for consumption smoothing (longer term loans that are not self-amortizing or have more flexible repayment schedules) and microinsurance, both of which would reduce vulnerability, should be more thoroughly integrated into credit expansion programs, particularly microfinance.

Chapter IV

How Representative Are the ACP Data?

1. Introduction

One relevant question that arises from the analysis of enterprise choice and credit use

amongst the Lima microentrepreneurs is the extent to which the results translate to a larger

sample. To what degree is the behavior exhibited by the entrepreneurs in the Peruvian

sample found in the general population of urban microentrepreneurs? To answer this, a

representative sample of urban microentrepreneurs is needed. While no such survey exists

for Peru or Lima, a representative survey does exist for Ecuador, a country that is very

similar to Peru geographically, economically, and culturally. The cross-sectional survey of

Ecuadorian urban microentrepreneurs was conducted under the SALTO Ecuador[97] project

from March to August 2004, and contains 17,738 microentrepreneurs, an estimated 3.8% of

all urban microentrepreneurs in the country. It is one of the few representative samples of

urban microentrepreneurs in the developing world and provides invaluable information about

the characteristics of the microenterprise sector, particularly within Latin America. Since the

universe of urban microentrepreneurs in Peru likely differs from that in Ecuador, the SALTO

data cannot exactly place the ACP sample sits within a broader context. Given the

representative nature of the SALTO data, however, the analysis is useful in assessing if the

behavior the ACP entrepreneurs is mimicked in a wider sample, and therefore if the analysis

in the first two chapters has relevance for the general microenterprise sector.

    To situate the ACP entrepreneurs I compare them to the larger, representative

Ecuadorian sample and to the subsample of 4,908 entrepreneurs that live in Quito and

Quayaquil. The Quito-Guayaquil sub-sample is constructed to address concerns that

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[97]See www.salto-ecuador.com for the data, documentation, and details of the survey

entrepreneurs in small and medium sized towns (the cut off for "urban" is a population of over 5000) are unrepresentative of entrepreneurs in cities of over a million inhabitants, such as Lima. Both cities are used in the "large city" comparison sample because they collectively have many of the characteristics of Lima, the capital, largest city, and economic center of Peru. Neither Quito nor Guayaquil can claim all three titles; Guayaquil is the largest city, Quito is the capital, and economic power is almost evenly divided between the two[98]. General country and city level information is presented in table IV.1.

The comparisons of the ACP and the Ecuadorian samples proceed in two steps. The first step, outlined in Section 2, compares household and enterprise characteristics, as well as skill and vulnerability measures. The second step, outlined in Section 3, examines formal credit use in the Ecuadorian sample and compares this to observed behavior in the ACP data. The main goal of the SALTO project was to gain a better understanding of access to and use of formal financial services by the microenterprise sector and potential barriers to each. The numerous survey questions aimed at microentrepreneurs use of and demand for formal financial services provide a good picture of their formal, financial lives.

2. Observable Household and Enterprise Characteristics

This section walks through comparisons of key household and enterprise characteristics across the ACP and SALTO-Ecuador samples. These characteristics include income and wealth, other household characteristics, enterprise characteristics and vulnerability and skill. Mean and, in some cases, median values are presented in table IV.2.

2.1 Incomes and Wealth

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[98]Quito is in the Andes while Quayaquil is on the coast. The history of Ecuador is marked by continual conflict between the coastal and Andean regions over economic and political power, and this division explains why, dissimilar to many Latin America countries, one city is not dominant.

Comparisons of monthly household income reveal that the ACP sample is better off than the average, urban microentrepreneur in Ecuador. Mean monthly income from all sources, including microenterprises, wage labor, remittances and other, is 45% higher for the ACP sample than for the total Ecuadorian sample. The median, which better controls for outliers, is 88% higher, and fits into the upper quartile of the distribution of Ecuadorian income data. Results for monthly microenterprise income present even greater differences. Mean microenterprise income is 79% higher in the ACP sample. Median microenterprise income is 113% higher and fits into the third quartile of the distribution in the Ecuadorian data. Both comparisons are essentially the same for the Quito-Guayaquil subsample. To the extent the Ecuadorian sample is representative of Peruvian microentrepreneurs, these results suggest the ACP entrepreneurs are better off and generate higher income from their businesses than the average, urban microentrepreneur.

Unfortunately it is not possible to complement the income analysis with a comparison of wealth as the Ecuadorian survey does not contain wealth information. Households were asked if they owned vehicles, equipment, machinery and other assets that could be used as loan collateral, but gross or net values were not acquired. Incidence alone of "collateral-worthy" assets suggests the ACP sample is better off. 46% of the Ecuadorian sample reports owning a vehicle, equipment, machinery, or other "collateral-worthy" assets, as opposed to 100% of the ACP sample. These comparisons are purely suggestive, however, since it is unclear if the asset questions in the Ecuadorian data include smaller durable goods, such as electrical appliances, listed by many of the ACP households. Meanwhile, although comparison of enterprise level assets makes the Ecuadorian sample look better off, the survey questions differ across the samples and are not fully comparable. In particular, the

Ecuadorian survey attempts to gauge the value of assets which were not included in the ACP questionnaire, such as vehicles, land, installations and inventory. Although I remove land and inventory from the Ecuador asset values, the other categories are broad and likely include fixed assets which are not listed by the ACP entrepreneurs.

One important extension is a comparison of the Never Join group (the group that never has microfinance in the ACP data) to the Ecuadorian sample. The Never Join group stands out from the entrepreneurs with microfinance and for the purposes of understanding low credit use, it is instructive to see if this group better reflects the average urban microentrepreneur than ACP entrepreneurs with microfinance credit. Simple income comparisons imply this is the case, as the differences in monthly collapse when only considering the Never Join group. Mean total income is only 17% higher for the Never Join group and median income is 44% higher. Meanwhile, mean microenterprise income is actually slightly lower for the Never Join group, while median values are slightly higher. This suggests the Never Join group may be closer to the broad universe of urban microentrepreneurs than their counterparts with microfinance.

2.2 Other Household Characteristics

Other household characteristics include the age and gender of the entrepreneur and the dependency ratio[99]. The gender breakdown differs across the two samples, reflecting the fact that while ACP/Mibanco lends to men, women remain a targeted group of the institution. Over 60% of the ACP sample is comprised of female entrepreneurs, as opposed to 46-47% of

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[99]In the Ecuador data the dependency ratio is calculated as the number of children less than or equal to 12 as a percentage of total household members. The ACP values presented previously, which were based on number of children less than 16, were adjusted in table IV.2 for comparability. Total working members of the household, considered in the ACP analysis, is not available in the Ecuador sample.

the Ecuadorian sample. Meanwhile, the age composition and the dependency ratios of the two samples are the same.

2.3 Enterprise Characteristics

The types of enterprises operated by households, as evidenced by the distribution across nine categories, is similar across the two samples. For both samples the majority of enterprises are in the retail and wholesale category; 63% in the ACP sample and 55% in the Ecuadorian sample. The most notable differences are that the food and clothing production and hospitality categories constitute larger portions of enterprises in the Ecuadorian sample. Overall, however, the distributions look similar and illustrate that the ACP sample, small as it is, probably represents well the types of enterprises found in the sector.

While the categories of enterprises do not differ significantly, the number of enterprises operated by a household and monthly enterprise sales do. The values for both are significantly higher for the ACP sample, suggesting these households are more "entrepreneurial" than the average. For enterprise number, the average number for ACP households is 1.5, as opposed to 1.2 for Ecuadorian households. Furthermore, only 59% of the households in the ACP data operate only one enterprise, as compared to 80% of households in the Ecuadorian data. Increased entrepreneurial activity also is evidenced by enterprise sales, whose values in the ACP data dwarf those in the Ecuador data. Mean and median month sales for the ACP sample are over 400% higher, and mean and median values of the Never Join group are almost 300% higher than those in the Ecuadorian sample. These results further suggest the ACP households are better off than the average, urban microentrepreneur.

One interesting result is that despite higher enterprise sales, the incidence of informality is approximately the same in the ACP and Ecuador samples. 64% of the enterprises in the ACP data are informal, as opposed to 61% of the enterprises in the total Ecuadorian sample and 70% of enterprises in the Quito-Guayaquil sample. The high degree of informality could be the result of similar difficulties in legalizing enterprises[100], documented compellingly by DeSoto in the case of Peru (1989).

2.4 Vulnerability and Skill

To compare vulnerability and skill I use the variables outlined in the first two chapters.

Vulnerability: Vulnerability is defined as the inability to smooth consumption across negative income shocks and, in the absence of a direct measure, is captured by indirect measures of internal funds and access to consumption credit, including savings, the net value of durables and vehicles, home ownership, marital status and Time lived in the city of residence. Of these, only savings incidence, home ownership and marital status are directly comparable across the samples, as time in city of residence and net household wealth are not available in the Ecuador sample.

For savings, either formal or informal, incidence is the roughly the same across both samples. While total savings looks larger for the ACP data, the top line number has to be adjusted because it includes cash stashed at home, which is excluded from the Ecuadorian survey. This omission is critical because cash at home proves the most important savings vehicle for ACP households (almost 60% of respondents report that some of the savings takes this form), and the same is likely true of Ecuadorian households. Comparisons of the

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[100] The difficulty in formalizing enterprises is famously detailed in Hernando De Soto's "The Other Path" (1989).

non-cash savings measure show no difference. 34% of the ACP sample has savings, as opposed to 36% of the total Ecuadorian sample and 31% of the Quito-Guayaquil sample.

Property wealth as measured by home ownership is more prevalent amongst the ACP sample. 79% of the ACP sample has title to their home in 1997, as compared to 51% of the total Ecuadorian sample and 50% of the Quito-Guayaquil sample. It is possible the high incidence of home title in the ACP data is a result of the massive urban titling program put in place in Peru starting in 1992. Over a period of approximately 10 years this program gave title to over 1.2 million households[101]. A similar project has not been launched in Ecuador.

Finally, marital status, which proved the strongest predictor of microfinance participation, is equivalent across the two samples. 78% of the ACP sample in 1997 is married or has a partner, as compared to 76% of the total Ecuadorian sample and 77% of the Quito and Guayaquil subsample. Unfortunately, similar to the ACP data, the Ecuadorian data do not give more information on the extent and quality of social networks, the most important source of consumption credit in times of need. As such marital status remains the only variable we can use to capture the extent of informal networks.

Based on these three vulnerability measures alone the ACP sample looks no more or less vulnerable than the average, urban microentrepreneur in Ecuador. Responses on credit use, however, suggest that the ACP households are less vulnerable. The use of informal and formal credit is significantly higher in the ACP sample, as is detailed in the next section. Higher credit use is even seen in the Never Join group in the ACP sample. If any of the multiple credit sources listed by ACP household can be used to smooth consumption, higher credit incidence implies ACP households are less vulnerable.

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[101]See Field (2003) for more details on the titling program in Peru

Finally, similar to the ACP survey, the Ecuadorian survey includes questions on mechanisms for managing adverse shocks at the household and enterprise level. Responses are included in the second half of table IV.3. In line with the ACP data, borrowing from family and friends and savings are among the most important mechanisms. Dissimilar to the Peruvian entrepreneurs, however, loans from family and friends trump all other sources. Over 50% of Ecuadorian households report loans from family and friends as the main mechanism for managing a household emergency, as opposed to 18% of ACP households. The tremendous dependence on family and friends further illustrates the importance of informal networks in determining vulnerability. It also illustrates the need to obtain more detail on the quantity and quality of informal ties to create more robust measures of vulnerability.

Skill: To measure skill I used education and experience. For education, the average level is lower in the Ecuadorian sample than in the ACP sample. Only 53% of the Ecuadorian sample (full and Quito-Guayaquil) has education above the primary level, as opposed to 68% of the ACP sample. This may reflect the fact that the ACP households are better off, on average, than the typical, urban microentrepreneur in Ecuador. Experience, in terms of years in entrepreneurship, is higher amongst the Ecuadorian sample. Since we don't know which measure dominates, on the surface it appears skill is the same.

2.5 Conclusions about Comparability

Simple comparisons suggest that ACP entrepreneurs are better off, generate higher microenterprise income, and are slightly more entrepreneurial than the average microentrepreneur. If the ACP group is better off than the average, urban microenterpreneur, vulnerability may have substantial, relevance for the general microenterprise sector.

3. Formal Credit Use

The SALTO Ecuador survey is extremely useful in understanding formal credit use because it was designed with the purpose of understanding access to and use of financial services by microentrepreneurs sector and the barriers to each. As such, it provides a valuable aid in assessing if demand factors drive some portion of low credit use. Selected information from the Ecuador survey questions are shown in table IV.3. Information on the ACP sample is provided when the questions are comparable.

The numerous survey questions from the SALTO project reveal that formal credit use amongst urban microentrepreneurs is incredibly low. In the total sample only 7.2% of entrepreneurs used formal credit to start their enterprises and only 2.5% use formal finance for on-going operations. The numbers are no better for the Quito-Guayaquil sample; 5.7% of entrepreneurs used formal credit for start-up and 2.9% use formal credit for on-going operations. These low percentages do not fully stem from lack of collateral. Only 36% of households with collateral in the form of home, land or vehicle ownership, have ever had a formal loan and only 20% have applied for a formal loan in the past 12 months.

The survey also highlights that not all households who use formal credit are repeat borrowers. Of the 5,151 households that have ever had a formal loan, 44% have not applied for one in the past 12 months. Fear of overindebtedness and lack of need are cited as the main reasons. This shows that formal credit use is by no means permanent and that dropout behavior is not a specific phenomenon of microfinance institutions.

The lack of credit use is complemented by tremendous dependence on self-finance. 68% of entrepreneurs list savings as the main source of funds for start-up and 90% list retained earnings as the principal financing source for on-going operations. Savings is the

second most cited source of on-going finance. In general these entrepreneurs don't rely on

any type of external finance, formal or informal. This is a substantial departure from the

credit histories displayed by the ACP entrepreneurs, where 12% report using formal credit

other than microfinance, and 44% report supplier credit. Including microfinance, almost

61% of ACP households in 1997 have formal credit. This compares with 2.5% of the

Ecuadorian sample that reports formal credit and 5.6% that reports supplier credit. While

lower use in the Ecuador sample could result from more limited access, the numbers are so

dramatically dissimilar that they suggest behavioral differences may be part of the

explanation. In particular, the limited dependence on supplier credit is surprising given the

large reliance on this in the ACP data. Differential use may be an indication that ACP

enterprises are better established, despite lower tenure, and therefore have developed

relationships with suppliers.

Low leverage may be a determinant of stagnation in microenterprises, in which case

higher credit use may explain why ACP enterprises appear to generate higher sales and

income than the average Ecuadorian microenterprise. Addressing the reliance on internal

funds, the authors of the Ecuador survey comment:

> "The problem is that relying only on internally generated funds limits a firm's ability
> to grow. Ecuadorian microenterprises, in general, do not generate large cash flows,
> and profitability, especially in absolute terms, is relatively low. This shortage of cash
> leads to financial problems. Expanding the business often requires more capital than
> they can generate internally, yet the low levels of income and profitability limit their
> ability to service high-cost loans." (Magill and Meyer 2005)

Increasing reliance on external funds therefore may be pivotal to generating growth in the

microenterprise sector. Behavior of some entrepreneurs suggests, however, that demand

factors are an important driver of low levels of leverage. For example, there are 2,362

households that had a formal loan at one point, but have not applied for one in the past 12 months. When asked why, the most cited reason was fear of becoming indebted (33%), followed by no need for credit (19%). Furthermore, 39% of households with collateral in the form of home, land, vehicles or equipment report no interest in borrowing any amount at an interest rate of 20%, a rate lower than those charged by most MFIs in Ecuador. These responses and conversations with focus groups in Quito and Guayayuil led the survey authors to comment that "many microentrepreneurs only borrow when they really need it- when circumstances force them to take on a debt obligation." They subsequently conclude that "perhaps the most important challenge to MFIs in Ecuador is to overcome the microentrepreneurs' resistance to using credit." (Magill and Meyer 2005)

Finally, there is some evidence of negative relationships between credit use and several of the vulnerability measures in the Ecuadorian data. Of the entrepreneurs who have ever had a formal loan, 82% are married or have a partner, 66% have savings, and 62% own their home. This compares with marital incidence of 74%, savings incidence of 25%, and home ownership incidence of 44% for entrepreneurs who have never had formal credit. For all three measures the differences across entrepreneurs who have or have not used formal credit are significant at the 1% level. These comparisons by no means show causality between vulnerability and credit use, but they suggest a relationship may exist.

Overall the representative Ecuadorian data provides a more comprehensive picture of the low use of formal credit, showing that low penetration is not simply the domain of microfinance institutions, but of all types of formal lenders. More compelling than this, however, is the strong evidence that muted demand partially drives these results. The number of entrepreneurs who say they have no interest in formal credit because they are

afraid of over-indebtedness is large and challenges the notion that credit constraints are the main barrier to improved productivity of microenterprises. While I do not test if vulnerability is linked to non-participation behavior in the Ecuadorian data, simple correlations with the vulnerability measures suggest it may play a role.

4. Conclusion

On the majority of household and enterprise characteristics, the ACP sample does not differ dramatically from the average, urban microentrepreneur in the SALTO-Ecuador data. The average Ecuadorian microentrepreneur is married and about 40 years old, has a secondary education, various years of experience in microentrepreneurship, and operates an enterprise in the retail sector. This entrepreneur depends heavily on family and friends in times of need and has limited reliance on external finance, either formal or informal. The average ACP entrepreneur, in contrast, is slightly better off and uses substantially more external finance at the enterprise level, especially supplier credit.

Going forward I plan to investigate the determinants of enterprise choice and formal credit use in the Ecuadorian data. In the case of enterprise choice the analysis is limited due to the cross-sectional nature of the SALTO-Ecuador project, but nevertheless possible thanks to a line of questions in the survey on the variability of sales. For the portion of entrepreneurs that report variable sales the questions allow for construction of expected sales and variance of sales, two of the proxy measures of the portion of resources dedicated to the risky enterprise (θ). In the case of credit use, one important path of research is exploring the determinants of limited demand for formal credit exhibited by many of the Ecuadorian entrepreneurs. Given that limited demand explains a portion of low credit use, explicating

some of the causes of debt aversion is critical to better understanding the role credit can

actually play in improving the lives of poor households.

Table II.2: Summary Statistics

Mean Values	1997 Values[102]	1999 Values
Enterprise Characteristics, household level		
Average number of enterprises per HH	1.53	1.52
Informality		
All enterprises are informal	26.5%	33.8%
At least one enterprise is informal	48.4%	54.6%
Household Characteristics		
Hit by Shock in past two years	44.4%	57.1%
Age of Respondent	41.7 years	43.1 years
% Respondents that are women	60.8%	60.1%
Working Members of HH	3.36	3.40
Dependency Ratio	0.30	0.27
Vulnerability Measures		
Net Household Assets	8,996.7 Soles	9,416.7 soles
Have Savings	55.8%	46.9%
Own Home	80.8%	81.5%
HH has Other Property	13.5%	14.9%
Respondent married or equivalent	79.8%	76.7%
Time in Lima	28.4 years	30.4 years
Skill Measures		
Education of entrepreneur (% in each category)		
Primary & Below (left out group)	32.2%	30.0%
Secondary	48.3%	51.5%
More Than Secondary	19.5%	18.5%
Experience (max years of any enterprise)	8.06 years	9.50 years
Observations (N households)	520	520
Enterprise Characteristics, enterprise level		
Monthly Sales	3,861.5 soles	3,375.2 soles
Estimated Annual Sales	44,257.1 soles	41,773.4 soles
Time in operation	6.47 years	7.53 years
Net Enterprise Assets (by enterprise)	4,873.1 soles	6,325.0 soles
Total Enterprise Investment	2,593.0 soles	1,986.6 soles
Total employees per enterprise[103]	1.87	1.32
% enterprises with employees (not including entrepreneur)	72.3%	48.0%
Business Categories (% total enterprises)		
Food and Clothing	5.5%	6.7%
Manufacturing	3.9%	4.1%
Construction	2.2%	1.8%
Auto Repair/ Auto Parts Sales	5.2%	2.2%
Minor Retail and Wholesale	62.5%	60.5%
Hospitality	6.7%	7.5%
Transport	7.3%	9.9%
Services	4.5%	4.7%
Other	2.3%	2.5%
Enterprises in Sample (N)	786	759

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[102] 1997 values inflated to 1999 prices. For 1997 and 1999, 3.36 soles= 1USD (Banco Central de Reserva del Peru)

[103] Employees do not include the entrepreneur. Workers=Employees + Entrepreneur

Table II.3: Other Summary Statistics

Mean Value	1997 Values[104]	1999 Values
Income and Consumption		
Total Income	22.777.1 soles	22,775.4 soles
Total Microenterprise Income	13,310.6 soles	14,620.6 soles
Percent of Total	64.5%	65.4%
Income Per Adult Equivalent	5,731.1 soles	5,745.0 soles
Microenterprise income per adult equivalent	3,934.5 soles	3,809.1 soles
Essential Consumption per Adult Equivalent	4,702.6 soles	4,879.4 soles
Observations	518	518

Table II.4: Proxy Measures for θ

	Mean	Median
Total Microenterprise Income		
Average Microenterprise Income	14,647.1	11,224.8
Standard Deviation of Microenterprise Income	5,218.5	2,511.4
Coefficient of Variation*100	34.8	28.2
Observations (N)	514	514
Sales, Primary Enterprise		
Monthly Sales of Primary Enterprise, 1997	4,944.3	1,981.5
Monthly Sales of Primary Enterprise, 1999	4,574.8	1,820.0
Average Monthly Sales of Primary Enterprise	4,602.1	2,183.3
Standard Deviation of Monthly Sales	1,953.1	554.8
Coefficient of Variation*100	32.7	29.4
Observations (N)	418	418

All values in 1999 Nuevo Soles

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[104] 1997 values are inflated to 1999 prices. For 1997 and 1999 values 3.36 soles= 1USD (source, Banco Central de Reserva del Peru)

Table II.5: Results of OLS Estimation of Microenterprise Income

Dependent Variable=	Average Microenterprise Income		1999 Microenterprise Income		Standard Deviation of Microenterprise Income	
Values of Regressors:	1997	1999	1997	1999	1997	1999
	(1)	(2)	(3)	(4)	(5)	(6)
Vulnerability						
Own Home	154.4	-376.7	774.5	-970.6	-194.1	98.7
	(0.10)	(0.24)	(0.33)	(0.45)	(0.19)	(0.10)
Other Property	3346.6	-575.1	3347.1	-1696.1	1062.5	-857.2
	(1.99)**	(0.35)	(1.37)	(0.75)	(0.99)	(0.80)
Have Savings	1947.4	2807.0	924.9	4109.1	613.5	305.0
	(1.63)	(2.38)**	(0.53)	(2.52)**	(0.80)	(0.40)
Married or Equivalent	46.0	206.7	429.1	-196.5	-1248.7	-1277.1
	(0.03)	(0.14)	(0.19)	(0.10)	(1.25)	(1.36)
Time in Lima	9.1	20.2	-12.4	-34.2	-17.6	-35.3
	(0.17)	(0.38)	(0.16)	(0.47)	(0.51)	(1.03)
Wealth (Net HH Assets/1000	428.9	390.7	555.7	558.3	234.5	190.0
	(5.44)***	(5.48)***	(4.84)***	(5.68)***	(4.64)***	(4.13)***
Skill						
Secondary Education 1997	836.8	446.4	-879.5	-2360.2	-3.14	-19.8
	(0.60)	(0.32)	(0.44)	(1.24)	(0.00)	(0.02)
Above Secondary Education 1997	274.0	844.9	-2312.5	-2516.9	-109.1	305.4
	(0.15)	(0.48)	(0.89)	(1.03)	(0.18)	(0.27)
Experience 1997	10.7	98.7	-56.8	-12.4	17.4	62.1
	(0.12)	(1.15)	(0.43)	(0.10)	(0.30)	(1.12)
HH & Enterprise Controls[105]						
Informant a woman	-3397.5	-3044.1	-4805.9	-4713.2	-1315.2	-978.6
	(2.60)***	(2.31)**	(2.53)**	(2.60)***	(1.57)	(1.15)
Informal Enterprise	-3245.4	-3435.1	-2647.1	-3201.7	-1289.4	-1342.0
	(2.31)**	(2.61)***	(1.30)	(1.78)*	(1.43)	(1.58)
Constant	9456.9	6703.7	9662.2	4094.8	3422.9	4872.9
N	477	479	480	482	477	479
Adjusted R^2	0.179	0.190	0.090	0.188	0.066	0.066

*Absolute value of t statistics in brackets   *significant at 5%; ** significant at 1%*

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[105] Other controls include gender, age as captured by three dummy variables (less than 25, between 40 and 60 and above 60), dependency ratio, whether or not a household was hit with a negative shock in the past two years, the number of enterprises (significant at 5%), the informality status of enterprises, and dummy variables for the type of enterprise across 8 categories

Table II.6: Results of OLS Estimation of Primary Enterprise Sales

Dependent Variable=	Mean Monthly Sales		Standard Deviation of Monthly Sales	
Values of Regressors:	1997	1999	1997	1999
	(1)	(2)	(3)	(4)
Vulnerability				
Own Home	407.7	905.4	257.2	507.5
	(0.36)	(0.83)	(0.37)	(0.74)
Have Other Property	3970.5	295.9	1838.9	863.2
	(3.32)***	(0.25)	(2.45)**	(1.17)
Have Savings	953.5	352.0	261.1	100.6
	(1.16)	(0.43)	(0.51)	(0.20)
Married or Equivalent	247.6	-720.3	215.2	-626.0
	(0.23)	(0.71)	(0.32)	(1.00)
Time In Lima	54.2	31.3	37.7	31.3
	(1.45)	(0.83)	(1.61)	(1.34)
Wealth (Net HH Assets/1000)	80.9	124.0	34.6	59.1
	(1.53)	(2.50)**	(1.05)	(1.91)*
Skill				
Secondary Education in 1997	1058.4	779.8	649.1	537.5
	(1.10)	(0.80)	(1.08)	(0.89)
Above Secondary Education in 1997	1165.2	1291.8	173.8	274.8
	(0.92)	(1.02)	(0.22)	(0.35)
Experience of Entrepreneur in 1997	-39.3	-18.9	-49.7	
	(0.58)	(0.30)	(1.16)	
HH & Enterprise Controls[106]				
Entrepreneur a woman	-3282.5	-2779.2	-1628.0	-1474.1
	(3.50)***	(2.88)***	(2.76)***	(2.46)**
Informal Enterprise	-1414.4	-1854.0	-659.5	-651.5
	(1.55)	(2.01)**	(1.15)	(1.14)
Constant	6636.7	1305.6	3669.3	740.3
N	412	413	412	413
Adjusted R^2	0.074	0.058	0.036	0.034

*Absolute value of t statistics in brackets   *significant at 5%; ** significant at 1%*

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[106] Other controls include: age as captured by three dummy variables (less than 25, between 40 and 60 and above 60), dependency ratio, whether or not a household was hit with a negative shock in the past two years, the number of working household members, the number of enterprises (significant at 5%), the informality status of enterprises, and dummy variables for the type of enterprise across 8 categories

Table II.7: θ Measures for Groups Based on Microfinance Status

(mean values reported)	Still Have	Dropout	Join MFI	Never Join	ANOVA p- value
Microenterprise Income					
Microenterprise Income 1997	17,579.9	16,221.9	12,641.0	10.344.0	0.000***
Microenterprise Income 1999	18,216.1	13,145.4	15.975.2	9,705.9	0.002***
Average Microenterprise Income	17,920.1	14,683.7	14,308.1	10.046.5	0.000***
Standard Deviation of Microenterprise Income	6,523.1	5,527.0	4,538.5	3,443.3	0.004***
N	216	87	63	149	515
Primary Enterprise					
Monthly Sales 1997[107]	5764.3	6307.0	6046.3	3533.9	0.237
Monthly Sales 1999	4855.2	4245.6	5050.6	2268.2	0.038**
Mean Monthly Sales	5309.4	5312.5	5548.4	2901.0	0.045**
Standard Deviation of Monthly Sales	1925.5	2741.4	2696.6	1351.7	0.227
N	183	55	52	128	418

*difference significant at 10% level; **difference significant at 5% level; ***difference significant at 1% level

Table II.8: Tests for the Equality of Distributions of θ Measures

Comparison Group	θ Measure	Test	P-value of test statistic
Microenterprise Income			
Still Have vs. Never Join	Average Microenterprise Income	t-test for equality of means	0.000***
Still Have vs. Never Join	Standard Deviation of Microenterprise Income	t-test for equality of means	0.000***
Still Have vs. Never Join	Average Microenterprise Income	Kolmogorov Smirnov test for equality of distributions	0.000***
Still Have vs. Never Join	Standard Deviation of Microenterprise Income	Kolmogorov Smirnov test for equality of distributions	0.000***
Monthly Sales of Primary Enterprise			
Still Have vs. Never Join	Average Monthly Sales	t-test for equality of means	0.008***
Still Have vs. Never Join	Standard Deviation Monthly Sales	t-test for equality of means	0.250
Still Have vs. Never Join	Average Monthly Sales	Kolmogorov Smirnov test for equality of distributions	0.000***
Still Have vs. Never Join	Standard Deviation Monthly Sales	Kolmogorov Smirnov test for equality of distributions	0.000***

***Can reject null of equality at 1% level

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[107] Adjusted to 1999 soles

Table III.1: Types of Credit Other than Microfinance, 1997

Use of Other Types of Credit (% of 1997 full sample respondents)	Have Microfinance in 1997	Do Not Have Microfinance in 1997	Median Amount Outstanding (1997 soles)
Family/Friend	8.9%	10.1%	500
Moneylenders	2.3%	5.8%	225
Pawnshop	0.6%	0.4%	200
Suppliers	54.1%	50.0%	200
Companies/Credit Unions	2.0%	1.4%	715
Banks	7.2%	3.3%	2,171
EDPYMEs[108]	1.1%	0.4%	700
Cooperatives	0.3%	0.7%	2,000
ROSCAs	6.3%	4.7%	200
Government	1.7%	1.8%	115
Construction Banks	7.2%	2.5%	2,510
Other	4.9%	5.1%	364
None	33.5%	39.1%	
ACP (for 1997 borrowers)			1,300
N respondents[109]	349	276	
% non-respondents	13.0%	8.0%	
Average # non MFI debt sources	0.97	0.86	
Mean debt outstanding, non ACP	1.229.7	698.9	

Use of Other Types of Credit (% Balanced Sample respondents)	Still Have	Dropout	Join MFI	Never Join
Family/Friend	10.3%	8.6%	10.3%	11.8%
Moneylenders	1.5%	5.7%	3.4%	5.1%
Pawnshop	0.5%	1.4%	0.0%	0.7%
Suppliers	49.0%	42.9%	48.3%	44.1%
Companies/Credit Unions	2.1%	2.8%	1.7%	1.5%
Banks	5.1%	8.6%	8.6%	0.0%
EDPYMEs	1.0%	2.8%	0.0%	0.0%
Cooperatives	0.5%	0.0%	0.0%	0.7%
ROSCAs	3.1%	7.1%	8.6%	2.2%
Government	0.5%	0.0%	3.4%	0.7%
Construction Banks	6.2%	11.4%	6.9%	1.5%
Other	4.6%	5.7%	1.7%	5.1%
None	34.0%	34.2%	34.5%	39.0%
N respondents[110]	194	70	58	136
% non-respondent	34.0%	34.3%	34.5%	39.0%
Average # non MFI debt sources	0.94	1.07	1.07	0.82
Mean debt outstanding, non ACP	1030.5	1269.0	1242.3	501.1
Mean debt outstanding ACP (1997 soles)	1,680.0	1,191.4		

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[108] *Entidades de Desarrollo para la Pequena y Microempresa*. These are MFIs that are regulated financial institutions, unlike most NGOs that are unregulated.

[109] 79 HHs do not respond to these questions in the 1997 survey. I leave them as non-responses

[110] 62 HHs in balanced sample do not respond to these questions. I leave them as non-responses

Table III.2: Summary Statistics, Full Sample 1997

All Values as of 1997	Have Microfinance in 1997	Don't Have Microfinance in 1997	ANOVA (p value)
Household Characteristics			
Total Income	24,667	16,180	0.000**
% Entrepreneurs that are women	62.2%	59.8%	0.001**
Age of Microentrepreneur (mean)	41.2	40.8	0.103
Age Distribution			
Less than or equal 25	2.8%	8.0%	0.002**
Between 25 and 40	44.5%	46.2%	0.659
Between 40 and 60	49.0%	39.5%	0.013*
Above 60	3.8%	6.3%	0.118
Dependency Ratio	30.4%	29.6%	0.642
# Working Members of HH	3.29	2.78	0.000**
Hit by Shock in past two years	48.2%	39.2%	0.017*
Enterprise Characteristics			
Enterprise Number	1.60	1.37	0.000**
Informality			
All enterprises informal	47.3%	59.1%	0.002**
At least one enterprise informal	70.1%	71.4%	0.710
Have Enterprise in Category			
Food and Clothing	9.11%	5.78%	0.105
Manufacturing	4.8%	6.1%	0.450
Construction	3.8%	2.4%	0.296
Auto Repair/ Auto Parts Sales	6.6%	7.8%	0.531
Minor Retail and Wholesale	79.0%	80.6%	0.600
Hospitality[111]	11.1%	6.8%	0.052
Transport	13.9%	5.1%	0.001**
Services	6.6%	6.1%	0.807
Employees & Capital			
Total employees, all enterprises	1.62	1.17	0.003**
Employees per Enterprise	1.10	0.86	0.007**
Net Enterprise Assets	9.187.1	3,983.6	0.000**
Vulnerability			
Have Savings	62.2%	50.8%	0.002**
Own Home	86.0%	70.0%	0.000**
Other Properties	15.2%	10.6%	0.074
Married or Equivalent	82.7%	71.8%	0.511
Time in Lima	29.8 years	25.8 years	0.000**
Wealth (net household assets)	11,121	6,840	0.000**
Skill			
Education			
Primary & Below	29.2%	36.2%	
Secondary	49.3%	43.9%	0.157
More Than Secondary	21.5%	19.9%	0.614
Experience (years in operation)	8.93 years	7.12 years	0.009**
Observations (N)	400	301	

*Difference in means significant at the 5% level; ** Difference in means significant at the 1% level*

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[111] 'Hospitality' includes hotels and restaurants. This is predominantly some form of food service.

Table III.3: Logit Estimation of 1997 Microfinance Status, Full Sample

1997 Microfinance Status	LOGIT			LIN. PROB. MODEL	
Coef=average marginal effects	(1)	(2)	(3)	(5)	(6)
Vulnerability Measures[112]					
Own Home	0.207	0.189	0.255	0.193	0.248
	(4.37)***	(3.96)***	(2.96)***	(4.02)***	(2.94)***
Have other property	0.083	0.076	0.082	0.073	0.079
	(1.58)	(1.45)	(1.59)	(1.37)	(1.49)
Have savings	0.088	0.072	0.119	0.075	0.129
	(2.44)**	(1.98)**	(1.84)*	(2.00)**	(1.99)**
Entrepreneur Married or Equivalent[113]	0.095	0.089	0.123	0.094	0.137
	(2.09)**	(1.96)**	(1.60)	(2.06)**	(1.82)*
Time in Lima	0.004	0.003	0.004	0.003	0.004
	(2.43)**	(1.95)*	(1.42)	(1.92)*	(1.63)
Wealth (*Net HH Assets/1000*)		0.007	0.015	0.006	0.018
		(2.80)***	(1.50)	(2.63)***	(1.97)*
Skill Measures					
Secondary Education	0.092	0.082	0.245	0.083	0.242
	(2.24)**	(1.98)**	(2.14)**	(1.94)*	(1.78)*
Above Secondary Education	0.067	0.038	0.041	0.045	0.039
	(1.28)	(0.70)	(0.74)	(0.81)	(0.68)
Maximum Time in Operation	0.004	0.004	0.003	0.004	0.003
	(1.34)	(1.32)	(1.18)	(1.31)	(1.19)
Interaction Terms					
Wealth*Home			-0.008		-0.009
			(1.21)		(1.54)
Wealth*Savings			-0.006		-0.007
			(1.12)		(1.45)
Wealth*Married			-0.001		-0.002
			(0.22)		(0.38)
Wealth*TimeinLima			0.000		0.000
			(0.43)		(0.71)
SecEd*Home			0.011		0.030
			(0.17)		(0.32)
SecEd*Savings			-0.005		0.012
			(0.10)		(0.16)
SecEd*Married			-0.070		-0.062
			(1.34)		(0.70)
SecEd*TimeinLima			-0.005		-0.005
			(1.60)		(1.73)*
Observations (N)	685	685	685	685	685
Pseudo R2	.123	.132	.141	.130	0.132

Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

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[112] Other controls include whether or not entrepreneur is a woman, the entrepreneur's age, the household's dependency ratio, the number of working HH members, whether or not HH hit with a shock in the past 2 years (significant at 10%), the number of enterprises (significant at 5%), the informality status of enterprises, and dummy variables for the type of enterprise across 8 categories.

[113] In all cases redefining marital status more restrictively (cohabitation not included) slightly reduces the size of the coefficients, but all remain significant at the 10% level.

Table III.4: Summary Statistics, Household and Enterprise Characteristics, Balanced Panel

Mean Values	Still Have	Dropouts	Join MFI	Never Join	ANOVA test (p value)
Household Characteristics					
Entrepreneur a Woman 1997	58.7%	74.7%	55.6%	55.3%	0.019*
Age Distribution					
Less than 25	1.4%	2.3%	3.1%	6.0%	0.087
Between 25 and 40	35.2%	41.4%	46.9%	46.0%	0.133
Between 40 and 60	59.3%	47.1%	43.7%	39.3%	0.001**
Above 60	4.1%	9.2%	6.3%	8.7%	0.238
Dependency Ratio					
1997	28.8%	32.9%	31.1%	28.7%	0.419
1999	26.5%	30.1%	29.8%	26.4%	0.443
# Working Members of HH					
1997	3.39	3.21	2.97	2.77	0.001**
1999	2.87	2.82	2.78	2.51	0.101
Hit by a Shock in past 2 years					
1997	45.2%	60.9%	37.5%	36.7%	0.002**
1999	57.3%	58.6%	58.6%	55.3%	0.951
Enterprise Characteristics					
Enterprise Number					
1997	1.61	1.59	1.50	1.40	0.033*
1999	1.61	1.49	1.38	1.45	0.033*
All Enterprises Informal					
1997	20.5%	28.7%	25.4%	34.2%	0.031*
1999	26.8%	46.2%	27.9%	39.9%	0.004**
Have Enterprise in Category					
Food and Clothing					
1997	10.7%	6.9%	6.3%	6.0%	0.364
1999	11.5%	10.2%	6.5%	9.8%	0.733
Manufacturing					
1997	6.0%	3.4%	4.8%	7.4%	0.681
1999	6.7%	3.8%	6.5%	6.3%	0.838
Construction					
1997	1.9%	6.9%	3.2%	2.0%	0.075
1999	1.9%	6.4%	3.3%	2.1%	0.208
Auto, Other Repair & Parts					
1997	6.0%	4.6%	6.3%	8.7%	0.407
1999	7.2%	6.4%	4.9%	9.1%	0.400
Minor Retail and Wholesale					
1997	79.1%	77.0%	88.9%	79.1%	0.082
1999	74.6%	60.2%	78.7%	72.0%	0.010**
Hospitality[114]					
1997	9.8%	16.1%	6.3%	6.7%	0.091
1999	14.8%	12.8%	4.9%	4.9%	0.010**
Transport					
1997	12.5%	19.5%	7.9%	3.3%	0.001**
1999	18.2%	21.8%	6.5%	8.4%	0.005**
Services					
1997	6.0%	6.9%	9.5%	5.4%	0.732
1999	6.7%	7.7%	6.5%	6.3%	0.984

*Difference in means significant at the 5% level; **Difference in means significant at the 1% level

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[114] 'Hospitality' includes hotels and restaurants. This is predominantly some form of food service.

Table III.5: Summary Statistics, Vulnerability and Skill Measures, Balanced Panel

(values in 1997 nuevo soles)	Still Have	Dropout	Join MFI	Never Join	ANOVA p-value
Vulnerability					
Have Savings					
1997	63.9%	57.5%	42.2%	48.7%	0.003**
1999	50.7%	49.4%	47.6%	40.0%	0.241
Own Home					
1997	87.2%	87.4%	76.2%	70.0%	0.000**
1999	83.9%	88.5%	80.9%	74.0%	0.025*
Other Properties					
1997	15.6%	18.4%	11.1%	8.7%	0.117
1999	19.3%	14.9%	6.4%	12.0%	0.048*
Married or Equivalent					
1997	85.4%	81.6%	78.1%	71.3%	0.534
1999	82.2%	74.7%	76.6%	70.0%	0.534
Time in Lima 1997	30.2 years	30.4 years	26.2 years	25.5 years	0.001**
Wealth (Net HH Assets)					
1997	11,195 soles	9,687 soles	7,182 soles	6,171 soles	0.000**
1999	10,664.6 soles	10,394 soles	9,067 soles	7,138 soles	0.002**
Skill					
Education 1997					
Primary & Below	31.6%	25.3%	36.5%	35.3%	
Secondary	47.7%	54.0%	42.9%	48.0%	0.590
More Than Secondary	20.7%	20.7%	20.6%	16.7%	0.784
Experience 1997 (max years in operation of any enterprise)	8.78 years	8.64 years	7.40 years	6.98 years	0.092
Enterprise Resources					
Employees[115]					
Total employees all enterprises					
1997	2.19	1.84	1.76	1.49	0.006**
1999	1.70	0.97	1.45	0.87	0.000**
Employees per Enterprise					
1997	1.41	1.15	1.08	0.99	0.013*
1999	1.13	0.66	1.06	0.61	0.000**
% Enterprises with Employees					
1997	75.9%	70.1%	69.3%	60.6%	0.006**
1999					
Capital					
Net Enterprise Assets					
1997	10,420.3	6,943.6	5,398.8	3,684.4	0.000**
1999	12,082.1	7.115.3	9,858.8	6,034.8	0.019*
Enterprise Investment					
1997	3,250.7	2,890.5	2,932.4	1,315.4	0.092
1999	2,599.4	1,962.3	1,052.9	1,502.4	0.372

*Difference in means significant at 5% level;**Difference in means significant at 1% level*

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[115] Employees do not include the entrepreneur

Table III.6: Logit Estimation of Microfinance Status, Balanced Panel

1999 Microfinance Status	1999 Microfinance Status			1997 Microfinance Status		
(coef=avg. marginal effects)	(1)	(2)	(3)	(4)	(5)	(6)
Vulnerability Measures[116]						
Own Home	0.050	0.045	-0.050	0.176	0.153	0.291
	(0.84)	(0.75)	(0.46)	(2.98)***	(2.58)***	(2.51)**
Other property	0.004	-0.001	0.006	0.116	0.104	0.094
	(0.06)	(0.01)	(0.10)	(1.90)*	(1.70)*	(1.56)
Have Savings	0.034	0.030	0.086	0.128	0.112	0.081
	(0.76)	(0.66)	(1.07)	(2.97)***	(2.63)***	(1.05)
Entrepreneur married[117]	0.119	0.114	0.190	0.129	0.107	0.281
	(2.07)**	(1.96)**	(2.02)**	(2.25)**	(1.87)*	(2.77)***
Time Lived in Lima (1997)	0.002	0.002	0.002	0.006	0.005	0.003
	(0.82)	(0.76)	(0.73)	(2.93)***	(2.62)***	(0.85)
Wealth (*Net HH Assets/1000*)		0.002	0.024		0.008	0.032
		(0.60)	(1.81)*		(2.58)***	(2.05)**
Skill Measures						
Secondary Education	0.019	0.015	-0.133	0.082	0.068	0.251
	(0.35)	(0.28)	(0.81)	(1.70)*	(1.40)	(1.87)*
Above Secondary Education	-0.026	-0.032	-0.059	0.110	0.076	0.063
	(0.36)	(0.44)	(0.81)	(1.87)*	(1.23)	(0.98)
Maximum Time in Operation	0.002	0.002	0.002	0.005	0.004	0.004
	(0.71)	(0.70)	(0.57)	(1.40)	(1.33)	(1.17)
Interaction Terms						
Wealth*Home			-0.004			-0.022
			(0.37)			(1.44)
Wealth*Savings			-0.002			0.001
			(0.43)			(0.11)
Wealth*Married			-0.006			-0.018
			(0.81)			(1.28)
Wealth*TimeinLima			-0.000			0.001
			(1.00)			(0.48)
SecEd*Home			0.276			0.053
			(2.16)**			(0.47)
SecEd*Savings			-0.086			-0.040
			(0.99)			(0.45)
SecEd*Married			-0.043			-0.077
			(0.42)			(0.48)
SecEd*TimeinLima			0.004			-0.004
			(1.17)			(1.08)
Observations (N)	468	468	468	466	466	466
Pseudo R2	0.077	0.078	0.092	0.156	0.167	0.202

Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

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[116] Other controls include whether or not entrepreneur is a woman, the entrepreneur's age, the household's dependency ratio, whether or not HH hit with a shock in the past 2 years (significant at 10%), the number of enterprises (significant at 5%), whether or not all of the enterprises are informal (negative and significant at the 1% level in 1999, insignificant in 1997), and dummy variables for the type of enterprise across 8 categories.

[117] In all but column (1) defining marital status more restrictively (taking out cohabitation) slightly reduces the size of the marital status coefficients, but all remain significant at the 5% level.

Table III.7: Logit Estimation of Microfinance Status, Still Have vs. Never Join

(Coef=avg. marginal effects except interaction terms)	1997 Variables			1999 Variables		
	(1)	(2)	(3)	(4)	(5)	(6)
Vulnerability Measures[118]						
Own Home	0.190	0.165	0.255	0.128	0.123	0.017
	(2.64)***	(2.34)**	(1.71)*	(1.91)*	(1.84)*	(0.14)
Household has other property	0.140	0.121	0.117	0.046	0.036	0.019
	(1.99)**	(1.65)*	(1.65)*	(0.65)	(0.49)	(0.27)
Have savings	0.107	0.091	0.140	0.061	0.056	0.172
	(2.08)**	(1.77)*	(1.56)	(1.21)	(1.10)	(2.10)**
Entrepreneur married[119]	0.138	0.110	0.329	0.143	0.131	0.464
	(1.94)*	(1.57)	(2.71)***	(2.19)**	(1.99)**	(5.67)***
Time Lived in Lima	0.006	0.005	0.007	0.005	0.005	0.005
	(2.54)**	(2.21)**	(1.82)*	(2.28)**	(2.16)**	(1.23)
Wealth (*Net HH Assets/1000*)		0.010	0.045		0.003	0.055
		(2.47)**	(2.33)**		(0.89)	(2.76)***
Skill Measures						
Secondary Education	0.041	0.024	0.281	0.086	0.081	0.169
	(0.68)	(0.40)	(1.82)*	(1.43)	(1.32)	(0.87)
Above Secondary Education	0.091	0.052	0.021	0.052	0.044	-0.009
	(1.27)	(0.70)	(0.26)	(0.68)	(0.57)	(0.11)
Maximum Time in Operation	0.005	0.005	0.004	0.007	0.007	0.006
	(1.18)	(1.14)	(0.91)	(1.82)*	(1.78)*	(1.63)
Interaction Terms						
Wealth*Home			-0.023			0.005
			(1.03)			(0.30)
Wealth*Savings			-0.005			-0.008
			(0.27)			(0.62)
Wealth*Married			-0.017			-0.042
			(0.78)			(1.87)*
Wealth*TimeinLima			-0.001			-0.000
			(0.12)			(0.02)
SecEd*Home			0.136			0.269
			(0.89)			(1.64)
SecEd*Savings			-0.160			-0.138
			(1.30)			(1.15)
SecEd*Married			-0.064			-0.071
			(0.32)			(0.46)
SecEd*TimeinLima			-0.006			0.002
			(1.17)			(0.44)
Observations (N)	331	329	329	331	331	331
Pseudo R2	0.171	0.187	0.233	0.166	0.168	0.214

Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

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[118] Other controls include whether or not entrepreneur is a woman, the entrepreneur's age, the household's dependency ratio, the number of working age HH members, whether or not HH hit with a shock in the past 2 years (significant at 10%), the number of enterprises (significant at 5%), whether or not all of the enterprises are informal (significant at 1% level in 1999, insignificant in 1997) and dummy variables for the type of enterprise across 8 categories.

[119] In all but column (5) redefining marital status slightly reduces the size of the marital status coefficients, but all remain significant at the 10% level.

Table III.8: Shocks, Incidence and Management

All Values	Have Microfinance in 1997	Don't Have Microfinance in 1997	Total	ANOVA test (p value)
Macroeconomic Indicators				
Real GDP				
ΔQ3 1995- Q3 1997			8.72%	
ΔQ3 1997- Q3 1999			-0.2%	
Internal Demand				
ΔQ3 1995- Q3 1997			8.6%	
ΔQ3 1997- Q3 1999			-6.4%	
Shock Incidence				
1997 Shocks				
Hit by Shock in past two years	49.7%	36.9%	44.4%	0.004**
Most Severe Shock[120]				
Robbery	35.5%	27.8%	32.9%	0.007**
Severe Illness	27.6%	26.6%	27.3%	0.200
Loss or Reduction in Income	15.8%	19.0%	16.9%	0.695
Death of Income Earner	0.7%	5.1%	2.2%	0.163
Job Loss	6.6%	6.3%	6.5%	0.896
1999 Shocks				
Hit by Shock in past two years	57.7%	56.6%	57.2%	0.757
Most Severe Shock				
Loss of Reduction of Income	36.2%	34.2%	35.4%	0.720
Robbery	21.8%	21.7%	21.8%	0.972
Severe Illness	17.8%	20.0%	18.7%	0.638
Death of Income Earner	1.7%	2.5%	2.0%	0.645
Job Loss	4.0%	6.7%	5.1%	0.313
% Below Poverty Line[121]				
1997	22.0%	31.5%	25.9%	0.000***
1999	27.1%	44.4%	34.2%	0.015**
Observations (N)	206	214	520	
Managing Negative Shocks[122]				
1997				
Use Savings	30.0%	28.0%	29.3%	
Borrow at all	26.4%	22.0%	24.8%	
o/w Borrow from family/friends	20.2%	14.4%	18.0%	
Observations (N)	193	118	311	
1999				
Use Savings	19.9%	21.7%	20.6%	
Borrow at all	25.6%	23.3%	24.7%	
o/w Borrow from family/friends	13.1%	15.8%	14.2%	
Observations (N)	176	120	296	

*Difference in means significant at the 5% level; **Difference in means significant at the 1% level.

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[120] Shock listed as most severe for those who reported being hit with a shock over the past two years. Distribution across most severe shock similar for full 1997 sample.

[121] Poverty line calculated by INEI (Peruvian statistical agency) using a $2/day measure. Household classified as below the poverty line if consumption per adult equivalent falls below $2 day measure.

[122] Households who were hit with a shock were asked the primary way of managing the adverse event.

Table IV.1: Summary Statistics, Country and City Level

| | Country (as of 1997)[123] | | City | | |
	Ecuador[124]	Peru	Lima (as of 2000)[125]	Quito[126]	Guayaquil (as of 2001)[127]
Population	11.9 million	24.4 million	7.4 million	1.5 million	1.9 million
Urban population (% total)	71.7%	60.3%			
GDP, current prices	$19.8 billion	$63.8 billion			
GDP per capita	$1,656	$2,619			
GDP growth	3.4%	7.2%			
Literacy Rate					
Life Expectancy	70.2 years	68.5 years			
Credit to private sector (% GDP)					
Domestic credit provided by banking sector (% GDP)	36.9%	17.7%			
Deposit Interest Rate	28.1%	15.0%			
Inflation (consumer prices)	30.6%	8.6%			

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[123] Source: World Development Indicators, World Bank
[124] From the 2001 Census
[125] Source: Instituto Nacional de Estadistica e Informatica (INEI), Estadisticas Vitales en Lima Metropolitana, 1999-2000
[126] Source: Instituto Nacional de Estadistica y Censos (INEC)
[127] www.visitaguayaquil.com (not available in INEC)

Table IV.2: Summary Statistics: Sample Comparison

Mean values (median value in parentheses)	Lima ACP[128]		SALTO Ecuador	
	ACP Full Sample 1997	ACP Never Join group 1997	Total Sample	Quito and Guayaquil
Household Characteristics				
Total Monthly Income for HH	$737.5 ($578.9)	$484.3 ($392.9)	$411.0 ($272)	$429.9 ($310)
Total Monthly Microenterprise Income for HH	$459.3 ($338.3)	$308.9 ($225.7)	$315.3 ($180)	$318.8 ($200)
% Income from microenterprises	65.0% (65.9%)	65.2% (69.5%)	73.9% (100%)	70.9% (91.4%)
Household Assets: Own vehicle, equipment, machinery, other assets	100%	100%	46.0%	48.6%
Dwelling characteristics				
Have Electricity	98.6%	97.3%	99.4%	99.5%
Have Sanitation	82.9%	80.0%	80.8%	79.2%
Water inside home	82.4%	79.3%	61.3%	61.8%
Entrepreneur a woman	61.2%	55.3%	46.7%	46.3%
Entrepreneur's age	41.5 years (40 years)	42.3 years (40 years)	41.9 years (40 years)	41.9 years (41 years)
Dependency Ratio	22.9%	20.9%	25%	24%
Vulnerability & Skill				
Entrepreneur Married	78.0%	71.3%	76.2%	76.6%
Has title to home	79.0%	70.0%	51.3%	50.4%
Savings (not including cash at home)	34.4%	31.0%	36.1%	30.6%
Education				
Secondary	46.9%	48.0%	41.4%	43.2%
Above Secondary	20.8%	16.7%	11.9%	9.8%
Experience	8.1 years (6 years)	7.0 years (4 years)	10.2 years (7 years)	10.4 years (7 years)
Observations (Households)	701	150	17,559	4,908
Enterprise Characteristics				
Enterprise Number	1.5	1.4	1.2	1.2
% that have one enterprise	59.6%	67.3%	82.3%	82.5%
Month Sales	$1,447.2 ($564)	$1242.2 ($375.9)	$269.9 ($100)	$244 ($104)
Enterprise Assets (for one enterprise in Ecuador data)	$1838.9 ($589)	$1027.7 ($296)	$1,915.7 ($20)	$1,707.1 ($50)
Enterprise informal	64.4%	66.5%	60.4%	71.3%
Tenure	6.6 years (4 years)	5.9 years (3 years)	9.4 years (5.8 years)	9.4 years (5.8 years)
Business Category				
Food and Clothing Production	5.2%	4.8%	11.0%	10.9%
Manufacturing	3.7%	5.3%	7.1%	7.3%
Construction	2.3%	1.9%	1.1%	1.5%
Auto and Other Repairs	5.4%	8.6%	5.0%	5.0%
Retail or Wholesale	62.9%	66.0%	54.6%	55.0%
Hospitality	6.5%	5.3%	10.0%	9.7%
Transportation	7.0%	2.4%	7.1%	7.0%
Personal Services	4.4%	3.8%	4.0%	3.6%
Other	2.5%	1.9%	0.01%	0.0%
Observations (Enterprises)	1,047	209	17,559	4,908

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[128] 2.66 as conversion ratio to USD in Sept 1997 for Nuevo Soles

Table IV.3: Credit Use

	Peru	Ecuador	
	ACP Entrepreneurs	Total Sample	Quito Guayaquil
Formal Credit Use			
Do you know any formal lenders who lend to microenterprises?	94.0%[129]	33.9%	36.7%
Have you ever had a formal loan?		30.8%	30.7%
Have you applied for a loan in the past 12 months?		17.3%	17.3%
Enterprise Financing			
Sources for start-up			
Personal Savings		68.1%	68.9%
Family and Friends		27.1%	27.6%
Formal loan[130]		7.2%	5.7%
Moneylender		2.2%	2.1%
Sources for on-going operations			
Retained Earnings		90.9%	90.4%
Supplier credit	44.5%	5.6%	3.7%
Formal loan[131]	11.4%	2.5%	2.9%
Family and Friends	9.3%	2.5%	2.9%
Savings		9.4%	12.2%
"None"[132]	35.4%		
Observations	625	17,621	4,875
Collateral			
Households that have collateral (own home, land or vehicle)		10,859	2,902
% with collateral that has ever had formal credit		36.0%	35.0%
% with collateral that has applied for formal credit in the past 12 months		20.1%	19.8%
Credit Demand			
% of sample NOT interested in a loan at a 20% interest rate		38.5%	35.0%
Of these, households that have collateral		70.0%	68.2%
Shock Management			
Principal means of managing a negative shock (HH level)			
Savings	29.3%	10.9%	11.2%
Loan From Family and Friends	18.0%	53.5%	51.9%
Loan From a Moneylender	2.6%	10.6%	9.9%
Loan from a formal lender	4.5%	12.2%	13.6%
Observations	786	17,621	4,875

[129] This represents the number of households in the ACP sample who have heard of ACP/Mibanco

[130] Includes banks, cooperatives, financieras, and NGOs (MFIs included here)

[131] For Ecuador includes banks, cooperatives, financieras, and NGOs (MFIs included here). For Peru formal lenders include these sources plus construction banks.

[132] The ACP questionnaire was meant to obtain information on sources of debt, and therefore retained Earnings and savings not listed as financing options for the enterprise. However, 35.4% of the households that answered the debt questionnaire list "none" as sources of credit. It is therefore likely these entrepreneurs rely purely on internal finance in the form of retained earnings.

Graph II.1: Breakdown of Enterprises by Category

Types of Enterprises in Sample, 1997
Total Enterprises=786

Other
2.3%

Services (cleaning, barber shop, etc.)
4.5%

Transport
7.3%

Hospitality
6.7%

Food and Clothing
5.5%

Manufacturing
3.9%

Construction
2.2%

Auto Repair, Sale of Auto Parts
5.2%

Minor Retail & Wholesale
62.5%

Types of Enterprises in Sample, 1999
Total Enterprises=759

Food and clothing
6.7%

Personal services
4.7%

Other
2.5%

Manufacturing
4.1%

Transport
9.9%

Construction
1.8%

Auto and Other Repair, Parts Sales
5.1%

Hospitality
7.5%

Minor Retail and Wholesale
57.6%

Graph II.2: Tests of First Order Stochastic Dominance for θ Measures

Graph II.2A: Total Microenterprise Income
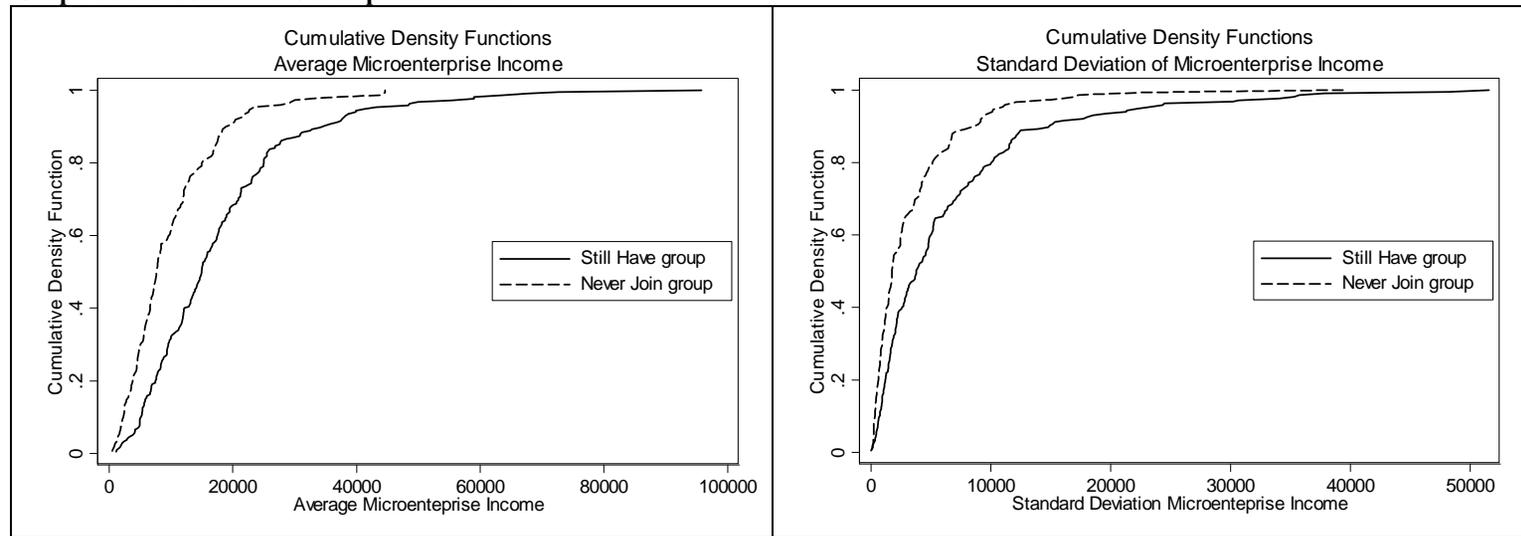
Graph II.2B: Monthly Sales for Primary Enterprise

Cumulative Density Functions
Average Month Sales Primary Enterprise

Still Have group
Never Join group

Cumulative Density Function

Average Month Sales

Cumulative Density Functions
Standard Deviation of Month Sales Primary Enterprise

Still Have group
Never Join group

Cumulative Density Function

Standard Deviation Month Sales
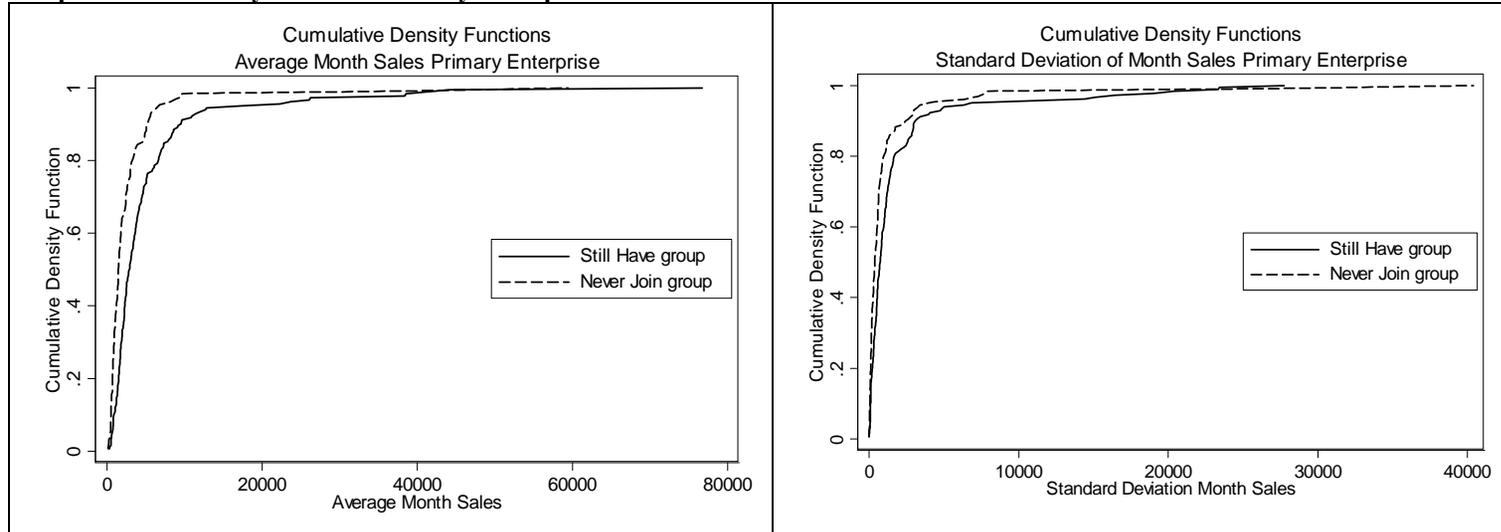
Graph IV. 1: Enterprise Categories, Ecuador Sample

**Distribution of Enterprises Across Categories
Ecuador Full Sample**

Other
0%

Personal Services
4%

Production of Food and
Clothing
11%

Transportation
7%

Manufacturing (non food or
clothing production)
7%

Hospitality
10%

Construction
1%

Auto and Other Repairs,
Parts
5%

Retail or Wholesale
55%
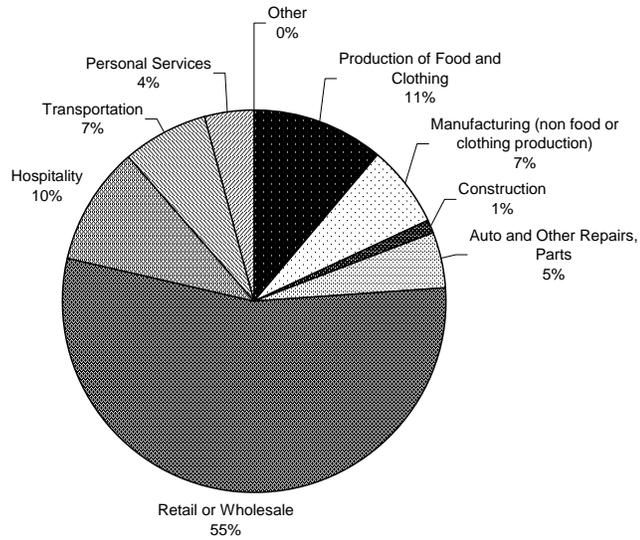
**Distribution of Enterprises Across Category
Subsample of Quito and Guayaquil**

Personal Services
4%

Other
0%

Production of Food and Clothing
11%

Transportation
7%

Manufacturing (non food or clothing
production)
7%

Hospitality
10%

Construction
1%

Auto and Other Repairs, Parts
5%

Retail or Wholesale
55%
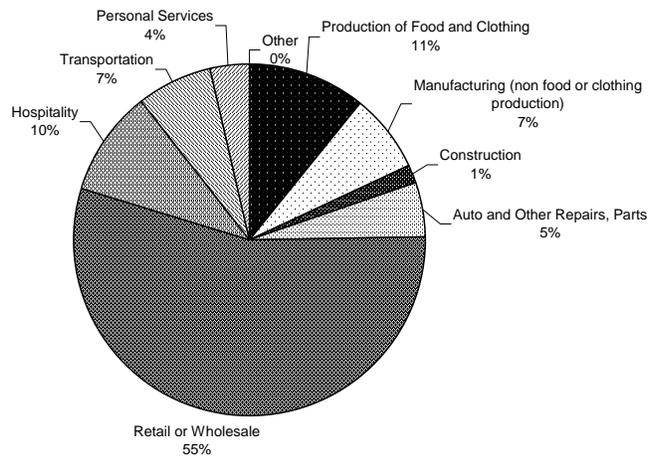
Appendix 1: Nested Logit Estimation of Microfinance Selection

For robustness I estimate microfinance selection in the balanced panel using a nested logit model. I choose a nested logit over a simple non-nested multinomial logit model because the choices under consideration stem from a sequential decision process, making it highly probable the independence of irrelevant alternatives assumption[133] (IIA) is violated and that a multinomial logit yields inconsistent estimates. The nested logit is more appropriate in this context because it allows for unobserved similarities between groups within a defined subset, or nest. This is a valuable feature as it is likely entrepreneurs with microfinance in 1997 (Still Have and Dropout groups) have more in common with each other, regardless of their 1999 microfinance status, than with entrepreneurs without microfinance in 1997 (Never Join or Join MFI group).

The nested logit model[134] allows for unobserved similarities across certain groups by creating a hierarchical structure. The choice set is divided into S mutually exclusive subsets, or nests, and the probability an entrepreneur belongs to a particular group is the probability she chooses a certain nest s over all other nests multiplied by the probability she chooses a specific group j from within nest s. In the ACP data I divide the four groups into two nests. The first nest contains the two groups with microfinance in 1997 (the Still Have and Dropout groups) and the second nest contains the two groups without microfinance in 1997 (the Join MFI and Never Join groups). Each nest thus contains one group with microfinance in 1999 and one group without microfinance in 1999.

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[133] This assumption states the relative probabilities of two choices are not impacted by the inclusion of another choice. For example, the probability an entrepreneur is a 'Still Have' relative to the probability she is a 'Never Join' will not be impacted by the possibility she is a 'Join MFI'. It is likely this assumption holds. I did run a MNL model and Small-Hsiao tests confirmed that in all cases the IIA assumption did not hold.

[134] The discussion of the nested logit model follows that of Greene (2003), Stancill (2000) and Hensher (1986).

```
                    ┌─────────────────────────┐
                    │  1997 Microfinance Status │
                    └─────────────────────────┘
                         /                 \
      Have Microfinance  /                   \  Don't Have
      in 1997           /                     \  Microfinance in 1997
              ┌──────────────────────────┐
              │  1999 Microfinance Status │
              └──────────────────────────┘
            /          \           /          \
    Still Have      Dropout     Join MFI    Never Join
    (group=1)      (group=2)   (group=3)    (group=4)
```
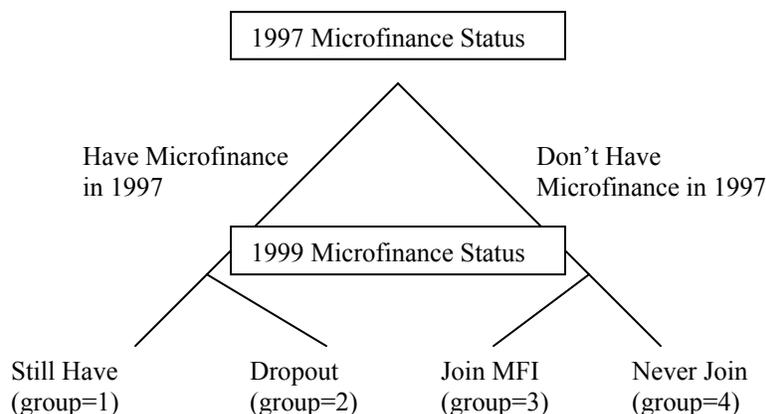
The probability an entrepreneur belongs to one of the four groups (P_{js}) is the probability she selects microfinance prior to 1997 (probability of choosing nest s= P_s) multiplied by the probability she selects microfinance between 1997 and 1999 (probability of choosing a specific choice within a nest= $P_{j|s}$). Estimating these marginal and conditional probabilities reveals the determinants of microfinance status in both periods.

The nested logit follows a random utility framework, such that the probability an entrepreneur falls into a specific group is the probability this group yields higher expected utility than every other group. If utility from a given group j in nest s is a linear function of observable attributes that vary across nests (Z_s), observable attributes that vary across groups ($X_{j|s}$), and unobservable factors (ε_{js}) ($U_{jsi} = X_{j|s}'\beta + Z_s'\xi + \varepsilon_{js}$) and if the unobservable utility components (ε_{js}) are distributed according to a generalized extreme value distribution (GEV)[135] it can be shown the probability an entrepreneur falls into a specific group (P_{js}) can be written as:

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[135] Under this distribution the random components of choices within a specific nest are allowed to be correlated while random components of choices across sets are assumed to be independent:

$$P_{js} = P_s * P_{j|s} = \frac{\exp(Z_s'\xi + \varrho_s I_s)}{\sum\limits_{r=1}^{S} \exp(Z_r'\xi + \varrho_r I_r)} * \frac{\exp(X_{j|s}'\beta/\varrho_s)}{\exp(I_s)} \tag{2}$$

Where ϱ_s measures the degree of correlation of the error terms for the elements of set *s*.

The *inclusive value* for set *s*, (I_s), is defined as: $I_s = \ln\left(\sum\limits_{j=1}^{J_s} \exp(X_{j|s}'\beta/\varrho_s) \right)$ (3)

The inclusive value is an index of the expected maximum utility from the choices in a particular set and captures the degree of complementarity amongst elements of a particular nest. In order for a nested logit model to be consistent with utility maximization estimated inclusive values must lie within the unit interval[136]. If inclusive value estimates lie outside this range, the nested logit likely is inappropriate over other models of multinomial choice.

    I estimate the parameters of the nested logit model using a full information maximum likelihood model, as this yields consistent and efficient estimates[137]. For observable factors that impact 1997 microfinance status (Z_i) I use the same household and enterprise characteristics, vulnerability and skill measures as in the logit analysis. For factors that impact 1999 microfinance status $(X_{j|s})$ I use the variables outlined below. Average values across groups are provided in table A.1.

$$F(\varepsilon_i) = \exp[-\sum\limits_{r=1}^{S}\left(\sum\limits_{js=1}^{J_s} - \exp(\varepsilon_{js}/\varrho_s) \right)^{\varrho_s}$$

Where $\varrho_s \in [0,1]$ and $(1-\varrho_s)$ measures the degree of correlation between the error terms of the two choices in the set. McFadden (1981) shows the Independence of Irrelevant Alternatives assumption (IIA) holds within nests but not across nests under this distribution. When $\rho_s=1$ the choices in the nest are independent and the nested logit collapses to the standard multinomial logit model.

[136] If the inclusive value for a nest equals 0 the model degenerates since no utility will come from any other nest. Alternatively, if the inclusive values for nests equal 1 there is no complementarity amongst the elements in the nests and the nested structure is unnecessary. In this case a multinomial logit model is more appropriate.

[137] Implicit is the assumption that in both periods households have the option of choosing microfinance.

1) Household characteristics ($HC_{j|s}$) include: changes in the dependency ratio; changes in the number of working household members; whether or not the entrepreneur was hit with a shock in the past two years; and the age and gender of an entrepreneur as of 1997.

2) Enterprise characteristics ($EC_{j|s}$) include: changes in the number of enterprises; whether on not a household closed the primary enterprise between 1997 and 1999[138]; changes in the formality status of enterprises run by the household (if the household had more or less informal enterprises in 1999 than in 1997); and changes in the categories of enterprises run by the household[139].

3) Vulnerability Measures include: changes in net household assets, savings, home ownership, other property[140], and marital status. Also included is the entrepreneur's tenure in Lima as of 1997.

4) Skill Measures include: Education and experience, but since these variables do not extensively change over the two year period, I use 1997 values in the estimation.

Results of full maximum likelihood estimation of the nested logit model are presented in table A.2. Coefficients in the top half of the table report the impact of the observables on the probability an entrepreneur does not have microfinance in 1997 ($P(Y_{si} = 2)$ =Upper Nest=2) over the probability an entrepreneur has microfinance in 1997 (($P(Y_{si} = 1)$ =Upper Nest=1). Coefficients in the bottom half report the impact of the observables on the probability an entrepreneur does not have microfinance in 1999

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[138] Households were asked if the enterprise they listed as primary in 1997 still exists in 1999. "No' responses were coded as primary business closure. In many cases household opened new enterprises, so the net change in enterprises is zero or even positive.

[139] I create a dummy variable that takes on the value of 1 if the categories of the businesses run by the household differ in 1999 relative to 1997. For example, if in 1997 the household had one enterprise in the retail sector and one enterprise in the construction section and in 1999 the household had two enterprises in the retail sector, the household would have a value of 1 for this dummy variable.

[140] I also used 1999 levels of vulnerability measures, but results do not differ from those when changes are used.

over the probability an entrepreneur does. The first column contains estimated impacts

on the probability an entrepreneur is in the Dropout group over the Still Have group

($P(Y_{ji|1} = 2)$). The second column contains estimated impacts on the probability an

entrepreneur is in the Never Join group over the Join MFI join ($P(Y_{ji|2} = 4)$). All

reported coefficients are average marginal effects.

The results are very similar to those from the simple logit model. Estimation of the

upper branches finds savings, home ownership and marital status are all significant in

predicting microfinance status in 1997. Savings decreases the probability an entrepreneur

does not have microfinance in 1997 by 14.7%. Home ownership decreases the

probability by 25%, and martial status decreases the probability by 23.4%. While net

household assets are also found to significantly decrease the probability of falling into the

no-microfinance in 1997 branch, the estimated marginal effect is zero, implying the

importance of wealth is quite low. Thus the nested logit finds that in 1997 lower

vulnerability increases the probability an entrepreneur has microfinance.

For 1999 microfinance status, similar to the logit analysis, estimation of the lower

branches finds less conclusive determinants of microfinance selection. Within the first

nest (Dropout vs. Still Have) a negative change in marital status, a positive change in the

number of working household members, the closure of the primary enterprise, and an

increase in the degree of informality are significant in distinguishing the Dropout group.

In all cases positive values increase the probability an entrepreneur drops out of the

microfinance program instead of staying. For marital status, the significance of a

negative change in determining dropout behavior supports the vulnerability hypothesis of

the paper. Entrepreneurs that become more vulnerable through the loss a spouse or

partner are more likely to leave microfinance programs. This result is particularly compelling given that marital status is likely the strongest measure of vulnerability in the data and proves to be the most robust predictor of microfinance status in the logit analyses.

Within the second nest only a positive change in marital status is significant in distinguishing the Join MFI and the Never Join groups. Amongst entrepreneurs that do not have microfinance in 1997, those that marry or begin to cohabitate have a higher propensity of not joining microfinance programs by 1999. These results are perplexing and go against the vulnerability hypothesis of this paper. However, for this branch it is clear there is little variation across the two groups, making it difficult to determine the factors that drive one group to join microfinance programs.

Table A.2 also includes estimated inclusive values for each branch. We can reject the hypothesis that the inclusive values equal 1, given the chi squared of the likelihood ratio test is over 200. This finding confirms the existence of unobserved similarities between the groups within each nest, supporting the choice of a nested logit model over a multinomial logit model. Inconsistent with utility maximization, the inclusive value for the Join MFI and Never Join branch is greater than 1. However neither inclusive value is significantly different from zero. This result could stem from the small sample size of each group and the lack of large variation between the groups within each nest. Finally the bottom portion of Table A.1 presents percent correct predictions for each group. The percentages show the nested logit does a good job of predicting the Still Have group, a decent job of predicting the Never Join groups, and a poor job of predicting the Dropout and Join MFI groups. The lack of predictive power for the Dropout and Join MFI groups

may result from the small sample size of each group. As a result there may simply be

insufficient information to distinguish within each branch the group that takes out

microfinance loans between 1997 and 1999 and the group that does not.

Table A.1: Additional Explanatory Variables for Lower Branch Estimation, Nested Logit (*Xi|j*)

Mean Values	Still Have	Dropout	Join MFI	Never Join	ANOVA p-value
Vulnerability					
Change in net HH assets	-50.1 soles	70.7 soles	180.8 soles	92.7 soles	0.096*
Change in property (home ownership or other property)[141]					
Positive	14.6%	12.6%	14.1%	17.3%	0.781
Negative	13.7%	14.9%	12.5%	11.3%	0.860
Change in savings					
Positive (now have)	18.3%	18.4%	19.0%	18.0%	0.998
Negative (no longer have)	31.8%	26.4%	14.3%	26.7%	0.054*
Change in Marital Status					
Positive	3.6%	4.6%	1.6%	7.3%	0.115
Negative	6.4%	11.5%	1.6%	8.7%	0.236
Household Characteristics					
Entrepreneur a Woman (1997)	58.7%	74.7%	55.6%	55.3%	0.019**
Age of Entrepreneur (1997)	44.0	43.2	41.9	42.4	0.391
Change in Dependency Ratio	-0.02	-0.03	-0.01	-0.02	0.965
Change in Working HH members	-0.51	-0.39	-0.19	-0.25	0.278
Hit with Shock between 1997 and 1999	57.3%	58.6%	58.7%	55.3%	0.952
Enterprise Characteristics					
Change in Formality Status					
Positive	14.8%	14.1%	16.3%	9.8%	0.482
Negative	21.9%	21.8%	14.1%	17.3%	0.433
Change in Enterprise Number					
Positive	21.5%	23.0%	14.1%	24.7%	0.384
Negative	21.5%	31.0%	25.0%	17.3%	0.097*
Change in Composition of Enterprises (business categories)	45.9%	56.4%	29.5%	42.6%	0.015**
Close Primary Enterprise between 1997 and 1999	14.6%	34.5%	18.8%	13.3%	0.002***
Predictive Power Nested Logit					
Observations in Nested Logit estimation	203	78	61	138	480
% correct percent predictions	76.8%	11.5%	6.5%	55.8%	

*Difference in means significant at 5% level **Difference in means significant at 1% level

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[141] I merged the home ownership and other property dummy variables, since the positive and negative changes for each one are minimal. Thus the property variable registers a positive change if either home ownership or other property changes in the positive or negative direction.

Table A.2: Nested Logit Estimation

UPPER NEST= Microfinance Status in 1997 (average marginal effects reported)	Do Not Have Microfinance 1997 vs. Have 1997 Microfinance
Vulnerability Measures	
Own Home 1997	-0.250***
Other Property 1997	-0.029
Have Savings 1997	-0.147**
Married or Equivalent 1997	-0.234*
Time in Lima	0.000
Net HH Assets 1997 (Wealth)	-0.000**
Household & Enterprise Controls[142]	
Working Household Members 1997	0.000
Hit with Shock in Past 2 years, 1997	-0.083**
All Enterprises Informal 1997	0.010

LOWER BRANCHES= Microfinance Status in 1999	Dropout vs. Still Have	Never Have vs. Join MFI
Vulnerability Measures		
Change in Property Status (home & other)		
Positive	0.000	-0.003
Negative	-0.001	-0.010
Change in Savings		
Positive	-0.017	0.025
Negative	-0.007	0.044
Change in Marital Status		
Positive	0.016	0.016*
Negative	0.022*	0.020
Time in Lima 1997	0.000	0.000
Change in Net HH Assets (Wealth)	-0.000	-0.000
Household & Enterprise Controls[143]		
Change in Working HH Members	0.000*	0.000
Hit with Shock in Past 2 years, 1999	0.001	-0.027
Change in Informality Status		
Positive	-0.008	0.003
Negative	-0.025*	0.012
End Primary Enterprise from 1997	0.019**	0.000
Inclusive Value Estimates (*Is*)	0.37	1.34
Chi Squared	273.8	
Observations (N)	480	

*significant at 10% level; **significant at 5% level; ***significant at 10% level

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[142] Other controls include age, as measured by bins, whether or not entrepreneur is a woman, the dependency ratio, business category dummy variables and skill as measured by dummy variables for secondary education, above secondary education, and experience.

[143] Other controls include age, whether or not entrepreneur is a woman, change in the dependency ratio, a change in the number of enterprises, and skill as measured by dummy variables for secondary education in 1997, above secondary education in 1997 and experience in 1997.

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