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How Microlending Affects Innovation and Entrepreneurship: Evidence from Ethiopia

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How Microlending Affects Innovation and Entrepreneurship: Evidence from Ethiopia

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Abstract

Advocates of microlending suggest it is a sustainable intervention that reaches the poor directly and offers them the means to invest and improve their incomes (Khavul, 2010; Morduch, 1999; Yunus, 2007); yet, impact studies of these interventions have suggested they often have little or even a detrimental impact on borrowers (Van Rooyen, Stewart & De Wet, 2012). This dissertation examines the efforts to promote entrepreneurship and alleviate poverty in developing countries through microlending. I begin by reviewing the microlending literature, and in particular, impact studies of the effect microlending is having in developing countries. Next, I review theory and empirical evidence that suggests innovation is an important mediating mechanism through which capital access may contribute to poverty alleviation. Subsequently, I put forth a person-situation interactional model to explain, at least in part, how two commonly implemented parts of microlending – incremental loans and joint liability – may negatively impact innovation adoption and reduce the relationship between capital access and poverty alleviation.

To empirically test this model, structured interviews were conducted with 340 borrowers of both individual and group-based microloans in Ethiopia across three different microlending organizations and 11 locations. The findings are consistent with a sorting effect in that innovative individuals appear more likely to take individual loans than group loans. Additionally, the results are also consistent with a social pressure effect where innovative individuals taking group loans are less likely to behave innovatively than their peers taking individual loans.

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I. INTRODUCTION

> *Productivity isn't everything, but in the long run it is almost*
> *everything. A country's ability to improve its standard of living*
> *over time depends almost entirely on its ability to raise its output*
> *per worker.*
>
> Paul Krugman, The Age of
> Diminishing Expectations
> (1994)

Beginning in the 1950's, it was noted the rural poor suffer from a lack of access to formal credit, and the informal credit available had very high interest rates and were often short-term in nature, which inhibits long-term productive investment (Gonzalez-Vega, 1994: 5). The belief was, and in large part still is, that if the poor were provided reasonable access to credit they would be able to act entrepreneurially and grow their incomes to pull themselves out of poverty (Bradley, McMullen, Artz & Simiyu, 2012). Seeking to improve credit access, development strategies in least developed countries (LDCs) from the 1950's up to the 1980's often included subsidized credit to the poor (Morduch, 1999). However, these interventions were "nearly all disasters" in that repayments rates often dropped below 50 percent, and credit was often directed to the politically well-connected (Morduch, 1999; 1570). In the last few decades, microlending, which represents a new method of offering financial services, has gained prominence as the intervention of choice to stimulate economic growth and alleviate poverty (Pellegrina, 2011; Khavul, 2010).

Microlending was developed in the late 1970's as a new way to provide financial services to the "unbankable" poor of the world (Yunus, 2007). It combines group lending with incremental loans in an attempt to overcome the repayment rate problems that made previous interventions unsustainable (Morduch, 1999). This new way to structure loans to the poor has

improved repayment rates to where many microlending organizations report rates in excess of 95 percent (Khavul, 2010). In spite of the success of microlending in improving repayment rates, the social and economic benefit of providing loans to the poor is increasingly being questioned (Duvendack & Palmer-Jones, 2011). A recent randomized control trial by Karlan and Zinman (2011) suggests borrowers are marginally worse off as evidenced by a reduction in the number of reported employees and lower self-evaluations of well-being. Additionally, other studies suggest microlending has a negligible impact on physical assets, savings, health care, education (Coleman, 1999), income, consumption, or the likelihood of sending children to school (Morduch, 1998).

Exacerbating this debate is the recent large increase in for-profit microlenders that do not necessarily hold social and economic benefit for the poor as an underlying motive to provide microloans. However, for the purposes of this study I leave aside the larger question of the ethical and moral implications of for-profit lending to the poor. Rather, I take the social and economic impacts of microlending as a topic of interest as a given. Along these lines, the lack of rigorous empirical evidence of the positive impacts of microlending, begs the question of whether the founding assumption of microlending is flawed, or whether there are other factors preventing the benefits from being realized?

To answer this question, I begin by providing an overview of the microlending literature. Next, I explore how credit access is proposed to improve the lives of the poor. Although increasing entrepreneurship has been cited as the mechanism by which microlending may reduce poverty (Khavul, 2010; Yunus, 2007), little scholarly work has attempted to integrate the literature on entrepreneurially related economic growth with the microlending literature. As such, I review the literature on how entrepreneurship may stimulate economic growth and the

related empirical evidence. In particular, I outline the mediating mechanism of innovation adoption that leads to productivity increases, which has been identified as a key factor between capital access and economic growth (Aghion, Howitt & Mayer-Foulkes, 2005).

Next, I review the literature on the individual determinants of innovation adoption to assess whether the structure of microlending may be inhibiting this part of the causal chain. I then propose a person-situation interactional model. This model theorizes how incremental loans and group lending may be impacting innovation adoption among borrowers. Lastly, I test this model with data gathered through semi-structured interviews with microloan borrowers in Ethiopia.

This research seeks to contribute to the literature in a number of ways. Although the microlending literature references and tests theories on how group lending reduces default rates (Hermes & Lensink, 2007; Stiglitz, 1990; Varian, 1990), the literature lacks a robust discussion of how the structure of interventions intended to improve credit access among the poor may affect the ultimate goal of poverty alleviation. By integrating the entrepreneurship related growth literature with the microlending literature, this research seeks to provide a framework from which a systematic research stream can be developed to assess and understand the impact of microlending on poverty alleviation.

Additionally, although some research has explored topics related to social capital within microlending groups (e.g. Cassar, Crowley & Wydick, 2007; Besley & Coates, 1995), there is a complete dearth of research into how group lending may impact investment decisions. The ways in which the poor invest their loans inevitably has a significant impact on outcomes; therefore, this area of research is critical to understanding the impacts of microlending on poverty alleviation. To explore this important area of research, I begin by providing some initial theories

and testing them.

Finally, this research seeks to contribute to the practice of microlending by discussing practical approaches to improve the efficacy of loans in achieving the productivity gains necessary to improve the standard of living among the poor.

II. LITERATURE REVIEW

Microlending

Microlending has experienced incredible growth over the past several decades. Thousands of organizations have loaned billions of dollars in microloans to millions of poor individuals (Daley-Harris, 2009). The concept of microloans originated when Muhammad Yunus—the founder of Grameen Bank and Nobel Peace Prize winner—noticed in his work in Bangladesh that the poor lacked the capital to purchase the raw materials necessary for them to work (Yunus, 2007). As a result, the poor often turned to local moneylenders who charged exorbitant interest rates, often in excess of 100 percent (Bruton, Khavul & Chavez, 2011). Yunus believed that a small loan of just a few dollars at a more reasonable interest rate would significantly improve the lives of the poor (Yunus, 2007).

However, the transaction costs involved in administering many small loans, determining the creditworthiness of potential borrowers, and enforcing timely repayment would be cost prohibitive for such small amounts (Morduch, 1999). To reduce transaction costs Yunus (2007) decided to bundle the small loans into groups. Furthermore, he found that asking individuals to self-select into these groups served as a tool to determine creditworthiness (Morduch, 1999; Yunus, 2007). Potential borrowers knew each other and would only select those who were creditworthy to be in their groups (Hermes et al., 2007).

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Yunus also offered the groups the opportunity of taking out larger loans in the future only if the group loan was paid in full (Yunus, 2007). This provided an incentive to members of the group to apply social pressure, if necessary, to any group members who might become delinquent on their loans to continue making payments (Hermes et al., 2007). This informal social pressure served as a mechanism to enforce the terms of the loan without the microlending institution having to incur additional costs (Morduch, 1999).

The model that Yunus created has become the foundation of microlending, with most lenders utilizing some form of group lending and incremental loans (Pellegrina, 2011). Group lending typically entails small groups of individuals coming together to take individual loans, and the possibility of taking out future loans is contingent on the entire group paying off their debt. Meetings typically occur weekly or bi-weekly in order to collect loan payments (Khavul, 2010). These meetings are often held in public and continue until all of the loan obligations are met. Overall, this novel structure of group lending has reduced the transaction costs of providing loans to the poor to a point that it was scaled up to the size we see today. Between 1997 and 2005, the number of microlending organizations worldwide rose from 618 to 3,133, and the number of people who receive microloans increased from 13.5 million to 113.3 million over the same time period (Hermes et al., 2007).

It is important to note that I am specifically using the term "microlending" rather than "microfinance", because microfinance often references other financial services, such as deposit accounts and insurance. Although these other financial services deserve investigation in their own right, I am limiting the scope of this study to the group lending practices often incorporated into microlending.

Microlending Review

The microlending literature can be organized around three major themes. The first stream has proposed and investigated theories regarding how group lending reduces default rates. Most notably, this literature has suggested that group lending reduces agency costs and information asymmetry between borrowers and lenders by locating the screening, monitoring, and enforcement mechanisms at the community level where group members know each other (Banerjee et al., 1994; Hermes et al., 2007; Stiglitz, 1990; Varian, 1990).

The second stream has focused on the trade-off between sustainability and outreach to the poor. Most microlending organizations depend on subsidies to offset the costs of providing loans to the poor (Hermes et al., 2011). The *financial systems* model suggests that microlenders need to charge higher interest rates and limit outreach in order to be self-sufficient. Proponents of this view suggest financial sustainability is important to the long-term survival of microlending institutions, and longevity is important to the industry's long-term impact on poverty alleviation. The *poverty lending* approach suggests raising interest rates and limiting outreach reduces the efficacy of microlending in reducing poverty (Hermes et al., 2011). Proponents of this view suggest donors desire social impact and are willing to forego financial gains or even endure losses to achieve this mission.

Assessing impact is the third identifiable stream of research in the microlending literature. However, in spite of the many articles on microlending's impact there are few academic articles as suggested by the following quote from Coleman (1999) "[m]ost existing impact studies are nonacademic project evaluations that are of a descriptive nature or suffer from the selection bias problem" (109).

While advocacy articles that trumpet "scientific" findings about the impact of microlending are problematic to the understanding and development of the industry, more problematic are the clearly academic articles that suffer untold methodological issues, which do not appropriately capture the actual impact. The primary methodological flaw of early microlending studies was selection bias (Coleman, 1999; Karlan et al., 2011). Microlending institutions do not randomly select the locations of their branches, and borrowers are not randomly selected from the population. This makes it difficult to tease out and isolate the effect of the individual, the village, and the microloan on borrower outcomes (Berhane & Garderbroek, 2011; Coleman, 1999; Duvendack et al., 2011).

An additional issue in measuring the impact of microlending is that there is little consensus about what an appropriate outcome to measure is. The income of poor individuals in developing countries is difficult to measure, because it is often highly variable, and there are few, if any, records kept (Collier, 2007; Collins, Morduch, Rutherford & Ruthven, 2009). Additionally, development economists have suggested poverty alleviation should be measured in terms of the welfare of the poor (Sen, 1988), which is not necessarily highly correlated with income and may include other factors, such as life expectancy, education levels, nutrition, access to health care, and crime rates. This has led to a variety of outcomes being measured in the few academic empirical studies of microlending's impact. While I discuss these various outcomes in my review of microlending impact studies, the primary focus of this study is on understanding the economic impact of microlending, which I feel is more generalizable across microlending interventions than social impacts, such as women's empowerment and children's education rates, which are likely to be more dependent on context specific factors, such as the existing culture and institutions.

Some of the issues of measurement with early microlending impact studies can be demonstrated by using the example of Pitt and Khandker (1998). This study is often pointed to as empirical evidence that microlending has a positive impact on the lives of the poor (Basher, 2010; Demirguc-Kunt & Levine, 2009; Hermes et al., 2011). The data from this study suggested microlending improved consumption by 18 percent for women and 11 percent for men, but the methodology has been questioned because of the cross-sectional nature of the data and the instrument used to control for selection bias (Karlan & Zinman, 2011; Khandker, 2005; McIntosh, Villaran & Wydick, 2011). Pitt and Khandker (1998) used the stated land owning eligibility requirement of microlenders to control for selection bias by finding a population slightly above and below the requirements. Unfortunately, it has been demonstrated that loan officers often fudge the eligibility requirement, which compromises the efficacy of this instrument (McIntosh et al., 2011). Revised estimates of the impacts of microlending by Khandker (2005) using panel data from the same sample used in Pitt and Khandker's (1998) previous study suggests the long-term impact of microlending is about half of the original estimates.

While the Khandker studies employed the eligibility requirements as an instrument to control for selection bias, other studies that have used a specific study design to control for selection bias have often found little or no evidence of a positive impact of microlending on the welfare of the poor. For instance, Coleman (1999) designed a study where villages that were selected as future sites for microlending institution branches were used as a control sample. Moreover, villagers were able to construct their microlending groups within these villages prior to the establishment of the branches and disbursement of the loans. This design not only helped in accounting for the potential selection bias of where microlending branches are placed but also

the selection bias of the individuals that self-select to become borrowers. The results suggested no significant impact of microlending on improving household incomes, physical assets, savings, sales, labor, health care, or education (Coleman, 1999).

Banerjee, Duflo, Glennerster and Kinnan (2009) used randomized treatment and control groups to account for potential selection bias. In conjunction with a microfinance institution, Banerjee et al. (2009) randomly assigned half the neighborhoods of Hyderabad, India to receive promotions related to the services of the microlender while the other half did not. They found evidence that suggests microlending increases the number of business startups, the purchase of durable goods, and higher profits among previously existing businesses, but they found no effect on overall consumption in contrast to the Khandker (1998, 2005) studies.

Karlan and Zinman (2011) also attempted to control for selection bias when they randomly assigned marginally acceptable borrowers to receive or not receive loans. They found that many borrowers were marginally worse off as evidenced by fewer employees after taking a loan and lower self-reported ratings of subjective well-being. Additionally, female borrowers showed no significant difference in profitability after taking the loans while male borrowers and relatively high income borrowers did show an increase.

Pelligrina (2011) attempted to compare the impact of microlending to two other forms of credit: formal bank loans and informal credit. This type of study is important in order to demonstrate the unique benefits of microlending, and her data suggests microlending is primarily used to increase working capital while bank loans improve the acquisition of fixed assets (Hermes & Lensink, 2011; Pelligrina, 2011). She goes on to suggest that the acquisition of fixed assets is more likely to improve long-term income due to borrowers' ability to generate long-term productive activities. Furthermore, Pelligrina (2011) suggests the different lending

characteristics of microloans and bank loans are likely to account for the difference. Microloans generally have short and regular repayment schedules and utilize the group lending method that may push borrowers seeking long-term investments to use formal bank loans that, in her study, offered balloon payments and an individual lending method.

A review of multiple studies on the impact of microcredit in Sub-Saharan Africa (Van Rooyen, Stewart & de Wet, 2012) found that although one study demonstrated marginal financial benefits for borrowers (Ashraf, Gine & Karlan, 2008), others demonstrated a negligible impact or a positive *and* negative impact on borrower incomes (Barnes, Gaile & Kibombo, 2001; Barnes, Keogh & Nemarundwe, 2001; Gubert & Roubaud, 2005; Nanor, 2008).

Ashraf et al., (2008) reviewed the benefits of providing credit and training in export crops to rural farmers in Kenya. While they found farmers increased their incomes, it has been suggested this was largely attributable to the export crop training rather than access to microcredit (Van Rooyen et al., 2012).

Barnes, Gaile and Kibombo (2001) assessed the impact of microcredit interventions in Uganda and found that while borrowers had a significantly higher likelihood of increasing net revenue, the general trend was that borrowers had reduced levels of net revenue (Barnes et al., 2001: XV). Another study by Barnes and colleagues (Barnes, Keogh et al., 2001) assessed the impact of microlending interventions in Zimbabwe, and found that although borrowers demonstrated a reduced income two years after the initial assessment, after controlling for initial differences, there was no significant difference in this reduction of income from what non-borrowers reported over the same time period. Although this suggests the overall economic climate in Zimbabwe likely attributed to the decline of income for both groups, borrowers did not fare better than non-borrowers.

Gubert and Roubaud (2005) conducted an analysis of businesses receiving microcredit in Madagascar and found that although borrowers had higher incomes than non-borrowers at the end of the study, the difference was statistically non-significant. The study period also covered a downturn in the economy during 2002. The authors suggest, similar to Barnes, Keogh and Nemarundwe (2001), that credit did not insulate borrowers from the same negative economic outcomes non-borrowers experienced.

Nanor (2008) assessed the impact of microcredit interventions in four districts of Eastern Ghana. In this study, he demonstrated that microcredit improved income levels in two of the four districts. However, his results also suggested that the longer a borrower remained a microcredit client the *worse* their business profit became (Nanor, 2008; Van Rooyen, et al., 2012). However, a longitudinal study conducted in Northern Ethiopia by Berhane and Gardebroek (2011) suggests the longer borrowers participate in microloan programs the more likely they are to experience positive impacts on household consumption and make improvements to their homes.

As demonstrated by this review of impact studies, microlending interventions have produced mixed results. While these results may cause some to question the relationship between capital access and improved economic outcomes, another non-microlending study suggests the reasons microlending interventions are having little impact are likely the result of the structure of microloans rather than the underlying theory.

De Mel, McKenzie and Woodruff (2008) conducted a field experiment in Sri Lanka where they provided grants to randomly selected small business owners to ascertain how productive they are with windfall infusions of cash, regardless of whether or not they apply for credit. While this approach avoids the issues of selection bias discussed earlier, the results are

also not necessarily representative of the specific impacts of microlending, due to the structure and incentives microlending typically includes. De Mel and colleagues (2008) found that the average return to capital in their randomly selected businesses was between 55 and 63 percent per year, which initially suggests that poor individuals in developing countries would be able to increase their incomes substantially if reasonably priced credit was available. However, upon delving deeper into de Mel's (2005) results, they demonstrate that almost 60 percent of female business owners and just over 20 percent of male business owners had negative returns on capital. This suggests the variance in returns to capital was quite large between businesses and that a large proportion of business owners were not meeting the minimum threshold of productivity to repay a loan with interest.

These results beg the question of why the de Mel (2005) grant recipients had, on average, such a high return to capital while many microlending studies find a negligible impact on borrowers. Microlenders have selection processes in place that should improve returns to capital rather than reduce them. The low returns to capital achieved by microlenders when compared to the random recipients of the de Mel (2005) study suggest several possibilities such as: the screening device used by microlenders may prohibit individuals with the ability to attain high returns to capital from receiving loans, individuals with the ability to attain high returns may remove themselves from the applicant pool, the structure of microloans inhibits a borrower's ability to invest in high return activities, or some combination of these.

In the following section, I review the literature on entrepreneurially-spurred economic growth, and in particular the literature on innovation, in order to provide a conceptual framework for how microlending may alleviate poverty. Then using this framework, I put forth a model to explain how group lending and incremental loans may be prohibiting individuals with the ability

to attain high returns from participating in microloans and/or inhibiting their ability to invest in high return activities.

The Importance of Innovation

A substantial body of research exists in the area of innovation, and examines such issues as the determinants of innovation (Baker & Nelson, 2005; Kirton, 1976), innovation's effect on competitive advantage (McGrath, Tsai, Venkataraman & MacMillan, 1996), and innovation's role in economic growth (Aghion et al., 1998; Schumpeter, 1934). In spite of this vast amount of literature, little research has attempted to integrate innovation with microlending. In the following section I outline some of the research on innovation to demonstrate its applicability and importance to the field of microlending.

Neoclassical growth models predict convergence of per capita gross domestic product (GDP) between low-income countries and high-income countries due to the assumption of diminishing returns to capital investment (Aghion et al., 1998; Romer, 1994). Essentially, low-income countries will realize higher gains to investment than high-income countries which will ultimately result in their per capita GDP's coming closer together. However, data emerged in the late 1980's and early 1990's that was inconsistent with neoclassical growth models (Honohan, 2004). The per capita GDP of low-income countries was relatively stagnant in the period from 1960-1985 while the per capita GDP of high-income countries continued to grow (Aghion, Howitt & Mayer-Foulkes, 2005; Heston & Summers, 1991; Maddison, 1982). This is indicative of divergence not convergence. This resulted in some scholars questioning two basic assumptions of the neoclassical model: technological change is exogenous and the same technological opportunities are available in all countries (Honohan, 2004; Lucas, 1988; Romer,

1986, 1994). The result of attempting to reconcile the emerging data and neoclassical models was a renewed interest in the importance of innovation (Aghion & Howitt, 1998).

Recent theories regarding the importance of innovation to economic growth can attribute much of their origins to the writings of Joseph Schumpeter (1934). In particular, Schumpeter speculated that entrepreneurs play a key role in economic growth by innovating new products or processes that are more productive than existing ones. Entrepreneurs thus find more productive uses of resources that increase returns to capital invested and stimulate economic growth.

There are two base assumptions of Schumpeter's work (1934) as it relates to entrepreneurs: 1) the free market puts resources to their most efficient use; and 2) the entrepreneur is an innovator who develops new and more productive uses of resources. Specifically, people acting in their self-interest participate in the market by buying and selling items. Assuming no coercion, fraud, or other free market inhibitors, these market transactions divert resources from less productive uses to more productive uses as consumers attempt to purchase the highest value items for the lowest cost. Entrepreneurs, acting in their own self-interest, seek the potential of monopolistic rents stemming from the introduction of unique goods and services that create more value for consumers.

Based on these assumptions, Schumpeter (1934) speculated that the entrepreneur plays a significant role in economic growth. He suggested entrepreneurs create more market efficiency by recombining resources in a novel and more productive way that push less productive uses of resources from the marketplace. Through the mechanism of a free market, entrepreneurs thus divert resources from old, obsolete, and less productive uses of resources to the new more productive use of resources they innovated. This increase in productivity results in economic growth.

Microlending advocates, such as Muhammad Yunus, have suggested that microlending will achieve its economic goal of poverty alleviation by promoting entrepreneurship (Yunus, 2005). Unfortunately, the common use of the term "entrepreneurship" often refers to small owner-operated businesses or the process of starting a business rather than Schumpeter's definition of entrepreneurs as innovators. An example of this is Birch (1979), which is the source most often cited in the management literature as empirical evidence that entrepreneurship is linked to economic growth. Birch demonstrated that a disproportionately greater number of new jobs are created by small businesses than by large businesses (Audretsch, 2005; Low & MacMillan, 1988; Shane, 1996). However, Birch's research measured the effects of small business, which is conceptually distinct from innovation (Carland, Hoy, Boulton & Carland, 1984; Shane, 2009; Wong et al., 2005). Entrepreneurs have been theoretically linked to economic growth due to their role as innovators, and not all small business owners are innovative. Anecdotally supporting this distinction is Birch's own research. His research showed it was a small subsection of small business, as little as four percent, which accounted for nearly all of the small business job growth in his sample.

What accounts for the difference between the job growth created by this small subsection and the rest of the small businesses in Birch's (1979) sample? I suggest what Birch captured in this four percent were innovators. An international study by Wong, Ho and Autio (2005) not only suggests small business ownership is conceptually distinct from innovation, but demonstrates that only innovation and high-growth potential entrepreneurship (a small sub-set of entrepreneurs that expect employment growth, market impact, a globalized customer base, and the *use of new technology,* p.341) are correlated with economic growth and not entrepreneurial

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activity in general. Again to emphasize the conceptual difference, innovators may start out as small businesses, but not all small businesses are innovators.

Another common misconception is that start-ups, as a measure of entrepreneurship, is linked to economic growth. However, start-ups are not inherently innovative either. Shane (2009) stated, "The typical start-up is not innovative, creates few jobs, and generates little wealth" (pg 1). Furthermore, researchers that have studied the impact of start-up activity on economic growth have shown that a high level of self-employment is associated with economic stagnation in developing countries (Acs & Varga, 2005; Autio & Yli-Renko, 1998). This is the opposite relationship entrepreneurship is expected to have on economic growth and highlights a potentially stark difference between innovative entrepreneurship and start-ups in developing countries.

Not only are start-ups, small businesses, and innovators conceptually distinct, but their differing effects on economic growth have been empirically demonstrated (Acs et al., 2005; Autio et al., 1998; Wong et al., 2005). It is important to note that, although the innovation literature has often focused on technological innovation, or the efforts to push technological frontiers, (Lumpkin & Dess, 1996), not all innovations are necessarily of this type. My conceptualization is that innovativeness represents a willingness to depart from the status quo (Kimberly & Evanisko, 1981). Similar to Nord and Tucker (1987) and Klein and Sorra (1996), I define innovation as a technology or practice being used for the first time by an organization whether or not it has been previously used by other organizations. This definition embraces the various ways in which a business may improve productivity and includes radical disruptive innovation (Schumpeter, 1934), incremental innovation (Benner & Tushman, 2003), product-

market innovation (Lumpkin et al., 1996) and efforts to differentiate end products or services in unique ways (Porter, 1990) among others.

Although monopolistic rents are often cited as the motivation to create innovations (Grossman & Helpman, 1989; Romer, 1986), intellectual property rights are often incomplete which allows for the rent-free spread of productivity enhancing innovations to others (Aghion et al., 1998). This suggests that businesses may utilize innovations developed elsewhere to improve their own productivity. Knowledge spillovers are not costless propositions though. Scholars such as Aghion et al., (2005) and Cohen and Levinthal (1990) have suggested investment is necessary to understand, adapt, and utilize innovations. Kirzner (1997) suggested there are informational asymmetries that allow certain individuals to act entrepreneurially by acting as brokers between those that "know" and those that "don't know". Overcoming the ignorance of not knowing about innovations requires human capital investments to understand the potential implications of innovations as well as investments in search activities to find appropriate innovations to institute (McMullen & Shepherd, 2006).

Another aspect to consider is that innovations may be sold to businesses. For instance, a new software program that allows companies to be more productive may be purchased for a price in the marketplace. By purchasing appropriate software a company can adopt the software as an innovation, improve workplace productivity, and reap economic benefits. This type of innovation adoption also requires investments of capital to search for, understand, purchase, and appropriately utilize the innovation.

These theoretical developments can be summarized as follows: 1) Innovations represent more productive combinations of resources than previously existed; 2) Entrepreneurs seeking monopoly rents introduce innovations; 3) Imperfect knowledge protection and innovations that

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are openly sold in the market allow others to take advantage of productivity enhancing innovations originally developed elsewhere; 4) Effectively adopting an innovation requires investments to understand, find and possibly purchase the innovation, as well as adapt, and utilize the innovation. These items suggest one avenue for how microlending may enhance the welfare of the poor. By providing capital, microlending institutions may provide the poor with the means to find and adopt productivity enhancing innovations that will lead to increases in their incomes.

Empirical Evidence

Because innovation is difficult to measure, evidence of the importance of innovation to economic growth has largely been relegated to studies of productivity growth, which is largely assumed to be the outcome of successful innovation adoption (Aghion et al., 2005). Studies have demonstrated that simple capital accumulation models, as suggested by early neoclassical growth models where capital is assumed to have a constant return, routinely underestimate productivity gains (Aghion et al., 1998). Scholars have suggested this is due to the failure to account for innovations that increase the returns of capital investments and improve productivity growth (Aghion et al., 1998). Studies by Easterly and Levine (2001) and Klenow and Rodriguez-Clare (1997) suggest over 60 percent of the variation in growth rates of GDP per capita across countries is attributable to differences in productivity growth. Given the continued divergence between developed and developing countries, this suggests that developed countries are able to routinely invest in innovations that improve productivity while developing countries are not (Aghion et al., 2005)

However, Schumpeter's writings and the empirical articles cited above have been conducted at the macro level. The question of the applicability of this research to the individual

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and group level remains. For this I turn to the work of Bradley et al. (2012b) where they find

that the financial performance of microloan borrowers in Kenya was mediated by innovation.

Specifically, they examined groups of borrowers and found the ones that were more innovative

in their business practices achieved higher financial performance than those borrowers that were

not as innovative. In another empirical study set in the Dominican Republic, Bradley et al.

(2012a) found that increasing microcredit loan size had a positive effect on income level but only

in the presence of business innovation. These findings, when seen together with the macro level

evidence of the importance of innovation, suggest a homologous multilevel model (Klein &

Kozlowski, 2000) where innovation creates productivity increases that lead to increased incomes

at the individual level and economic growth at the macro level.

The Role of Banking

Another theory that suggests how microlending may alleviate poverty, which also stems

from the work of Schumpeter (1934), is that financial intermediaries, such as banks, may play an

important role in economic growth. Schumpeter speculated that banks improve the efficient use

of capital by allocating it to the most productive projects. By shifting capital away from

unprofitable or low-profit businesses to highly profitable businesses, banks increase the returns

to capital invested, raise the average productivity growth rate, and thereby stimulate economic

growth.

Agency theory (Jensen & Meckling, 1976) suggests the separation of principals and

agents leads to potential conflicts of interest (see Dalton, Hitt, Certo & Dalton, 2007 or

Eisenhardt, 1989 for a review). In the context of lending, banks act as principals and borrowers

as agents. Borrowers may be dishonest regarding the intended uses of loan proceeds, the

collateral they possess, the profitability of their business, or even their intent to repay the loans.

One way to overcome the information asymmetry and moral hazard inherent in most lending situations is to effectively monitor and prescreen the agents and banks offer some distinct advantages over individuals in this respect. Evaluating potential entrepreneurs to ensure the capital is put to productive use requires large up-front information processing costs. As specialists, banks acquire the ability to significantly lower these information processing costs (Acemoglu & Zilibotti, 1997; Aghion et al., 1998). Additionally, banks are able to diversify the risk of investing in entrepreneurs over many different loans that individuals cannot achieve. These advantages allow banks to more efficiently divert funds to the most productive entrepreneurs at the expense of less productive ones, and reduce overall risk through diversification (King et al., 1993b). Consequently banks, in their own self-interest, improve productivity by rationing credit.

Multiple studies have demonstrated that financial depth, or the ratio of private credit to gross domestic product, is a robust predictor of economic growth (Honohan, 2004; King & Levine 1993a, 1993b; Levine, Loayza & Beck, 2000). This research demonstrates that financial depth predicted economic growth better than other previously used indicators, such as initial income level, government spending, inflation, and trade openness. Furthermore, King and Levine (1993b), and subsequently Levine, Loayza and Beck (2000), tested possible reverse causality of the relationship between financial depth and economic growth and determined financial depth preceded economic growth thereby negating the criticisms of possible endogeneity (Robinson, 1952; Lucas, 1988).

However, it has been suggested that financial depth may disproportionately benefit the rich (Greenwood & Jovanovic, 1990). Specifically, the rich may be in a better position to avail themselves of the benefits stemming from the use of the financial system. This in turn would

increase the incomes of the rich but not the poor, and thus financial depth may exacerbate income inequality. Empirical evidence suggests that although the rich do benefit from increases in financial depth, the poor disproportionately benefit which reduces income inequality (Beck, Demirguc-Kunt & Levine, 2007; Demirguc-Kunt & Levine, 2009). Further support that financial depth benefits the poor can be found in indicators of poverty. Children of impoverished families often have difficulties staying in school due to a need for them to work at an early age to help support their families. Benhabib and Spiegel (2000) found that financial depth was associated with an increase in education rates among the poor. Additionally, Dehejia and Gatti (2005) found that financial depth was associated with a reduction in child labor. Cumulatively, this evidence suggests that increases in financial depth promotes economic growth and improves the lives of the poor.

While it is possible for microlending to have the same effect as banks in increasing financial depth and improving economic growth, the tools used for reducing information asymmetry and evaluating prospective borrowers are significantly different between these institutions. While banks typically require collateral, good credit scores, information about what the loan proceeds are going to be used for, and have specialists to evaluate this information microlending institutions rely on poor borrowers to perform this task through the process of inclusion and exclusion from borrowing groups. Because group loan borrowers are often uneducated and lack experience in evaluating businesses, I suggest they are ill-equipped to determine the likelihood of success of other borrowers. Evidence suggests they often use poor proxies such as marital status, number of relatives in the village, and prestigious positions held by family members (Coleman, 1999) when determining who receives a loan. While these proxies may reduce the likelihood of a strategic default, where a borrower could repay the loan

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but decides not to, they are not likely to efficiently differentiate between highly productive activities and those that are less so.

I suggest that if microlending is to be effective in creating economic growth it must foster innovation adoption, because the current structure that does not rely on specialists is not likely to achieve effective credit rationing that results in increasing productivity. Furthermore, without innovation microlending may inadvertently be promoting the economic stagnation associated with high levels of self-employment in developing countries (Acs et al., 2005; Autio et al., 1998). While there is little empirical evidence of how innovative the poor are in general, what cannot be disputed is that the poor continue to engage in low-value producing activities that subject them to a subsistence lifestyle in much of the world. This suggests the poor are largely unable to adopt innovations that would increase their productivity, increase the value they create, and ultimately enable them to lift themselves out of poverty.

Microlending and Risk

Poverty alleviation is one of the primary goals of microlending (Yunus, 2007), but what is meant by poverty? The World Bank defines the "extremely poor" as those earning below $1.25 purchasing power parity (PPP) per day at 2005 prices (Chen & Ravallion, 2010). While this $1.25 cutoff may seem rather arbitrary, $1.25 is based on significant amounts of research that suggest this level of income is necessary to obtain the basic essentials of living such as minimal housing and a nutritionally adequate diet (Chen et al., 2010). Pairing this definition of poverty with the statistics that suggest over 1.4 billion people are currently living below this threshold (Chen et al., 2010) reveals the conclusion that 20 per cent of the world's population is living without adequate access to food, shelter, and other necessities.

When living a subsistence lifestyle, risk of disease and starvation are an ever present concern. The poor in developing countries, where microlending has been most often targeted, often generate income through work consisting of farming and animal raising (Banerjee & Duflo, 2007; Yesuf & Bluffstone, 2009). This type of work carries many risks including variance in rainfall, crop diseases, and animal mortality. Additionally, even if poor individuals are not involved in farming, they may become injured or fall ill which prevents them from generating an income. Although in developed countries there are often many private and government sponsored assistance programs, access to these types of programs are few and far between in developing countries. Thus individuals in developing countries are often left to insure themselves against these types of calamities. Evidence of the poor's aversion to risk has been found in several studies. Hamal and Anderson (1982) found that farmers in Nepal had very high levels of risk aversion that tend to decrease as wealth increases. This suggests that wealth may serve as a buffer stock to smooth future consumption.

Another related study by Dercon and Christiaensen (2011) explored the use of fertilizers in Ethiopia and discovered a similar risk aversion among poor farmers. The Ethiopian government had undertaken a large campaign to increase the use of fertilizer by increasing its availability and training farmers in its use. However, in spite of the government's efforts, fertilizer use by farmers in Ethiopia is still only approximately 22% (Dercon et al., 2011). The issue that is limiting the use of fertilizer appears not to be the availability or feasibility of using fertilizers but rather the desirability of using them. Dercon et al. (2011) suggest that the uncertainty of returns to using fertilizers coupled with the decrease of surplus stocks, used to purchase the fertilizers, make the desirability of using fertilizers low. To put it more simply, farmers would have to reduce buffer stocks, either at the time of purchase or in the future if

credit was used, to purchase fertilizers which increases the farmers' dependence on a good

harvest and reduces their ability to cope should the harvest fail. Purchasing fertilizers thus not

only represents the potential to increase profits, as touted by most advocates, but also increases

the risk bearing of the farmers which has stymied its widespread use in Ethiopia.

I suggest risk is an important aspect to consider when evaluating when and how

innovations, such as fertilizers, are adopted in the developing world. In the next section I begin

developing an individual level model of innovation adoption, and I include perceived risk as an

important motivator.

III. THEORETICAL MODEL DEVELOPMENT

Personality and Behavior

Entrepreneurship researchers have suggested that although individual characteristics may

account for some of the variance of who engages in entrepreneurship, "it is improbable that

entrepreneurship can be explained *solely* by reference to a characteristic of certain people

independent of the situations in which they find themselves" (emphasis in the original, Shane &

Venkataraman, 2000: 218). Similarly, innovation, which is oftentimes used synonymously with

entrepreneurship (e.g. Schumpeter, 1934; Carland, Hoy, Carland, 1984), may be the result of an

interaction between individual characteristics and the environment. In order to understand how

microlending may be affecting the adoption of innovations, I must begin by disentangling the

characteristics of individuals and the aspects of microlending that may affect innovation

adoption.

Beginning with Kirton (1976) researchers have attempted to understand how to predict

when an individual is more likely to "do things differently" rather than adapt to the status quo.

Along these lines, researchers have found supporting evidence that characteristics such as high

levels of creativity increase an individual's likelihood to create innovations (Kirton, 1976;

Goldsmith, d'Hauteville & Flynn, 1997). This leads me to my first hypothesis:

> *Hypothesis 1: Borrowers with characteristics indicative of a proclivity to innovate*
>
> *are more likely to engage in innovative behavior than those*
>
> *borrowers with characteristics indicative of a low proclivity to*
>
> *innovate.*

Situational Strength

However, understanding innovation adoption requires more than simply measuring an

individual's characteristics; "The complexity of human behavior and its determinants must be

studied from a perspective that accounts for the simultaneous and interactive impact of

individual differences and situational characteristics" (Meyer, Dalal & Hermida, 2010: 124). To

provide a framework for understanding the interaction of an individual's proclivity to innovate

with situational factors, I turn to Mischel's (1977) concept of weak and strong situations.

Mischel suggested that strong situations are ones in which most actors draw similar

conclusions about what is appropriate behavior, and thus act in a similar fashion. In these

situations, environmental cues are better predictors of behavior than individual characteristics

and personality traits (Meyer et al., 2010). For instance, a stop sign is an environmental cue that

creates a strong situation where most, albeit not all, drivers stop in spite of their vast personality

differences. Alternatively, weak situations are ones in which the environmental cues are

ambiguous about what behavior is appropriate (Mischel, 1977). Continuing with the driving

example, a weak situation may be illustrated with snowy driving conditions. An individual with

high driving self-efficacy is more likely to go on unnecessary errands in spite of the driving

conditions, while an individual low in driving self-efficacy is more likely to wait for the driving

conditions to improve. In this situation there is no clear 'right' way to act and an individual's

predispositions are more likely to guide how they behave rather than the environmental cues.

The literature suggests situational factors, such as access to capital, may moderate the

adoption of innovations (Armendariz de Aghion and Morduch, 1999; Fishman and Simhon,

2002; Patrick, 1966) and entrepreneurship (Kshetri, 2011). Providing access to capital allows an

individual with a high proclivity to innovate the opportunity to express that character trait. Not

only does capital availability allow an individual to purchase potential inputs for innovation, but

it may also provide buffer stocks of resources to fall back on should the innovation fail.

Microlending evolved from the assumption that the poor would seek out more productive

activities, and thus innovate, if it weren't for their capital constraints that prevent them from

doing so (Bradley et al., 2012). Providing access to capital, however, is not the only aspect of

microlending that may affect the adoption of innovations. I suggest that incremental loans and

group-based lending are situational factors that may constrain the impact of an individual's

proclivity to innovate on innovative behavior. As previously discussed, microlending

institutions typically offer groups of borrowers small initial loan amounts. If all loans made to

the group are paid in full, then the members are eligible for subsequent, larger loans (Khavul,

2010). Additionally, borrowers are not allowed to have more than one outstanding loan with a

microlender at a time. There is evidence that those who have received microloans do, in fact,

continue to take out new larger loans. In India, the average individual microloan debt has gone

from $27 in 2004 to $135 in 2009, a fivefold increase in just five years (Gokhale, 2009). Not

only is there evidence that borrowers continue to take out larger loans, but there is also support

for the proposition that access to larger loans is an important consideration among borrowers. A

qualitative study by Bruton, Khavul and Chavez (2011) showed that both individual borrowers and borrowing group leaders place an emphasis on maintaining access to future larger loans as a motivation for repayment. In their study, one borrower recounted how a group leader came to her when she was unable to pay and asked her if she wanted to be able to receive another loan in the future. When a different borrower was asked what would happen if the group failed to make the loan payment, this borrower responded by saying that the lender "would stop giving loans" (Bruton et al., 2011, p.732). These responses suggest borrowers value access to future loans.

One reason borrowers may desire access to future loans is that they value the economic returns they can generate from profitably investing the proceeds. Losing access to future loans would then represent lost profits in the future. I suggest a complementary reason borrowers in developing countries value access to future loans is that they may see access to credit as a type of insurance against idiosyncratic shocks. For instance, if a crop fails or an individual gets sick or injured, a microloan may help the individual overcome a temporary loss in income and smooth their consumption over time (Amin et al., 2003). Thus securing access to future loans may provide an individual an avenue to avoid a short-term catastrophe, and empirical evidence supports the role of microloans in income smoothing (Morduch, 1998; Pitt & Khandker, 1998). This second reason suggests that the poor investment of a microloan, that precludes repayment, represents not only the lost profits potentially generated by future loans, but also the loss of buffer resources that may insure an individual against the tragic consequences of idiosyncratic shocks in developing countries. Therefore, individuals with high levels of intent to take out future loans are likely to prefer less risky uses of their current loan proceeds regardless of their characteristic proclivity to innovate.

However, if an individual borrower does not intend to take out a future loan the impetus to make a conservative investment in order to ensure repayment and maintain future eligibility is removed. As such, individuals with low levels of intent to take out future loans are more likely to be guided by their innovative characteristics when deciding how to invest their current loan proceeds rather than the pressure to maintain future loan eligibility.

Hypothesis 2: An individual's intent to take out future loans moderates the relationship between their proclivity to innovate and innovation adoption such that at high levels of intent the relationship is weaker and at low levels of intent it has no effect.

An additional consideration is whether or not borrowers have access to alternative sources of credit. Alternative sources of credit reduce the borrower's dependence on any particular source of credit, which would allow them to engage in higher risk higher reward investments without the fear of losing access to credit in the future. Individuals that have multiple sources of credit are not as likely to perceive such strong situational cues and thus are more likely to allow their predispositions to determine how they invest loan proceeds.

Hypothesis 3: The availability of alternative sources of credit strengthens the effect of an individual's proclivity to innovate on innovation adoption.

Group Lending

Another aspect of the microlending context that needs to be considered is group lending. The most commonly used form of group lending includes individual loans with joint liability (Bhatt & Tang, 1998; Pelligrina, 2011). In this scenario, individuals are provided loans, but if one borrower in their group defaults all members of the group are treated as defaulting. Thus the joint liability aspect of group lending causes any individual level risk of default to become

elevated to a group level risk due to the shared fate of eligibility for future loans. To put it another way, group lending creates a "weakest link" structure where the highest risk of failure of any individual becomes the group's shared risk of failure. Furthermore, the loans are individual and often invested in the borrower's personal business. This means that other members of the group do not have a claim on any of the profits resulting from a good investment of the loan proceeds. Thus if an individual decides to take on a risky business opportunity only the risk of failure gets transferred to the other members and not the potential rewards. For example, if a group has an individual that defaults, they are then left with the choice of two onerous actions: 1) Let the group default on the loan with the consequence of being unable to access future loans; or 2) Make payments on the defaulter's portion of the loan from their personal assets. However, if a group has a member that makes a risky investment decision that pays off, the profits are not distributed to other group members. I suggest that because the group is not compensated for the risks any individual may take, in the form of potential profits, but is penalized for risks that result in a default, the group has an incentive to reduce individual risk taking among group members. Innovation inherently requires trying something new, and is often considered risky. Due to the incentives of group lending and the perceived risks of innovation I suggest innovation is less likely to occur in group loans than individual loans.

Hypothesis 4: Innovation adoption will occur less frequently among group borrowers than individual borrowers.

Group Socialization Model

In the following section, I outline two potential mechanisms by which groups may reduce innovation adoption: sorting and social pressure. The literature on groups and teams within the management literature is quite extensive (e.g Ilgen, Hollenbeck, Johnson & Jundt, 2005;

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Kozlowski & Bell, 2003; Mathieu, Maynard, Rapp & Gilson, 2008). However, within much of this literature the membership of the team or group is often taken as a given. This stems from the belief that work groups are often assigned by managers and team members have little, if any, say in the team's composition. This arrangement differs quite considerably from microlending groups where membership is voluntary and mutually agreed upon.

One stream of literature that investigates the role of self-selection in group dynamics is by Levine and Moreland (1982, 1985, 1988, 1990, 1994). The group socialization model (GSM, Levine et al., 1994) primarily applies to small, voluntary, autonomous groups whose members interact on a regular basis and are behaviorally interdependent. I believe this model is much more applicable to group lending than group or teamwork theories whose membership is assumed to not be voluntary.

The GSM incorporates three psychological processes: evaluation, commitment, and role transition (Levine et al., 1994). While I discuss evaluation and commitment in the context of microlending, role transition often includes ascending to other ranks within the group, such as moving from an entry level position to mid-level and senior positions (Levine et al., 1994) that is unlikely to occur in borrowing groups. The relatively small number of members in many borrowing groups along with the flat hierarchical structure often precludes role transitions to mid and senior level positions by borrowers. While role transitions also occur when members leave the group and investigating turnover among microloan borrowers may provide fruitful insight into the dynamics of group processes, with such theories as self-categorization theory (Hogg, 1987) and identity theory (Stryker, 1968), this area of research is beyond the scope of this current study, and as such role transitions are not discussed any further.

Evaluation involves the efforts by the group and individual members to assess and maximize the rewardingness of their relationship. The GSM takes the assumption that every group has some goal or goals it wishes to accomplish (Levine et al., 1994). Microlending groups, at a minimum, have the goal of meeting the requirements to receive a group-based loan. Additionally, I have suggested that group borrowers often have the secondary goal of maximizing the likelihood of being eligible for future loans (Bruton et al., 2011; Morduch, 1999). In terms of the GSM, this suggests individuals evaluate the rewardingness of being eligible for microloans prior to joining a borrowing group. Furthermore, the group evaluates potential members and their ability to contribute to the group's goals (Levine et al., 1994). This two-way evaluation ends in group membership when an individual decides the rewardingness of being a member of the group is sufficient and the group decides the individual can sufficiently contribute to the attainment of group goals. While consensus about potential members is not necessarily easily reached, "most groups develop informal or formal mechanisms for reaching consensus about individuals members" (Levine et al., 1994: p308).

Commitment, which depends on the outcome of the evaluation process, is based on the group's and individual's beliefs about the rewardingness of the relationship when compared to potential alternative relationships (Levine et al., 1994). Acknowledging that initial loan proceeds are often received relatively contemporaneously with group formation, commitment to the borrowing group is thus likely determined by individual borrowers through an evaluation of the rewardingness of maintaining future access to loans, the likelihood of the group to maintain access to future loans, and the possible repercussions of withdrawing commitment to the group. Assuming that borrowers' value future access to loans (Bruton et al., 2011; Gokhale, 2009), this suggests individuals with a lower risk of default than the group will likely have low commitment

to the group if alternative groups with a similarly low risk or even lower risk of default than the individual can be located. Alternatively, individual borrowers with a higher risk of default than the group will likely have high commitment because maintaining membership in the group increases the likelihood of them achieving their goal. Reciprocally, groups also evaluate commitment to individual members (Levine et al., 1994). Groups with a higher risk of default than an individual borrower will likely have a high commitment to the individual due to their ability to contribute to the group goal of maintaining access to future loans, while groups with a lower risk of default than an individual member will likely have a low level of commitment to that individual.

Supporting this notion are economic models that suggest a positive assortative matching process between potential borrowers whereby individuals with a similarly low or high risk of default form borrowing groups together rather than with individuals with dissimilar risk profiles (Armendariz de Aghion & Gollier, 2000; Ghatak, 2000; Van Tassel, 1999). Positive assortative matching is based on the assumption that individuals within a community have relatively full knowledge of the riskiness of other members of the community (Ghatak, 2000). Self-interested safe borrowers are thus able to form groups with other safe borrowers which lowers the risk of default, while risky borrowers are left to form groups with other risky borrowers. Furthermore, empirical evidence suggests repayment rates are higher among borrowing groups that are able to actively engage in the screening of members (Wenner, 1995).

I suggest exclusion will likely occur as a mechanism to reduce collective risk and inadvertently diminish the adoption of innovative business activities. Exclusion will occur when a potential group member is perceived by the other members of the group to be disproportionately more risky than the other members prior to receiving the loan (Coleman,

1999; Ghatak, 1999). The higher risk of this individual increases the collective risk of default, and reduces the likelihood of the group attaining their group goal. The other group members are thus incentivized to find a lower risk alternative to this individual who is more likely to positively contribute to goal attainment. If a suitable alternative can be found, the high risk individual will be excluded from the group loan. While exclusion has been empirically shown to reduce the overall group risk of default (Ghatak, 1999), I suggest it also reduces the adoption of innovative business practices due to their perception as uncertain and risky. I suggest an individual that has previously attempted innovative activities, and thus likely has a relatively high proclivity to innovate, is likely to be perceived as risky and thus is more likely to be excluded by a borrowing group than individuals that engage in traditional activities that are perceived as 'safe'.

> *Hypothesis 5: Individuals with a high proclivity to innovate are less likely to*
>
> > *participate in borrowing groups than others with a low proclivity to*
> >
> > *innovate.*

Another possible mechanism that would reduce the levels of innovation adoption among borrowing groups is innovative individuals may opt out of participating in group loans. This differs from the mechanism of exclusion discussed above in that rather than borrowing groups deciding to exclude innovative individuals, the individuals themselves are opting not to participate in borrowing groups. However, I suggest this is unlikely. Group loans offer a significant, if not the only, source of reasonable credit available to many of the poor in developing countries. Additionally, if innovative individuals feel that adopting an innovation would jeopardize their relationships with other group members they may simply elect to engage in more traditional activities. The group loan would still provide the benefits of income

smoothing and insurance against idiosyncratic shock. Moreover, if innovative individuals are aware of the riskiness of their business activities, they should seek to spread this risk by joining a borrowing group.

GSM also suggests behavioral expectations, or norms, are created for how goals are to be accomplished and each individual's behavior is compared to these norms (Levine et al., 1994). If there is a discrepancy between group norms and an individual's behavior corrective action may be taken by the group such as social isolation or expulsion. This type of response may be considered a "tit for tat" type behavior wherein the individual's nonconformist behavior impedes the group's ability to achieve their goal and the notion of reciprocity, and in particular negative reciprocity (Fehr & Gachter, 2000), dictate an in-kind response. In the context of microlending, the potential enforcement of social sanctions against individuals that default is one often cited reason for the high repayment rates observed (Morduch, 1999). A study conducted by Wydick (1999) in Guatemala suggests peer monitoring, or the ability of group members to assess individual member actions, is the most important aspect of group lending in determining loan repayment rates. Individual members that perform behaviors consistent with group norms but that suffer hardship, which precludes them from repaying their loan, are often insured by other group members, while individuals that do not adequately perform behaviors consistent with group norms are expelled from the group (Wydick, 1999). Moreover, it has been suggested the social isolation that occurs as a result of default carries over from the microlending context to other economic and social functions within the community such as the loss of reputation and restrictions on access to inputs necessary for business (Armendariz de Aghion & Morduch, 2000).

I suggest that not only are negative group responses likely to occur when an individual defaults, but also when an individual is perceived to be increasing the risk of default. If an individual joins a borrowing group, accepts the loan and then is observed by the group to be using the loan proceeds for what is perceived to be a risky activity, I suggest they will often be pressured by the group to choose a less risky alternative that decreases the likelihood of default. Bruton et al. (2011), based on their qualitative data collected in Guatemala and the Dominican Republic, observed that some borrowers actively manage relationships within their borrowing groups. Furthermore, given that peer monitoring is an important part of the group lending process (Wydick, 1999), it appears highly unlikely that groups would simply wait to take action until an actual default occurs.

I suggest that because innovative business activities are likely perceived to have uncertain returns, and thus be risky, a borrowing group may see an individual member engaging in innovative activities as increasing the group's risk of default for personal gain. Moreover, because increasing the group's risk of default is likely antithetical to the group's goal of maintaining future access to loans (Bruton et al., 2011; Gokhale, 2009) this type of behavior would constitute a violation of group norms that according to the GSM (Levine et al., 1994) dictates corrective action be taken. I suggest that cues from other group members regarding potential social sanctions if risky activities are undertaken likely create a strong situation that decreases the likelihood an individual will express a proclivity to innovate by adopting an innovation.

> *Hypothesis 6: Loan type (group or individual) moderates the relationship between a*
>
> *borrower's personality traits and innovative behavior such that the*

relationship between personality traits and innovative behavior is weaker in

group loans and there is no effect on the relationship in individual loans.

IV. METHOD

Sample

One of the first steps in conducting an empirical study is defining the population to be sampled. While the ideal population for this study would be all borrowers from microlending institutions worldwide, obviously this is not feasible, so the population was narrowed to microlending borrowers within Ethiopia. However, again this sample is unfeasible given the geographic dispersion of borrowers throughout Ethiopia, where communication and travel are difficult at best due to poor infrastructure and often illiterate borrowers. As a result, this study began with microfinance institutions with an office located in the capital city of Addis Ababa.

At the time of the study, there were 30 microfinance institutions officially operating in Ethiopia. Of these, 11 have offices located in Addis Ababa and have more than 10,000 borrowers. Five of these microfinance institutions were asked to participate in the study and three agreed. With the help of managers and officers from each participating microfinance organization, 11 branches located within a four hour drive of Addis Ababa were purposefully selected to balance the competing interests of gathering a large and diverse sample with logistical limitations.

While the sample would ordinarily be compared to the population to establish the threat of any potential selection bias, this type of comparison is particularly difficult among microloan borrowers in Ethiopia. Not only is basic demographic information on borrowers not publicly available, but many microfinance organizations do not even capture this type of information making adequate datasets impossible to gather. Additionally, microloan borrowers are known to

possess different characteristics than the population as a whole. The selection bias issue covered previously in the review of microlending impact studies is indicative of this fact. Additionally, microloan borrowers are typically poor, but not the poorest in a community (Amin, Rai & Topa, 2003). These facts suggest comparing a sample of microloan borrowers to the general population of a geographic area is also inadequate. Because the potential of selection bias cannot be ruled out the results of this study cannot be generalized to any larger population with certainty. However, because care was taken to sample from three different types of microlending institutions and multiple branch locations were surveyed, I believe the concern of selection bias was minimized to the extent possible given the limited resources and data available.

In order to test the proposed hypotheses, data was gathered using semi-structured interviews with 340 microloan borrowers in Ethiopia. The interviews lasted between 30 minutes and one hour and were conducted over a three week period in the summer of 2013. Most borrowers were interviewed at the microfinance organization's branch office as they came to make a payment on their loan. However, when there were an insufficient number of borrowers coming to make payments at the branch office, interviewers went to a borrower's business, home, or place of work to conduct the interview.

Ten interviewers were recruited from Master's level programs at Addis Ababa University who were fluent in English and Amharic. Prior to conducting the interviews, the interviewers went through a two hour training session where proper interview techniques were discussed. An Amharic translation of the questionnaire was created, and the interview questions were discussed among the interviewers and lead researcher to ensure the interviewers understood each question. Interviewers were provided a questionnaire for each interview where they could record the borrower's answers. In a few situations where microloan borrowers only spoke Oromo,

additional translation was necessary. This was accomplished through two interviewers that

spoke some Oromo and three employees of the microlending institutions that were fluent in

Amharic and Oromo.

The sample's average household size was 4.5 with an income between 251-500 birr per

week ($13.45-$26.88). Approximately 54% of the respondents were female. The median total

savings for the sample was 1,200 birr (approximately $95) while the mean was 5,707 birr

(approximately $307). This demonstrates significant positive skew due to a handful of

individuals with a relatively large amount of savings (skewness 7.099). The sample also

consisted of 113 borrowers of individual loans and 227 borrowers of group loans.

The first institution is very large and backed by the Ethiopian government. This

organization offers loans in various sizes from 700 birr (approximately $37.50) up to 350,000

birr (approximately $18,800). The loans are packaged into different loan products such as micro

loans (700-5,000 birr or approximately $37.63-$269), small loans (5,000-250,000 birr or

approximately $269-$13,441), agricultural loans (700-250,000 birr or approximately $37.63-

$13,441), and housing loans (700-350,000 birr or approximately $37.50-$18,800) that each have

different loan repayment schedules. Additionally, each loan offered by this organization requires

a payment of 1-2 percent of the loan value to purchase insurance benefiting the microfinance

institution in the event the borrower passes away prior to repaying the loan. Loans are made in

both a non-collateralized group lending and a collateralized individual loan format. Acceptable

collateral for individual loans include land, pledged wages from a recognized employer (often

the government), or evidence of regular long-term income from business interests. Interest rates

range from 15 to 19 percent depending on the loan product and repayment schedule. 150 of the

340 interviews were conducted with borrowers from this institution. These borrowers had an

average household size of 4.13 with an income between 251-500 birr per week ($13.45-$26.88). Approximately 45% of the respondents from this institution were female.

The second microfinance organization is affiliated with a large international non-governmental organization (NGO). This organization offers agricultural loans, agribusiness loans, business loans, and family loans and uses a lending methodology of either individual loans, solidarity loans (3-9 members), and community banking loans (10-35 members). Interest rates range from 15 percent for business loans to 19 percent for family loans and 24 percent for agricultural loans. Additionally, all borrowers must pay 2.5 percent of the loan value for an insurance policy benefiting the microlender in case of the death of the borrower. Group loans (solidarity and community) require deposits amounting to 10 percent of the loan value. Individual loans below 7,000 birr ($376) require pledging salary as collateral, while above 7,000 birr fixed assets such as a house or car must be pledged as collateral. 118 of the 340 interviews were conducted with borrowers of this institution. These borrowers had an average household size of 4.95 with an income between 251-500 birr per week ($13.45-$26.88). Approximately 57% of the respondents from this institution were female.

The third microfinance organization is privately owned and not affiliated with the government or an NGO. This organization offers uncollateralized group loans between 2,000 birr and 10,000 birr (approximately $108 to $538) and individual collateralized loans up to 30,000 birr ($1,613). All loans have a 12 month repayment period and have interest rates between 15 and 20 percent. 72 of the 340 interviews were conducted with borrowers of this institution. These borrowers had an average household size of 4.36 with an income between 0-251 birr per week ($0-$13.45). Approximately 65% of the respondents from this institution were female.

While there are significant differences in the borrower characteristics of each microlending institution, these differences were expected given the demographic characteristics of the locations served by each institution, and each institution's respective emphasis on sustainability, outreach, or social impact. The large government backed microlender emphasizes growing the number of borrowers in a cost-effective manner, while maintaining high repayment rates. This is indicated by their largely urban branch locations and the metrics they gather to determine loan officer/branch success. The microlender affiliated with an international NGO emphasizes sustainability and outreach. This is indicated by their urban and rural locations, the wide range of products offered (for both the poor and relatively rich), and the metrics they gather on each borrower. The privately held microlender emphasizes social impact, which is indicated by their placement of branch offices in very poor semi-urban locations and the recruitment of women as borrowers. Early studies suggested loans to women had a higher social impact because women were more likely to invest in their homes and children than men were (Morduch, 1999; Yunus, 2007).

Measures

Dependent Variable

Innovation adoption, which has been suggested to be an important determinant in increasing individual incomes (Bradley et al., 2012a, 2012b) and economic growth (Aghion et al., 2005), was determined by using an adapted three item index from Dahlqvist/Wiklund's market newness index (2012). This index seeks to determine how innovative businesses are using self-report measures by probing whether respondents perceive their businesses to be offering new products, using new processes to create their products, and/or new methods of distribution to distribute their products when compared to their competitors on a Likert 1-5 scale

for each category. Individual scores are then aggregated and may range from 0 (no different methods) to 15 (very different methods in each category). For example, a borrower selling injera (a bread product that is a staple in the Ethiopian diet), would not likely consider it a new product, and thus have a low score on that component. However, if this same borrower was using a gas stove and delivering their product to hotels while their competitors were using charcoal and selling it in the marketplace, they may score highly on the components of innovative processes and distribution methods.

In addition to these questions, borrowers were asked if they had changed anything about the way in which they earn an income in the past year in order to capture the possibility that the microloan was used to bring them up to the current innovation standard rather than allowing them to push the innovation frontier.

Independent Variable

This study is intended to explore how the structure of microlending may impact innovation adoption. As such, I deemed it important to begin with a framework that recognized individual differences in order to distinguish between the sorting effect exclusion might create from the inhibitive effects social pressure might create.

The Kirton Adaptor-Innovator Inventory (KAI) seeks to measure an individual's likelihood to adapt or innovate by determining their trait creativity, a characteristic demonstrated to positively correlate with innovative behavior (Kirton, 1976; Miron, Erez & Naveh, 2004). This instrument includes questions such as "Do you have a lot of creative ideas?" Three items from this scale were used in the current study.

One concern of using a personality measure, such as the KAI, is whether it remains predictive across cultures. While, to my knowledge, no instrument intended to predict

innovative behavior has been used in East Africa, the KAI has been validated as a reliable indicator of an innovative personality in the U.S., U.K., Italy, France, Slovakia, and the Netherlands (Tullett & Kirton, 1995). While far from conclusive, these cross cultural examinations of the KAI provide some indication of its usefulness beyond the culture and language of the context where it was originally developed.

Moderating Variables

Group lending and incremental loans have been suggested to be important parts of how microlending has reduced default rates (Morduch, 1999). This study seeks to understand how these parts of microlending may also impact innovation adoption among borrowers. To determine whether borrowers were a part of a group loan or individual loan, a question of what type of loan they have was directly asked to the borrower in addition to the names of group members (if applicable). Confirmatory evidence was gathered from loan officers about the type of loan borrowers received when possible. To determine the potential impact incremental loans might have, the perceived value of future loans was gathered by asking borrowers how likely they are to take loans in the future, and if likely, how soon after repaying the current loan they would like to take another loan. Additionally, in order to determine the impact alternative sources of credit may have on innovation adoption borrowers were asked if they have access to other sources of credit such as other microfinance institutions, moneylenders, banks, and family.

Control Variables

In addition to the variables mentioned above, the literature has suggested other items that may affect the likelihood of innovation adoption. Specifically, the number of dependents in a household, household wealth, borrower income and household income have been suggested to

influence risk preferences that may reduce the likelihood of adopting an innovation (Al-Azzam, et al., 2012; Bradley, Artz, et al., 2012; Coleman, 2006; Dercon et al., 2011). Specifically, the larger the number of dependents the more risk averse a borrower is likely to be with regard to future income. Alternatively, higher household wealth, higher borrower income, and higher household income may provide buffer resources that allow borrowers to be more risk neutral or even risk seeking with regard to future income.

The number of dependents was determined by asking how many household members there are and whether or not they were currently working. It is assumed that all members of the household not currently working are dependents.

Household wealth was determined by asking a series of questions regarding the amount of current household savings and durable goods owned by a borrower (e.g. metal roof, concrete floors, mobile phone). Factor reduction was used with the answers to the durable goods questions to arrive at a factor score for each borrower. This factor score was found to be significantly correlated with household savings ($p < .001$) and proved to have no significant explanatory power above and beyond household savings. As such, it was dropped from the analyses.

Borrower and household income were determined by asking whether working members of the household made between 0-250 ($0-$13.44), 251-500 ($13.45-$26.88), 501-1000 ($26.89-$53.76), 1001-1500 ($53.77-$80.65), or over 1500 birr in the last week. The income ranges of each household worker were then aggregated to arrive at an approximate household income. Additionally, average household worker income was assessed to take into account the distribution of household income across the number of household workers. For instance, there may be a significant difference between a household with one worker earning 1001-1500 birr per

week with two dependents and a household with all three household members earning between 251-500 birr per week. In the case of farmers who may have difficulty determining weekly income, questions regarding last year's harvest were posed to determine a yearly income that will then be divided by 52 to make it comparable to other responses.

Aggregate household income proved to be non-significant in the analyses and was therefore dropped. Average household worker income was significant in several analyses; however, it is highly correlated with borrower income ($\beta = .945$; $p < .001$) and was dropped due to concerns about multicollinearity.

V. ANALYSIS AND RESULTS

This chapter reports the results of testing the hypothesized relationships. The descriptive statistics and correlations are reported first, followed by the results of a confirmatory factor analysis, and finally, the results of testing each hypothesized relationship are presented.

Descriptive Statistics and Correlations

The means, standard deviations, and correlations for all variables are reported in Table 1.

Table 1 - Means, Standard Deviations and Correlations

	Mean	Std. Deviation	1	2	3	4	5	6	7
Wealth	Br 5,706.92	Br 19,025.35	1	-.231**	.230**	.139*	.196**	.014	.184*
Dependents	2.116	1.706	-.231**	1	-.067	.002	-.117*	-.046	-.096
Income	2.228	1.173	.230**	-.067	1	-.017	.178**	-.091	.095
KAI	7.444	1.446	.139*	.002	-.017	1	.130*	-.030	-.100
Innovation	9.113	2.667	.196**	-.117*	.178**	.130*	1	.072	.041
Future Loan Likelihood	4.341	2.219	.014	-.046	-.091	-.030	.072	1	-.021
Alt. Sources	1.168	0.375	.184*	-.096	.095	-.100	.041	-.021	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Instrument Evaluation and Confirmatory Factor Analysis

The first step in analyzing the data is ensuring the sample size is large enough relative to the number of variables to detect a stable factor structure (Ferguson & Cox, 1993). Recommendations range between 2:1 and 10:1 for an acceptable subject-to-variable ratio (van Dierendonck & Nuijten, 2011). In this study my sample includes a total of 340 participants and 10 variables of interest providing a ratio of 34:1. Therefore, the sample in this study exceeds the threshold to determine a stable factor structure and variable relationships.

The next step is to determine the normality of the items by checking their skewness and kurtosis. Following Ferguson and Cox (1993), I determined whether the items exceeded ±2.0. No items except borrower wealth exceeded this threshold for skewness or kurtosis. The data of each variable was also analyzed for normality using the Shapiro-Wilkes method. Following this analysis, transformations of the following variables were conducted to improve the indicators of normality: log of borrower income and borrower wealth.

I then applied the Kaiser-Mayer-Olkin test and the Bartlett's test of sphericity to the KAI to ensure the correlation matrix was appropriate to produce a factor structure not found by chance and homogeneity of variance. The Kaiser-Mayer-Olkin test was .647, which exceeds the required minimum value of .5 (van Dierendonck et al., 2011). Additionally, the Bartlett's test of sphericity was significant (130.243, $df = 3$, $p < .001$), suggesting the assumption of homogeneity of variance is supported.

Next, to determine the construct and discriminant validity of the KAI instrument, a confirmatory factor analysis was conducted. Included in the factor analysis was Goldsmith and Hofacker's (1991) innovativeness index scale. This instrument was developed to determine the likelihood consumers would purchase an innovative product, and has been shown to be related

to, but narrower, than the KAI (Goldsmith & Foxall, 2003). Results of the factor analysis suggest the KAI and innovativeness index scale load on to two distinct factors that are significantly correlated with each other ($\beta = .173$, $p < .01$). Item 3 of the KAI was dropped due to its very low loading (.327). The factor analysis was run a second time without item 3 of the KAI, and produced a very clean two factor solution (see Table 2)

Table 2 - Factor Analysis

	Component	
	1	2
KAI - 1	-.037	.855
KAI - 2	.063	.822
Gold - 1	.725	-.172
Gold - 2	.746	.044
Gold - 3	.658	.078
Gold - 4	.785	.091

Extraction Method: Principal Component Analysis.
 Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 3 iterations.

The reliability of the KAI instrument was then assessed using three different methods as suggested by Hair, Black, Babin, Anderson, and Tatham (2010). The first method is to assess the item-to-total correlation and inter item correlations. The suggested minimum threshold for item-to-total correlation is .5 and .3 for inter item correlations. The item-to-total correlation for both items of the KAI in my sample exceed .782. Additionally, the inter item correlation is .437. Thus the items of the KAI exceed the minimum threshold for internal consistency using this method.

The second method for determining reliability is to use Cronbach's alpha. Using all three items of the KAI produced an alpha of .144, however, as mentioned previously, the third item of the KAI produced very low factor loadings. Using a two scale index, where the third item was dropped, produced an alpha of .58, which is also lower than the generally accepted threshold of

.70. However, Cronbach's alpha has been demonstrated to underestimate reliability ratings when there are few items in the scale (Hair et al., 2010). Regardless, the KAI items do not exceed the minimum threshold for internal reliability as suggested by Cronbach's alpha.

The third method for assessing reliability is to determine the item factor loadings in a confirmatory factor analysis. While it has been suggested that loadings between .6 and .7 may be acceptable, the generally accepted threshold is that items should exceed .7 (Hair et al., 2010). Both KAI items in my study exceed .8 (See Table 2), which demonstrates acceptable reliability. Given that the KAI exceeds the thresholds of two of the three methods used to determine reliability, and Cronbach's alpha has been demonstrated to underestimate reliability among scales with few items, I have determined that the KAI meets the minimum threshold of reliability to be utilized in this study.

Hypothesis 1

A hierarchical regression model was developed to test hypothesis 1, which suggested higher innovation scores on the KAI are correlated with innovative behavior. Model 1 included only the control variables of number of dependents, wealth, and borrower income. Model 2 introduced the personality measures of the KAI (Table 3).

The results provided in Table 3 suggest Kirton's KAI is a significant predictor of innovation adoption among microloan borrowers ($\beta = .135$, $p = .05$). This provides support for the main effect that the KAI personality measure predicts innovative behavior, and suggests the KAI has predictive validity within my sample. Hypothesis 1 is therefore supported.

Table 3 - Hypothesis 1

Dependent Variable Innovative Behavior	Model 1: Control	Model 2: KAI
Wealth	.188**	.162*
Dependents	-.023	-.024
Borrower Income	.211**	.204**
KAI		.135*
Model R^2	.100	.117
Adjusted R^2	.086	.099
Model F	7.225**	6.454**
ΔR^2	.100	.017
F for ΔR^2	7.225**	3.828*

n = 200
* = .05
** = .01

Hypothesis 2

To determine whether incremental loans may have a moderating impact on the relationship between personality and behavior another hierarchical regression was run (Table 4). Model 1 included only the control variables. Model 2 includes the KAI and borrower intent to take a future loan. Model 3 includes the multiplicative term of the KAI and borrower intent to take a future loan.

Hypothesis 2 suggested borrower intent to take a future loan would moderate the relationship between the KAI and innovative behavior. The results of Table 4 suggest intent of a borrower to take a future loan is not significant as a main effect in predicting innovative behavior when added to Model 2 with the KAI (p=.201). In Model 3 there is also no support for a moderating effect of intent to take a future loan (p=.783). Therefore Hypothesis 2 is not supported.

Table 4 - Hypothesis 2

Dependent Variable Innovative Behavior	Model 1: Control	Model 2: Main	Model 3: Interaction
Wealth	.188**	.160*	.161*
Dependents	-.023	-.018	-.020
Borrower Income	.211**	.218**	.217**
KAI		.134*	.136*
Future Loan		.087	.87
KAI x Future Loan			.019
Model R²	.100	.124	.125
Adjusted R²	.086	.102	.097
Model F	7.225**	5.509**	4.582**
Δ R²	.100	.025	.000
F for Δ R²	7.225**	2.742	.076

n = 200
* = .05
** = .01

Hypothesis 3

To test the potential of a moderation effect between the personality measures and alternative sources of credit as proposed in Hypothesis 3, hierarchical regressions were performed where Model 1 includes the control variables, Model 2 includes the main effect variables, and Model 3 introduces the interaction term. The results are reported in Table 5.

Hypothesis 3 proposed a moderation effect of access to alternative sources of credit between the KAI and innovative behavior. This hypothesis was tested by creating an interaction term with these two variables. The results of the hierarchical regression from Table 5 were not significant for the interaction term (p=.757). Hypothesis 3 is therefore not supported.

Table 5 - Hypothesis 3

Dependent Variable Innovative Behavior	Model 1: Control	Model 2: Main	Model 3: Interaction
Wealth	.130	.134	.135
Dependents	-.008	-.017	-.017
Borrower Income	.233**	.240**	.240**
KAI		.079	-.008
Loan Access		-.090	-.085
KAI x Loan Access			.091
Model R²	.085	.101	.101
Adjusted R²	.067	.071	.065
Model F	4.688**	3.355*	2.795*
Δ R²	.085	.016	.001
F for Δ R²	4.688**	1.325	.096

n = 156
* = .05
** = .01

Hypothesis 4

To test whether innovation occurs less frequently among borrowers taking group loans than borrowers taking individual loans (Hypothesis 4), a one-way ANOVA was conducted to compare the means of the innovative behavior measures between between loan types. The results are reported in Table 6.

Hypothesis 4 suggested innovation levels are lower among group loan borrowers than individual loan borrowers. A one-way ANOVA (reported in Table 6) was conducted to test this hypothesis. The results suggests borrowers taking individual loans (mean 9.58) are significantly more likely to engage in innovative behavior than borrowers taking group loans (mean 8.89), $F(1,318)$ 4.727, $p = .030$. This result supports hypothesis 4.

Table 6 - Hypothesis 4

Dependent Variable Innovative Behavior	Sum of Squares	df	Mean Square	F	Significance
Between Groups	33.232	1	33.232	4.727	0.030
Within Groups	228.706	317	7.031		
Total	2261.937	318			

Hypothesis 5

To test whether a sorting effect was present (Hypothesis 5), a one-way ANOVA was conducted to compare the means of the personality measures between loan types. The results are reported in Table 7.

Hypothesis 5 suggested one mechanism that may be contributing to the significant difference in innovative behavior between individual loan borrowers and group loan borrowers is a sorting effect. Specifically, I suggested individuals with higher scores on the KAI may be excluded from group loans. A one-way ANOVA (reported in Table 7) was conducted to test this hypothesis, and suggests individuals with a higher proclivity to innovate are more likely to be found taking individual loans (mean 7.64) than group loans (mean 7.35). The difference in means is statistically significant at the .1 level, $F(1, 332)$ 2.910, $p = .089$. This result is consistent with a weak sorting effect with regard to loan type on measures of the KAI. Therefore hypothesis 4 is marginally supported.

Table 7 - Hypothesis 5

Dependent Variable KAI	Sum of Squares	df	Mean Square	F	Significance
Between Groups	6.050	1	6.050	2.910	.089
Within Groups	688.172	331	2.079		
Total	694.222	332			

Hypothesis 6

To test hypothesis 6, which suggested loan type moderates the relationship between personality and behavior, another hierarchical regression (Table 8) was run that included an interaction term created by multiplying loan type and the KAI. Model 1 included the control variables. Model 2 included loan type and the KAI, and Model 3 included the interaction term. To further explore the moderating effect, the data was split based on loan type. A hierarchical regression was then run on both the individual borrower and group borrower subsamples (Table 9). Model 1 again includes the control variables and model 2 introduces the KAI.

Table 8 - Hypothesis 6			
Dependent Variable Innovative Behavior	Model 1: Control	Model 2: Main	Model 3: Interaction
Wealth	.188**	.156*	.150*
Dependents	-.023	-.021	-.046
Borrower Income	.211**	.203**	.211**
KAI		.133	.804**
Loan Type		-.019	.018
KAI x Loan Type			-.688*
Model R²	.100	.117	.147
Adjusted R²	.086	.094	.120
Model F	7.225**	5.153**	5.523**
Δ R²	.100	.018	.029
F for Δ R²	7.225**	1.940	6.628*
n = 200			
* = .05			
** = .01			

Hypothesis 6 suggested loan type would have a moderating effect on the relationship between personality and innovative behavior. The results provided in Table 8 suggest a moderating effect of loan type with the KAI personality measure in predicting innovative behavior (p=.011). To further explore the moderating effect of loan type the sample was split

according to loan type and hierarchical regressions were run with each subsample (Table 9). The

results support Hypothesis 6 in that loan type creates a moderating effect where the KAI predicts

innovative behavior in individual loans (p=.009) but not group loans (p=.796). This finding is

consistent with the assertion that group loans create a strong situation where individual

differences are overwhelmed by environmental cues. Specifically, an individual's personality

significantly predicts innovative behavior in individuals' loans, but not in group loans where I

suggested group pressure creates a strong situational cue to be risk averse.

To further explore whether a social pressure effect may have an effect on innovation

levels between group loans and individual loans beyond the sorting effect previously discuss, the

innovative behavior means of group loan borrowers and individual borrowers were compared

while controlling for KAI mean differences between loan types. The results of the ANCOVA

reported in Table 10 suggest individual borrowers are significantly more likely to engage in

innovative behavior than group loan borrowers after controlling for personality differences

$F(1,309)$ 3.585, p=.011. This result is consistent with the notion that group loans suppress

innovative behavior above and beyond a sorting effect.

Table 9 - Hypothesis 6

Dependent Variable Innovative Behavior		Model 1: Control	Model 2: KAI
	Wealth	.261	.200
	Dependents	.285*	.213*
	Borrower Income	.128	.161
	KAI		.319**
Individual Loan	Model R²	.206	.299
	Adjusted R²	.165	.249
	Model F	4.941**	5.985**
	Δ R²	.206	.093
	F for Δ R²	4.941**	7.440**
n = 61			
	Wealth	.105	.101
	Dependents	-.149	-.148
	Borrower Income	.214**	.212*
	KAI		.022
Group Loan	Model R²	.094	.095
	Adjusted R²	.074	.068
	Model F	4.678**	3.501**
	Δ R²	.094	.000
	F for Δ R²	4.678**	.067
n = 139			

* = .05
** = .01

To determine whether there was a significant difference in the average rates of innovation adoption between group loan and individual loan borrowers beyond any potential sorting effect, an ANCOVA was conducted that controlled for personality scores on the KAI. Levene's test of equality of error variances was conducted to ensure the assumption of homogeneity of variance held for the KAI scores between groups. The assumption of homogeneity of variance was supported, and the results of the ANCOVA are reported in Table 10.

Table 10

Dependent Variable Innovative Behavior	Sum of Squares	df	Mean Square	F	Significance
Corrected Model	62.681	2	31.340	4.495	.028
Intercept	635.902	1	635.902	91.204	.228
KAI	31.312	1	31.312	4.491	.014
Loan Type	24.994	1	24.994	3.585	.011
Error	2154.434	309	6.972		
Total	28032.000	312	7.031		
Corrected Total	2217.115	311			

VI. DISCUSSION

The fundamental goal of many microlending institutions is to improve the lives of the poor (Yunus, 2007; Khavul, 2010). Yet, recent studies suggest microlending is falling short of this goal (Coleman, 1999; Karlan et al., 2011). One key challenge to the development of the literature on microlending and improving its impact is understanding the mechanisms by which lending to the poor may achieve this goal.

Although researchers have suggested various reasons for why microlending should improve the lives of the poor such as promoting entrepreneurship or that access to credit is a de facto benefit for the poor, few have rigorously tested these theories. I have suggested that encouraging innovative behavior is one empirically supported avenue by which microlending may improve the lives of the poor. By providing credit, microlenders may offer borrowers the capital necessary to invest in new more productive business activities. However, I have also suggested that the structure of microloans that has led to improved repayment rates may also be inhibiting investment in innovative activities. This study provides a first step toward understanding how the structure of microloans may be impacting borrowers' investment

decisions. These investment decisions are what will ultimately determine whether microlending is effective in alleviating poverty or creating a cycle of debt.

The results of this study suggest group loans may have a negative effect on innovative behavior. In this sample, group loan borrowers are significantly less likely to engage in innovative behaviors than individual borrowers. This study also suggests there may be two causes for the difference in innovative behavior between loan types: a sorting effect and social pressure. Innovative individuals are less likely to partake in group loans than less-innovative individuals. This suggests that either group borrowers may be excluding innovative individuals from their borrowing groups or innovative individuals may be self-selecting out of participating in group loans.

Innovative individuals that are in group loans also appear to be pressured to not engage in innovative behavior as evidenced by the fact that an innovative personality is significantly related to a borrower's innovative behavior in individual loans but not group loans. The results of this study also suggest that, after controlling for differences in innovative personalities, group loans appear to significantly suppress innovative behavior. This result provides further support for the premise that group loans create pressure on individuals to not behave innovatively.

In spite of these results there are several ways microlenders may be able to improve innovative behavior and the productivity of their borrowers. For instance, specific purpose loans are offered to the poor for the purchase of predefined business items. In Ethiopia specific purpose loans have been offered to farmers for the purchase of fertilizer (Dercon et al., 2011) and tools and equipment for recently graduated tradesman (ADCSI, 2013, personal correspondence). Additionally, in Kenya Yehu Microfinance provides loans specifically for the purpose of chicken and goat farming (www.yehu.org).

Although, specific purpose loans reduce the ability of the borrower to be creative with the use of the loan proceeds, and thus may artificially cap productivity gains, because specific purpose loans are provided to individuals new to that type of business, in the case of chicken and goat farming loans, or specifically for productivity-enhancing investments, in the case of fertilizers, I suggest they are specifically targeted to increase the productivity of borrowers. Specific purpose loans are thus one potential avenue for microlenders to overcome the issues related to innovation adoption. Additionally, the inclusion of specific purpose loans by microlenders will not require a complete change of their structure or significantly alter the human capital needed by loan officers to administer such loans. Moreover, networks of borrowers of the same type of specific purpose loans can be established to share best practices and promote the efficient use of resources in the future.

However, specific purpose loans do require more judicial use than group lending previously required. Oversaturating a market with suppliers of any one product is doomed to failure for both the borrowers and the microlender. Additionally, the culpability of the microlender in the case of business failure is more in question due to the directed use of the loan proceeds.

The results of this study also suggest incremental loans have no significant moderating effect on innovative behavior. I had suggested that to the extent borrowers' value access to future loans they would act more conservatively with their current loan proceeds, but the data did not support this. One reason this could be is that innovators subjectively rate their risk of default as low. Research on entrepreneurs in the United States has suggested that cognitive biases, such as overconfidence and the illusion of control, cause entrepreneurs to perceive their risk of failure as low (Simon, Houghton & Aquino, 2000). Similarly, if innovative borrowers see their risk of

default as low, regardless of how much they value future access to loans it may have no noticeable effect on their behavior. Irrespective of why no significant results were found, the results of this study suggest providing an incentive to borrowers to repay the loan through an incremental loan process has little effect on whether borrowers behave innovatively or not, and should be continued by microlenders to the extent it reduces default.

Borrowers that have access to alternative sources of credit also do not appear to adjust their behavior based on this fact. However, in this study we did not account for the competitiveness of these other alternative sources of credit. It is quite feasible that many of the borrowers reporting an alternative source of credit were referring to moneylenders, which often have less attractive loan terms, or family, which may have significantly better terms, when compared to microlenders. Therefore this study's results should not be taken as conclusive because the true relationship of alternative sources of credit and innovative behavior may be more nuanced than my data allows me to detect.

Additionally, although previous studies have suggested wealth and income are correlated with risk preferences, the overwhelming significance of these items in predicting borrower behavior is worth noting. While this study attempted to highlight ways in which microlending may be inhibiting innovation adoption, another line of research is attempting to understand how to promote innovation adoption by reducing the wealth and income effect on risk aversion. A pilot program is currently underway in Northeast Ethiopia that provides borrowers weather insurance for loans used to purchase fertilizer. While fertilizer use generally increases yields, at the high-end and low-end of rainfall it has a negative return to investment (Dercon et al., 2011). Additionally, Dercon and colleagues (2011) suggested purchasing fertilizer decreases a farmer's buffer stocks of resources to survive a poor harvest. Thus a farmer that purchases fertilizer is

less diversified (more dependent on a good harvest), and less able to cope with a poor harvest. The weather insurance program is tied to loans offered to purchase fertilizers. If the weather stations placed around Northeast Ethiopia report too little or too much rain the insurance covers the borrowers' loan amount. The object of this pilot program is to test whether providing weather insurance, which reduces the downside risk of using fertilizers, increases fertilizer use among Ethiopian farmers. I suggest that this type of insurance scheme may be applied to other areas beyond fertilizer use in order to reduce the downside risk of investing in innovative businesses, and ultimately increase economic growth at the base-of-the-pyramid.

While this study is an initial step into understanding the potential unintended consequences of group lending, there are many limitations. First, the study utilizes cross-sectional data, and is thus unable to speak to the direction of causality. While I make the assumption that personality traits precede the act of taking a loan, a longitudinal study could make stronger inferences about causality. Additionally, a longitudinal study could examine the relationship between loan type, innovative behavior, and changes in income. Another shortcoming of this study is that it relies heavily on self-report measures. This may be particularly troubling regarding the measures of innovative behavior. A subsequent study could attempt to objectively measure the innovativeness of borrowers. Lastly, I want to point out that data for this study was collected exclusively from Ethiopia and does not necessarily generalize to other contexts where microloans are offered.

Another issue, which we lament not being able to discuss at length in this study, is whether debt financing is the optimal method for spurring economic growth. In much of the developed world equity financing is the key tool used to promote innovative businesses. A system of promoting micro-equity in developing countries may prove to be a better facilitator of

innovation-based economic growth than the current system of microloans. Microfranchising, a system similar to franchising in developed countries, is a step in the direction of a sustainable micro-equity system (Fairbourne, 2006). Microfranchisors have a stake in the growth and continued success of their franchisees that is analogous to a venture capitalists' stake in an innovative start-up. Moreover, the success of microfranchises such as Honey Care Africa, suggest this may be a viable alternative or complement to microlending.

Lastly, I want to note that although microlending has become big business in the developing world, and there has been significant research conducted on the topic, there is still a large amount of research to be done. For instance, little is known about how borrowers actually invest loan proceeds, how often group borrowers turnover and why, the impact of default on borrowers, or whether borrowers use a fourth loan differently than the first loan? Additionally, researchers should not lose sight of the fact that billions of individuals live in abject poverty around the world. Research on topics related to economic development and poverty alleviation could have far reaching practical impacts that improve their lives and the world we live in.

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VIII. APPENDICES

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Appendix A

Research Compliance Documentation

May 3, 2013

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MEMORANDUM

TO:	Robert Hirth
	Alan Ellstrand
	Jon Johnson
	Andrew Horowitz
FROM:	Ro Windwalker
	IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	13-04-686
Protocol Title:	*The Situational Effects of Microlending on Innovation Adoption*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 05/03/2013 Expiration Date: 05/02/2014

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (http://vpred.uark.edu/210.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 250 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes.   All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.