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Why Risk It? The Effect of Risk and Time Preferences on Microfinance Loan Default

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Abstract: Microfinance is widely recognized as a powerful method for poverty alleviation. However, little is known about the characteristics of those who default on their loans. Understanding the behavior of borrowers is an important component of mitigating adverse selection and the moral hazard of lending. Both of these concepts embody some of the greatest challenges faced by microfinance institutions, and they provide the major motivation for this study. Accordingly, the main objective of this research is to investigate whether non-delinquent borrowers and delinquent borrowers of a microfinance institution reveal any difference in their level of risk preference and time preference. This is tested through an artefactual field experiment with 97 borrowers from the National Microfinance Bank of the Hashemite Kingdom of Jordan. In the experiment, participants chose between six choices that measure their level of risk preference. In addition, participants selected a voucher that varies both in time and in value to capture their time preference levels. The results reveal that non-delinquent borrowers are more likely to be risk-seeking and impatient individuals when compared to delinquent borrowers, contradicting current literature on risk preference and time preference.

1. Introduction

Understanding the framework behind the mechanics of borrowing behavior is crucial for creating sound policies that are effective for poverty alleviation. Stiglitz and Weiss's seminal paper (1981) provided the context for understanding the relationship of moral hazard to lending credit. Since borrowers are incentivized to pursue risky investment projects, this in turn decreases the probability of repayment. It is important for microfinance institutions to understand the underpinnings of the behavioral framework to such models and test them with both experimental and survey data. Moreover, it is imperative for microfinance institutions to operate under a lean business model in order to stay on target with their mission statement. These strict guidelines consequently provide little room for error when delivering high cost-low profit loan products to the poorest of the poor in developing countries.

I present two artefactual field experiments carried out among Jordanian microfinance borrowers of the National Microfinance Bank of Jordan to test whether delinquent borrowers are more risk-seeking than non-delinquent borrowers, and whether delinquent borrowers are more impatient than non-delinquent borrowers. This paper tests the theory of Stiglitz and Weiss's (1981) seminal paper, *Credit Rationing in Markets with Imperfect Information*, in addition to a newer alternative theory in behavior credit market literature that suggests consumption today is preferred over the future (Banerjee and Mullainathan, 2010).

To test these hypotheses, I carried out an artefactual field experiment among 97 microfinance borrowers of the National Microfinance Bank of Jordan. This study was conducted nation-wide and included a stratified sample of borrowers. The sample includes approximately one-third of borrowers who have experienced some difficulty or severe difficulty with repaying their loans (referred to as delinquent borrowers). The remaining participants were selected from a group of borrowers who had experienced no difficulty in repaying their loans (referred to as non-delinquent borrowers).

Two experiments were conducted to collect behavioral data on risk preferences and time preferences. The risk experiment asked participants to choose one out of six risk preference choices. Each choice had a 50 percent chance of receiving a high or low payoff, and each of the six risk choices increased in both the variance of risk and the expected payoff. At the end of the experiment, participants were paid in full. In contrast, the time preference experiment required each participant to choose between receiving a smaller amount in one week or a larger amount in five weeks. After the participants made this initial selection, participants were also asked to choose between a voucher worth some amount in one year or a larger amount in one year and one month.

My experimental results reveal that non-delinquent borrowers hold a stronger preference for risk-seeking than delinquent borrowers. In other words, the results provide no empirical support for the Stiglitz and Weiss model. In addition, my experimental results on time preference indicate that borrowers who are patient now but impatient in the future (future bias time inconsistency) are more likely to be a non-delinquent borrower. This result contradicts the more recent behavioral models (Banerjee and Mullainathan, 2010). While the experiments do not capture the full dynamics behind decision-making in regard to risk preferences and time preferences, the results question the framework of the behavioral models in credit markets as applied to microfinance in the Middle East.

The next section will present a review of the literature. Section 3 describes the methodology, experiments, and survey data. Section 4 presents the data analysis. Lastly, section 5 presents a discussion of the results.

2. Literature Review

Microfinance is a term used to describe the provision of financial services to individuals who are generally excluded from traditional banking. It is often considered a mechanism for alleviating poverty because it helps overcome credit market failures by providing low-income individuals with access to credit. These individuals would otherwise rely on informal sources for these services because the poor are often thought of as being too risky and impatient for traditional banking services (Banerjee and Mullainathan, 2010; Stiglitz and Weiss, 1981). This paper investigates the impact of risk preference, trust, and time preference on microfinance defaults to see if assumptions about the poor hold true. It is hypothesized that microfinance borrowers default on their loans due to risky investment decisions and possessing little patience for the future (Binswagner, 1980). This is also believed to explain poverty traps among the poor in developing countries. Contrary to this hypothesis, recent literature has proposed an alternative explanation to why borrowers default. The alternative belief is that poor people default on their loans because they are not risky enough, thus, making the loan unproductive and as a result become unable to pay back their loans (Zeballos et al. 2011). The following literature review will explore how risk preference, trust, and time preference can help explain why a proportion of individuals default on their microloans.

As previously mentioned, the poor are often thought of as risky individuals and are unlikely to receive loans from formal banking institutions. Formal banking institutions are also reluctant to lend to the poor due to minimal, if any, holdings of assets for collateral. Microfinance Institutions (MFIs) have been able to provide loan products to the poor with no collateral by compensating for the risk by charging very high interest rates. Interestingly, high

interest rates could potentially deter individuals from requesting a loan. Stiglitz and Weiss (1981) suggest that interest rates serve as a potential screening device for borrowers. They propose that only the worse borrowers are willing to take out loans at high interest rates because their probability of repayment is minimal. Therefore, as banks increase interest rates, they are simultaneously increasing the probability of attracting risky borrowers. Safer investments typically yield lower returns compared to riskier investments, thus, as interest rates increase so does the probability of the investment being risky because the borrower needs a higher return in order to be able to pay the high interest rate. Consequently, banks could potentially become unsustainable by raising their interest rates too high. Then again, what is considered to be a high interest rate? The Consultative Group to Assist the Poor (CGAP) reported that the global average interest rate is around 35%, which can be interpreted as quite conservative depending on the country (Consultative Group to Assist the Poor, 2008). If all of these assumptions hold true, we could conclude that clients of MFIs are, on average, risky borrowers and, as a result, there should be high default rates among MFIs globally.

One of the greatest challenges for lending institutions is limiting the likelihood of lending to a client who could default. One possible way to address this challenge could be by determining an individual's risk preference during the due diligence process by having borrowers participate in an experiment. A seminal paper by Binswanger (1980) conducted one of the first experiments eliciting risk preferences from 330 unskilled rural laborers in India to see if there was a difference in their investment behavior. Risk preferences were elicited through a gambling experiment with real payoffs. Risk-aversion did not appear to be influenced by wealth when participants played for high payoffs. An effect was only apparent when low payoffs were used in the game.

In spite of Binswanger's findings, Stiglitz and Wiess (1981) proposed that those who achieved their wealth from returns on risky investments in the past are potentially less risk-averse than conservative individuals who invested in safer projects. Individuals who are willing to take the most risk are those who possess the most capital. According to Stiglitz and Weiss, the poor should be considered as risk-averse. Giné et al. (2009) found comparable results with an experiment that mimicked the framework of microfinance, which took place in a controlled laboratory setting in Lima, Peru. Their findings suggest that risk-averse borrowers will always choose the safer project for investment when placed under an individual liability contract. Further, they found it likely that commitment mechanisms and incentives play a significant role in reducing default rates.

On the other hand, are the poor risky investors, or are they reluctant to invest? Wydick, Cassar, and Zeballos (2011) used an artefactual field experiment to test if risky borrowers

prefer to consume their entire payoffs or to invest in a risky investment. Contrary to the findings by Stiglitz and Weiss (1981), they found no evidence to suggest that risky borrowers prefer risky investments and instead found that they would rather consume their loans than invest in a safe project. This further supports Banerjee and Mullainathan's (2010) assumption that when the borrower knows that the safer investment would yield little returns they would rather choose to increase their current consumption.

Similarly, Banerjee and Mullainathan's (2010) model provides a counter result of the desire for consumption smoothing. According to their model, expectations for an increase in future income could potentially transfer an individual's desire to spend on non-temptation goods today toward saving for the future. The model suggests that it could potentially outweigh the effects of consumption smoothing. For this reason, expecting future income from a loan transfers the borrower's desire to consume today and invest in the future by paying back their loan. However, the model also predicts the opposite effect to take place when an individual knows that their future income will fall. If a borrower's loan were invested in a project whose profits began to decline, they would be willing to increase consumption for the present and consequently default on the loan, willingly foregoing any future loans. The importance of taking up a loan is only inherent if it can significantly change an individual's level of wealth.

Trust has been shown to play an important role within a society because it is positively correlated with economic growth (Cardenas and Carpenter, 2006). Cassar and Wydick (2010) infer that social capital is crucial because it leads to higher levels of societal trust. Likewise, low levels of social capital were also linked to low contribution rates among group borrowers in Kenya, according to Cassar and Wydick (2010). However, trust has also been shown to have a negative effect on the likelihood of a borrower repaying their loan. Karlan (2005) conducted a trust experiment with Peruvian microfinance borrowers and found that participants who were considered to be more trusting were associated with having the most issues with repaying their loans. On the other hand, participants that were seen as more trusting of others (trustworthy) from the game were deemed more likely to repay their loans.

According to O'Donoghue and Rabin (1999), there are two types of people: those who are *sophisticated* and those who are *naive*. Both types of people deal with activities related to costs and rewards quite differently. *Sophisticated* people are those who know that they will have issues with self-control in the future while *naive* people do not. Non-delinquent borrowers see the loan as a cost and therefore would rather pay off their loan as soon as possible in fear of procrastinating and potentially defaulting. Whereas delinquent borrowers are more impatient and less likely to save because they would rather consume their money in the present. Since

they have little self-control, they lack the capital saved from their return on investment from their loan and consequently fall into default.

This is parallel to the findings of Banerjee and Mullainathan (2010). However, their models differ by incorporating initial levels of wealth as a factor. Banerjee and Mullainathan (2010) suggest that if a wealthy individual were to give into their temptation at high levels of consumption, it would result in a much smaller fraction of their total consumption compared to the poor. The poor are assumed to make myopic decisions and to be impatient which is why they borrow at exorbitantly high interest rates. This assumption is associated with the model of consumption decision-making, which states that people possess a strong inclination to consume in the present rather than the future. Nevertheless, two individuals who possess identical discount rates but hold different levels of wealth reveal dissimilar levels of patience. Individuals who are rich will appear patient where as individuals who are poor will appear impatient. This conjecture is contradictory to standard utility theory; whereas an investment is only important if it can significantly change an individual's status.

In addition, Banerjee and Mullainathan (2010) propose that individuals "chain" their temptations to multiple periods of one's self. A person is more tempted in the present because they know that a portion of their earnings will be wasted in every subsequent period until the last period. Therefore, an individual would prefer to give into temptation today. If someone knows that eventually they will give in then they would rather choose today than tomorrow since they will have a greater welfare gain. By comparison, O'Donoghue and Rabin (1999) suggest that welfare losses are greatest for *sophisticated* people because with each period they choose to procrastinate they suffer from a small welfare loss. The total welfare loss is absorbed by the accumulation in increments of each welfare loss. As a result, those who are *sophisticated* prefer to act today rather than tomorrow in order to have a greater welfare gain.

Risk preference, trust, and time preference have major implications on why borrowers default on their loans. If an individual has a significant present bias then access to credit could have negative impacts on welfare. Similarly, the shaping of an individual's expectations has vast implications in the microfinance sector. When approaching the problem as a whole it could potentially lead to myopic behavior among practitioners and economists. Binswanger (1980) believes that the poor are being held back because of external constraints, such as access to credit, which he suggests is a better indicator of the differences in investment behavior than risk preferences. Banerjee and Mullainathan (2010) recommend that a time discount experiment is needed to show that the apparent difference in patience between the poor and rich is a result of a difference in the composition of consumption instead of a mere difference in patience among the two. Certainly, there is a need to further understand risk preference, trust,

and time preferences through behavior models to further examine the impact that access to credit may have on poverty alleviation. This paper contributes to the existing literature in two ways. First, this paper adds to the minimal literature that exists on microfinance in the Middle East. Second, this paper reveals borrowing behavior characteristics of microfinance clients through the use of experimental data that captures both risk preference and time preference.

3. Methodology

3.1 Microfinance Institution

This analysis is focused on individual borrowers from the National Microfinance Bank of the Hashemite Kingdom of Jordan (NMB). The behavioral and survey data were collected in the summer of 2012 throughout various regions of the country. NMB, a Jordanian private shareholding nonprofit company, finances entrepreneurs in underserved portions of society through micro-credit lending. NMB began dispersing loans in March of 2006 under the patronage of Her Majesty Queen Rania and His Highness' Prince Talal bin Abdul-Aziz. NMB has grown from three branches in 2006 to 11 branches in 2012 with plans to open several more branches within the next year. An important factor that may influence this analysis is that bankruptcy courts do not exist in Jordan. If a borrower takes out a loan, they are required to repay their loan by law, no matter the time frame. If the borrower is unable to pay, they are obligated to go to court, and will face jail time if they are found guilty.

3.2 Sample Selection

The survey design generated a random sample of clients from 9 of the 11 NMB branches. In the sample population, we see that there are several differences between delinquent and non-delinquent borrowers. First, 35% of the sample population has completed BASIC (the first ten years of schooling) and 35% have completed secondary school[1]. Within the subsample of borrowers, the average level of education for delinquent borrowers is 2.91, equating to approximately a secondary level of education. In contrast, the average level of education for non-delinquent borrowers is 2.42, which is slightly lower than the total average. In addition, the average age for a delinquent borrower is 40 years old, and a non-delinquent borrower is 37 years old. Delinquent borrowers also reported a higher average household income than non-delinquent borrowers by 51.15JD[2] ($\approx$ \$72.30). Additionally, the average loan

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[1] Figures 3A and 3B further describe the distribution in the levels of education between non-delinquent borrowers and delinquent borrowers.

[2] 1 US Dollar equals approximately 0.71 Jordanian Dinar

size is greater for delinquent borrowers than non-delinquent borrowers by 91JD ($\approx$ \$128.62). However, these differences are not statistically significant between subsamples.

3.3 Survey Methodology

NMB operates 11 branches throughout various regions of Jordan. Two branches were excluded from this study for several reasons. The first branch, Al-Mafraq, was excluded because delinquent borrowers did not exist within this branch. It is speculated from NMB that a very strong social capital network exists in this town and no borrowers default on their loans. Most of the people who occupy this region work for the military and as a result are financially stable. The second branch excluded was the main branch of Western Amman, which carried very few loans that were greater than 3500JD ($\approx$ \$4,948.31).

A focus group was conducted during the initial stage of the research. Three NMB branches were randomly selected to conduct the focus groups and were led by the enumerators. Questions on risk preferences, trust, and time preferences were discussed to understand the cultural dynamics of these three subjects pertaining to Jordanian culture. This process was imperative in order to further understand the nature of the survey questions and their relative importance within Jordanian society. One example considers the practice of wearing your seatbelt, and how it is perceived in Jordan. Not wearing your seatbelt in the U.S. is considered to be very risky (aside from legality of the activity). However, in Jordan, wearing your seatbelt is required but not enforced because it is a new law. As a result, social pressure does not provide any influence and law enforcement does not actively force an individual to wear their seat belt. To determine if an individual who is not wearing a seat belt is seen as a risky activity it is necessary to pilot such questions before testing, especially when the culture and social norms of the researcher can hinder the outcome of the results through biasing the question (Hines, 1993).

I chose individual borrowers from NMB in the following way. First, only borrowers who have taken out a business loan that were less than or equal to 3500JD ($\approx$ \$4,948.31) were selected. The loan size was capped at 3500JD in order to focus on micro-entrepreneurs. The type of individual borrower is distinguished either as a non-delinquent or a delinquent borrower. Non-delinquent borrowers are those who have never been late on repayment regarding their current loan as of the collection period in June 2012. Delinquent borrowers are randomly chosen from two different groups. The first group is comprised of delinquent borrowers who are within a ten-day grace period. These are the type of borrowers who need more of a nudge to make sure they repay without being charged a penalty even though they are still technically late. The second group is comprised of borrowers who are greater than ten

days late in repayment. These are the borrowers that NMB has contacted to inquire as to why the borrower was unable to repay and many are being pursued through legal channels. NMB attempts to figure out an alternative repayment plan or if legal matters need to be pursued to collect repayment. Upon allocating all the borrowers of NMB into the two groups of borrowers (non-delinquent and delinquent), the sample was randomly selected from these lists. There were three instruments used to elicit data, including two experiments, and a survey to collect data on risk preferences, trust, and time preferences.

3.4 Experimental Methodology

The risk experiment was replicated from the Eckel-Grossman Risk Task (2002, 2008). Participants were asked to participate in a risk aversion experiment to elicit their relative risk preference (see Appendix A). There are six choices that the participant has to choose from in the form of six circles. Each circle is split in half. One half shows the low payoff amount and the other half shows the high payoff amount. All choices have a 50 percent chance of winning the high or low payoff amount. The six choices are structured in a clockwise manner that represents a dial. The one o'clock position, the safest choice, produces a guaranteed payoff with zero variance of risk. As one moves clockwise from this choice, each choice increases in both the expected returns and the variance of risk. The sixth choice holds the same value in expected returns as the fifth choice; however, the variance of risk increases. As a result, a borrower who chooses the sixth choice is considered to be extremely risk-seeking. After the participant chooses his or her choice, an enumerator flips a coin to determine whether they will receive the high or low payoff. The participant is presented with the coin to validate the two sides of the coin so they can trust the outcome of the coin toss. The coin is flipped into the air and upon being caught into the palm of the enumerator's hand, would then flip it onto the back-side of their palm. The enumerators were trained to conduct the coin toss in the same manner to provide consistent results. This simple design provides participants with an elegant means to preserve a sufficient range of risk choices. It is important to note that in previous studies each of the risk choices are referred to as gambles (Eckel and Grossman, 2002, 2008). I make a distinction in this paper that these "gambles" are referred to as choices. Participants were informed that by participating in the experiment they would be rewarded for both the experiment and the survey. This was a strict protocol in this experiment for gambling is forbidden in Islam[3]. Participants were paid for the risk experiment immediately following the end of the survey.

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[3] All necessary measures were taken to abide by the social norms and religious guidelines of Islam as to not offend or to tempt participants to engage in a forbidden activity.

Additionally, the same participants were asked to take part in a time preference experiment to estimate their level of patience. This experiment incorporated a front-end delay due to present-bias responses. People often choose to take something that is offered today rather than in the future (Harrison, 2002). It should be noted that the purpose of this method is not to estimate the discount rate, which is similar to other time preference experiments (Harrison, 2002). After the protocol is read to the participant, they are asked to make a decision between accepting a voucher for the present that is worth 1JD in one week, or 1.5JD in five weeks, and a voucher for the future that is worth 1JD in 12 months, or 1.5JD in 13 months. For example, a participant might choose 1JD in one week and 1.5JD in 13 months. Then, the enumerator flips a coin to determine whether the participant receives the present voucher (1JD in one week) or the future voucher (1.5JD in 13 months). People who receive these vouchers can redeem them at local grocery stores. Since participants are paid for the risk experiment, it is assumed that it would instill some level of trust for the participant to feel that the voucher is redeemable. In order to prevent duplication of the store vouchers, each voucher was signed by the researcher with a red glitter pen, numbered, and hole punched in the shape of a music note. The name of the store was listed on each voucher along with the name of the participant, their mobile number, and the date for which the voucher could be redeemed[4]. If participants do not trust that the voucher is valid, then most participants would choose the option to have the voucher that is redeemable in one week. Since the credit loan officer is well acquainted with the borrowers, and the stores that people from certain neighborhoods frequent the most, he or she would coordinate the locations of the grocery stores that were accessible by the participants. The enumerators confirmed the location of the grocery store and its accessibility with the participant.

To further determine a borrower's time preference, I coded their response to the choices of present and future vouchers. If a borrower chose a voucher for 1 week and 12 months, then this person was coded as having a strong present-bias, or are more impatient with respect to choices affecting their consumption in a week from the day the survey took place than with respect to choices about future consumption. Borrowers who chose a voucher starting in 1 week and 13 months are coded as having a weak present-bias. Those who chose a voucher starting in 5 weeks and in 12 months are future-bias time inconsistent, or are patient now but impatient in the future. Lastly, if a borrower chose a voucher starting in 5 weeks and in 13 months they are considered to be future time consistent.

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[4] I am able to circumvent having to deliver the voucher back to the participants by creating a redeemable date on the voucher.

Lastly, trust was elicited through three questions that were implemented after the risk preference and time preference questions in the household survey. The survey included three questions regarding trust from the General Social Survey (GSS) questions on "trust", "fairness", and "helping". Cardenas and Carpenter (2008) contend that these three questions are a better indicator of trustworthiness instead of trust. Previous studies that have regressed both trust and trustworthiness on these GSS questions have shown a higher correlation with trustworthiness than with trust (Glaeser et al., 2000; Johansson-Stenman et al., 2004; Lazzarini et al., 2004). The GSS questions are incorporated based on Karlan's (2005) findings to see if trustworthiness can explain the probability of being a non-delinquent in the context of a microfinance client of NMB.

The descriptive statistics for the risk preference and time preference experiments are displayed in table 2. The average level of risk preference is 3.6, with a median of 3, on a scale of 6. The sample population has a higher, on average, level of risk-seeking preference. When comparing the means of non-delinquent and delinquent borrowers, a test statistic reveals no significant difference between the two types of borrowers[5]. In addition, when I compare the means of non-delinquent and delinquent borrowers by each type of time preference, there is no statistically significant difference between the two types of borrowers. When looking at the distribution of responses to the risk experiment, as seen in Figure 2, we can see that the total count of responses is higher for non-delinquent borrowers in each risk-seeking choice from the experiment. The only risk choice where delinquent borrowers responded more than non-delinquent borrowers is in the lowest risk-seeking choice.

3.5 Empirical Estimations

I use a normal Ordinary Least Squares regression with a binary dependent variable (Linear Probability model) instead of a Probit or a Logit model to measure the effect of risk preference on the probability of being a non-delinquent borrower. The Linear Probability (LP) model offers some of the same advantages as the Probit and Logit models except the LP model specifies $P(Y_i=1|X)$ as a linear function. The marginal effects of X on $P(Y_i=1|X)$ is restricted to be constant for all values of X, thus they are easier to interpret. However, the standard errors are heteroskedastic in nature, so I use Eicker-Huber-White heteroskedastic-consistent standard errors. In addition, I want to constrain the predicted value of being a non-delinquent or delinquent borrower between 0 and 1. I have also chosen the LP model because including a summary index (using a weighted average) with the Probit or Logit model will lead to

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[5] When using a two-tail test there is no significant difference. However, a one-tail test reveals non-delinquent borrowers are more risk-seeking than delinquent borrowers at the 10% level of significance.

asymptotic bias (Train, McFadden, & Goett, 1987). Through the use of this model, it will be possible to test the effect of risk preference and trust on the probability of whether an individual borrower i is a non-delinquent borrower while controlling for other factors. My Linear Probability model, looking at the characteristics of risk, estimates:

$$P(Y_i = 1|X_i) = \beta_0 + \beta_1 R_i + \beta_2 RI_i + \beta_3 TI_i + \beta_4 X_i + \varepsilon_i \qquad (1)$$

where Y_i is a binary variable that is equal to 1 if an individual borrower i is a non-delinquent borrower and 0 if an individual borrower i is a delinquent borrower. The right-hand side variables include the level of risk tolerance from the experiment, $\beta_1 R_i$, a risk tolerance index variable, $\beta_2 IR_i$, a trust index variable, $\beta_3 TI_i$, and observed and unobserved factors, $\beta_4 X_i$ and ε_i, respectively. It is possible to test the first hypothesis of this research through the use of the Linear Probability model:

Hypothesis: Risk Preference

H₀: There is no significant difference between the level of risk preference between non-delinquent and delinquent borrowers.

Hₐ: There is a significant difference between the level of risk preference between non-delinquent and delinquent borrowers.

Additionally, I use a Linear Probability model to estimate how time preference determines the probability of whether an individual borrower i is a non-delinquent borrower while controlling for other factors. My Linear Probability model, looking at the characteristics of time preference, estimates:

$$P(Y_i = 1|X_i) = \beta_1 P_i^s + \beta_2 P_i^w + \beta_3 FTI_i + \beta_4 R_i + \beta_5 TPI_i + \beta_6 X_i + \varepsilon_i \qquad (2)$$

where Y_i is a binary variable that is equal to 1 if an individual borrower i is a non-delinquent borrower and 0 if an individual borrower i is a delinquent borrower. The right-hand side variables include a dummy variable for an individual who is strong present-biased, $\beta_1 P_i^s$, a dummy variable indicating a weak present-biased individual, $\beta_2 P_i^w$, a dummy variable representing an individual with future-biased time inconsistency (dummy for time-consistent preferences is omitted), $\beta_3 FTI_i$, level of risk tolerance from the experiment, $\beta_4 R_i$ a time preference index variable, $\beta_5 TPI_i$, and observed and unobserved factors, $\beta_6 X_i$ and ε_i, respectively. It is possible to test the second hypothesis of this research through the use of the Linear Probability model:

Hypothesis: Time Preference

H_0: There is no significant difference between the level of time preference between non-delinquent and delinquent borrowers.

H_a: There is a significant difference between the level of time preference between non-delinquent and delinquent borrowers.

3.5 Summary Indices

There were three summary indices created for my empirical estimations. The summary index approach was replicated from Michael Anderson (2008). In general, a summary index is a weighted average of several uniform outcomes (Anderson, 2008). The weights are calculated in such a way that the index is able to capture the maximum amount of information. This method is preferred because I am able to group multiple outcomes into a single test. The construction of the summary index can be found in Appendix C[6].

I define three indices based on borrowing characteristics: risk preferences, trust, and time preferences. The risk tolerance index is defined by the qualitative responses to the risk questions asked on the survey. Each of the nine questions contained a 0 or 1 response, 0 equal to risk-averse and 1 equal to risk-seeker. The risk tolerance index is on a scale from -.756, extremely risk-averse, to .986, risk-seeking. The trustworthy index contains three GSS questions, which are the most widely accepted questions used to determine an individual's level of trustworthiness. I coded the responses to the trustworthy questions in the following manner: 0 equal to the least amount of trustworthiness and 1 being equal to the most amount trustworthiness. The trustworthy index ranged from -.442, not trusting of others, to 1.295, most trusting of others. The time preference index contained nine questions with each response equal to 0 if impatient or 1 if patient. The time preference index is on a scale from -.960, no patience, to .671, very patient.

4. Data Analysis

4.1 Risk

Table 3 shows the Linear Probability estimations of the impact of risk characteristics by the type of borrower using Eicker-Huber-White heteroskedastic-consistent standard errors in order to produce asymptotically valid standard errors and t-statistics[7]. Column 1 solely

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[6] Note this is an efficient generalized least squares (GLS) estimator.
[7] I also performed the same regressions using hc2, hc3, and bootstrap standard errors. Even though the Eicker-Huber-White heteroskedastic-consistent standard errors are less conservative, the results maintain the same level

considers the effect of the risk experiment on the type of borrower. From column 1, the results indicate that an individual's risk preference does not display a significant impact on the probability of being a non-delinquent. The experiment is not robust to exclusively indicating the probability of being a non-delinquent. In column 2, I incorporate only the basic controls of an individual (excluding characteristics that could affect the likelihood of obtaining a loan). Here, the risk experiment remains insignificant; however, age has a positive and statistically significant coefficient. A one-year increase in the age of a borrower increases the probability of being a non-delinquent borrower by 8 percentage points. Similarly, age^2 is negative and statistically significant. Since the coefficient for age is positive and age^2 is negative, this tells us that age matters less with each additional year. When I control for characteristics that could affect the likelihood of obtaining a loan in column 5, the risk experiment variable becomes significant. An increase in the risk-seeking choices of the experiment increases the probability of being a non-delinquent by 6 percentage points. In column 3 and 4, I specify the model to either include the risk tolerance index or risk experiment, respectively, since the risk experiment and risk index simultaneously become statistically significant in column 5. It is important to note that neither the risk experiment nor the risk tolerance index coefficients are significant by themselves. Thus, I can rule out that one variable is not influencing the other. I also ran a correlation test between these two variables and the results show there is a correlation of 0.646. This rules out the possibility of multicollinearity. With this in mind, the reason the coefficients for the risk experiment and the risk tolerance index reveal opposite signs is because the risk experiment captures risk behavior of the borrowers for a single task. Whereas the risk tolerance index includes qualitative outcomes regarding questions related to various risk tasks from the survey. Furthermore, the risk experiment coefficient remains significant and approximately the same size in columns 6 and 7. However, it is bewildering that an increase in education decreases the predicted probability of an individual being a non-delinquent borrower by 8 percentage points. Additionally, in columns 6 and 7, I control for the location of the branch from where the borrower took out their loan. If a borrower is located at a rural branch then they are more likely to be a non-delinquent borrower by 45 percentage points and it is statistically significant at the 1% level of significance. Likewise, when I control for Ramadan it is negative and statistically significant at the 1% level of significance. Approximately half of the sample was surveyed before Ramadan and the other half during Ramadan. However, when I break this down into subsamples, there are more delinquent

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of statistical significance. Thus, I report the original model with Eicker-Huber-White heteroskedastic-consistent standard errors.

borrowers as a percentage of borrowers that were surveyed during Ramadan than compared to non-delinquents borrowers as a percentage of borrowers.

These estimations reveal that non-delinquent borrowers are more likely to be more risk-seeking than delinquent borrowers. However, delinquent borrowers are on average more educated than non-delinquent borrowers. The results also reveal that being more risk-seeking is crucial to understanding why some borrowers are less likely to default. An explanation as to why non-delinquent borrowers are likely to have lower levels of education could be that they were gaining entrepreneurial experience that affected their ability to carefully make risky decisions in business. Delinquent borrowers remained longer in academia and inherently faced a different type of risk. In addition, the results show that loan size does not have a statistically significant effect on the type of borrower. One of the oldest living texts contradicts these findings, stating that the size of the loan affects its productivity as well as the ability to repay the loan (Matthew 25:14-30). However, I am unable to arrive at any conclusion regarding the effect of loan size on the probability of being a non-delinquent borrower.

I included an additional variable to the model, a trustworthy index, to provide more explanatory power in predicting the type of borrower. Karlan (2005) found that participants who were considered to be more trusting of others were also associated with difficulty in loan repayment. In column 7 of table 3, all of the coefficients remain relatively the same. Moreover, all of the variables that revealed significance from column 6 retain the same sign. While the coefficient for the trustworthy index does reveal the same sign as Karlan's (2005) findings, the results show that the trustworthy index is not statistically significant. Therefore, I am unable to arrive at a concrete conclusion by including the trustworthy index.

Further, since the risk experiment and the risk tolerance index reveal opposite signs I disaggregated the index to see if the questions are a good indicator of an individual's risk measure. In table 6, I regressed the same controls from column 6 of table 3 except all nine regressions focus solely on each individual risk preference question comprised from the index[8]. For each risk preference question, the response is coded as 0 if the participant responded with the risk-averse answer, and 1 if the participant responded to the risk tolerant answer. In column 5, risk question #5 is negatively correlated with being a non-delinquent borrower and is statistically significant at the 10% level. This question asks "do you often stick with what you know or try new things"? Moreover, a borrower who often prefers to try new things is predicted less likely to be a non-delinquent borrower by 18 percentage points. It is also important to highlight that the risk experiment is statistically significant between the 5% and 10% level and remains positive throughout each specification. In summary, the only risk

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[8] The risk preference questions that correspond to each specification in table 6 can be found in Appendix D.

preference question that is a good indicator of an individual's risk measure is whether a borrower often tries new things or sticks to what they know.

4.2 Time Preference

In table 4, I present the Linear Probability estimates of time preference by type of borrower. Three different specifications are utilized in this table. Columns 1-3 include strong present-bias, weak present-bias, and future-bias time inconsistency variables while controlling for basic demographic variables to see if my model is robust to the inclusion of other variables. I am cautious of spurious correlations given the number of degrees of freedom in my model. The basic controls include gender, marriage, age and age^2, education, and reported household income. Columns 4 - 6 include additional controls for borrowing behavior such as loan size, a dummy if currently employed, a dummy for branch location, and controls for researcher and enumerator influence along with a dummy if the survey took place during Ramadan. My model omits a dummy for future time-consistent preferences, replicating a similar study by Bauer et al. (2012).

When I control for the same factors[9] as my previous Linear Probability model from table 3 and only include the strong-present bias variable, I found the coefficient is positive but not statistically significant. I would expect a negative coefficient, since being impatient is usually correlated with being a delinquent borrower (Banerjee and Mullainathan, 2010). My controls display approximately the same values for marginal effects and the signs remain in the same direction.

In column 2, I only include the weak present-bias variable and the same controls as column 1. The results indicate that the coefficient for weak present bias is not statistically significant. The other variables regarding risk preference, education, current employment, age and age^2, and a dummy for branch location all produce similar coefficients and the same signs as my previous specification.

When I control for future bias time inconsistency in column 3, however, I found it is statistically significant at the 10% level of significance. If a borrower is patient now but impatient in the future (future time inconsistency), then a borrower is more likely to be a non-delinquent borrower by 24 percentage points. In this specification, the coefficient for age and age^2 remain significant. Thus, again we see that age is important, but it is less important with each additional year. This is a peculiar finding since most analyses in the literature suggest that individuals are present biased (Takeuchi, 2011).

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[9] I excluded the risk tolerance index.

To further elicit the effects of time preference on the probability of being a non-delinquent borrower, I control for strong present-bias, weak present-bias, and future-bias time inconsistency in columns 4, 5, and 6, respectively. In addition, I include other explanatory variables that may help explain borrowing characteristics. I am also controlling for time preference index, loan size, whether a borrower is currently employed, a dummy for rural branch, Ramadan, and controls for both researcher and enumerator influence. Here, the results show that strong and weak present-bias variables remain insignificant and future-bias time inconsistency loses significance.

Lastly, the time preference index was disaggregated into different regressions to illustrate the impact of an individual's time preference measure that could capture strong present bias, weak present bias, and future bias time inconsistency in tables 7, 8, and 9, respectively. For each time preference question, the response is coded as 0 if the participant responded with the impatient answer, and 1 if the participant responded to the patient answer. In table 7, 8, and 9, I regress the same controls from columns 4 - 6 of table 4[10]. The only question that remains significant when measuring time preference is the time preference question #4, which asks "if you have 2 knafa would you be more likely to eat them all today or eat one today and save the rest for later"? A knafa is a sweet pastry that is commonly consumed among all income strata in Jordan[11]. The question on knafa is positive and statistically significant at the 5% level in column 4 of table 7, 8, and 9. The time preference dummy variable that captures strong present bias and future bias time inconsistency is insignificant in all specifications. The weak present bias dummy variable is only statistically significant in column 8. However, the time preference question that is being controlled for in this column is statistically insignificant. In summary, after disaggregating the time preference index only one time preference question is shown to be a good indicator of an individual's time preference measure.

4.2 Robustness checks

Since my time preference results are unusual, I ran a robustness check to see if there is evidence of something driving these results. I test this by running the same regression as in table 4, columns 1-3 with the exception of differentiating whether the experiment took place before or during Ramadan. I chose these three specified models since the future-bias time inconsistency coefficient was statistically significant. However, I see no statistical significance

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[10] The time preference questions that correspond to each specification in tables 7, 8, and 9 can be found in Appendix E.

[11] This question was selected from the focus group as the most widely consumed dessert among households in Jordan, especially during the Holy month of Ramada.

among any of the time preference variables when I split the sample between whether the survey took place before Ramadan or during Ramadan. As a result, I can conclude that Ramadan is not driving the results of future-bias time inconsistency from column 3 in table 4.

Furthermore, I checked the standardized residuals of each model to identify any influential observations. Through using this method with a threshold of 3 (in absolute value) I found that the specified model in column 6 of table 3 contained one influential outlier with a standardized residual of -3.02. Subsequently, I ran the model again after dropping this outlier and I found similar results as before except age^2 is no longer significant. The fully specified risk model remains robust with the exclusion of the influential outlier as seen in table 5.

5. Summary and Conclusions

One of the shortcomings of this paper is the limited sample size of the borrowers, which could explain the uneven distribution of non-delinquent and delinquent borrowers. An ideal study would have a roughly even ratio of delinquent to non-delinquent borrowers in order to provide a more equivalent variance between the two groups. Even though the GSS questions are highly correlated with trustworthiness (Glaeser et al., 2000; Johansson-Stenman et al., 2004; Lazzarini et al., 2004), I am unable to reveal similar findings with my experimental data. The ideal situation would have microfinance borrowers participate in a Trust Game to match the results of the risk experiment with the survey data, similar to Karlan (2005).

Further research should be conducted to see the effect of Ramadan on an individual's time preference. I suspect that during the time of Ramadan, people are more self-disciplined than at other times during the year. This is mainly because Ramadan is a time period in which Muslims are required to reflect on their shortcomings and better themselves as religious individuals. Nevertheless, it was beneficial to collect loan information on microfinance borrowers preceding the month of Ramadan. This allowed me to control for any effects that Ramadan could have had on the participants. Since this study collected data before Ramadan, it could have been more informative to collect loan information on borrowers before Ramadan, during Ramadan, and after Ramadan in addition to having the borrowers participate in the risk and time preference experiments during both periods. This would indicate the effect of Ramadan on the time preference of microfinance borrowers while simultaneously controlling for risk preference.

As seen from table 3, loan size did not have an effect on the probability of a borrower defaulting on his or her loan; however, delinquent borrowers from the sample hold larger loans than non-delinquent borrowers. It is possible that the reason borrowers go into default in the first place could be that loan officers are offering the borrower a larger loan once he or she pays

off their initial loan. This may not seem like a problem at first, however, if the borrower's income remains constant and their loan size has increased, this will eventually cause the borrower to face higher loan repayment schemes than they can manage. This seemed to happen with some degree of frequency. A loan officer has an incentive to keep a borrower in their portfolio if they have repaid one or more loans because the loan officer knows they can rely on that borrower. Loan officers are provided with an incentive to disburse a certain amount of loans each month. In order to meet this quota there is an additional incentive to the loan officer to distort the demand of loans by offering loans to borrowers who they know are unable to repay. NMB monitors the activity of credit loan officers but it is difficult to always capture this in time. It is important for future studies to determine the best type of payment scheme for loan officers, for they play a crucial link in the chain of driving the mission of microfinance.

In addition, it is perplexing to see that from this study delinquent borrowers have higher years of education and are more risk-averse than non-delinquent borrowers. Typically, an individual who has invested more years in education would receive a relatively higher income, holding everything else constant. Hence, a borrower would be more likely to repay their loans because income and repayment should be positively correlated. When taking an individual's time preference into account this could ultimately change this assumption as suggested by the results of this study.

The focus of this paper differs from previous literature because it does not focus on the types of investments an individual makes (Zeballos, Cassar, & Wydick, 2011) but rather on measuring an individual's level of risk preference. Based on risk theory, it is assumed that a riskier borrower would likely invest in a risky project (Stiglitz & Weiss, 1981) with a greater probability of defaulting on their loan. Under this assumption, my analysis contradicts Stiglitz and Weiss's (1981) theory that greater risk leads to greater defaults. My empirical results reveal that non-delinquent borrowers are more likely to be more risk-seeking than delinquent borrowers. Thus, I can reject the null hypothesis and state that there is a difference in the level of risk preference between the two types of borrowers. In addition, the regression analysis rejects the time preference hypothesis. When I take into account different variables for time preference I see that having a future-bias time inconsistency preference increases the probability of an individual being a non-delinquent borrower. In other words, a non-delinquent borrower is likely to be an individual who is patient now with respect to choices affecting their current consumption than with respect to choices about future consumption. Thus, I can reject the null hypothesis and state that there is a difference in the level of time preference between the two types of borrowers. It is not surprising that my results differ from past studies given the unique time period in which the data were collected, as well as the novelty of the study

location in the Middle East. There is limited information on microfinance borrowers from countries that observe Ramadan on a national scale. Based on my analysis regarding borrowers of the National Microfinance Bank of the Hashemite Kingdom of Jordan, I can conclude that risk preference and time preference may not hold the same implications that theory had once predicted.

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Figure 1: Map of the National Microfinance Bank branches that were surveyed
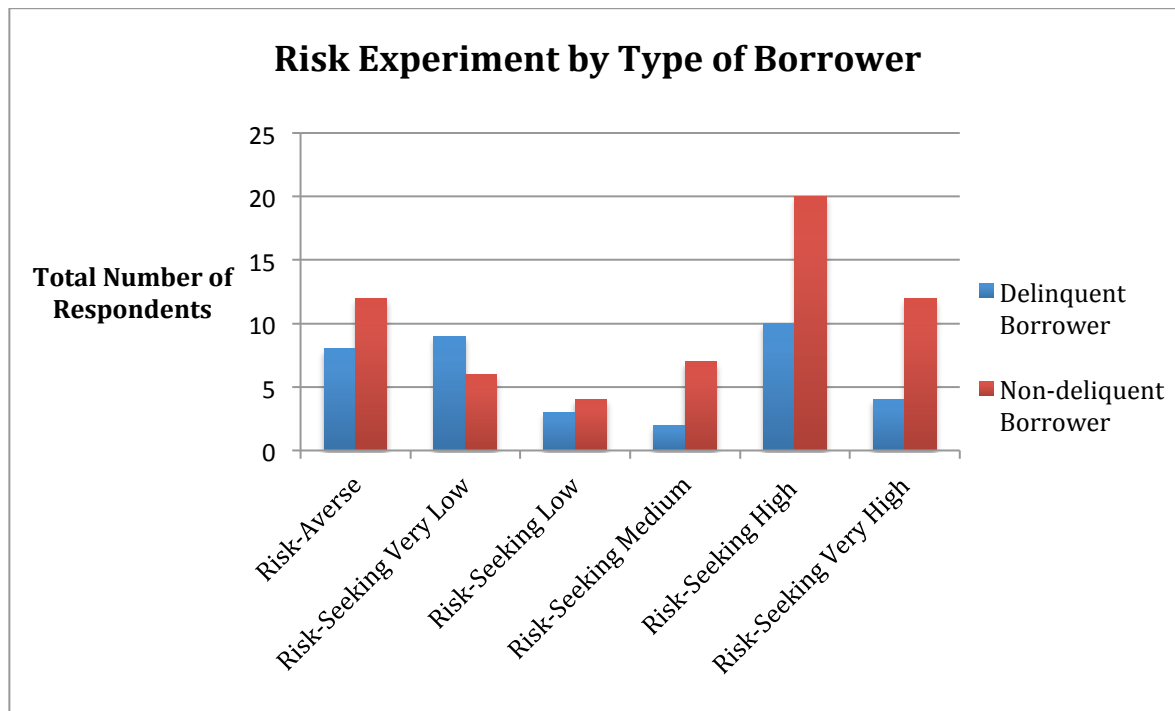
Figure 2: Histogram of the number of respondents for each risk choice

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Formal Education

	No formal schooling	Primary	BASIC	Secondary	Some college	A.A. Degree	B.A./ B.S. Degree	Graduate Degree
Total Sample	8	6	34	34	5	4	5	1
Non-delinquent	6	6	19	23	3	2	1	1
Delinquent	2	0	15	11	2	2	4	0
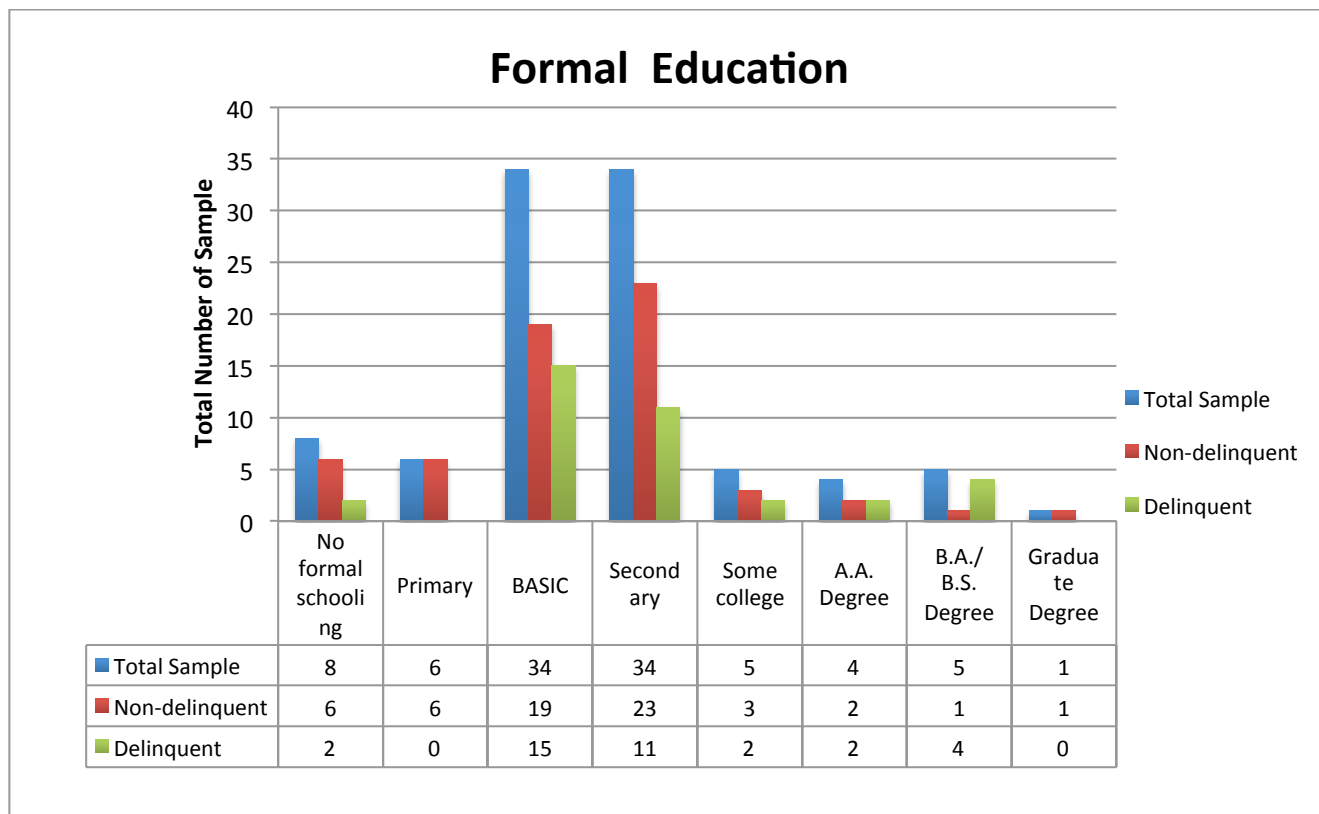
Figure 3A: Levels of Formal Education by Sub-Sample

Formal Education

	No formal schooling	Primary	BASIC	Secondary	Some college	A.A. Degree	B.A./ B.S. Degree	Graduate Degree
Total Sample	8.25%	6.19%	35.05%	35.05%	5.15%	4.12%	5.15%	1.03%
Non-delinquent	9.84%	9.84%	31.15%	37.70%	4.92%	3.28%	1.64%	1.64%
Delinquent	5.56%	0.00%	41.67%	30.56%	5.56%	5.56%	11.11%	0.00%
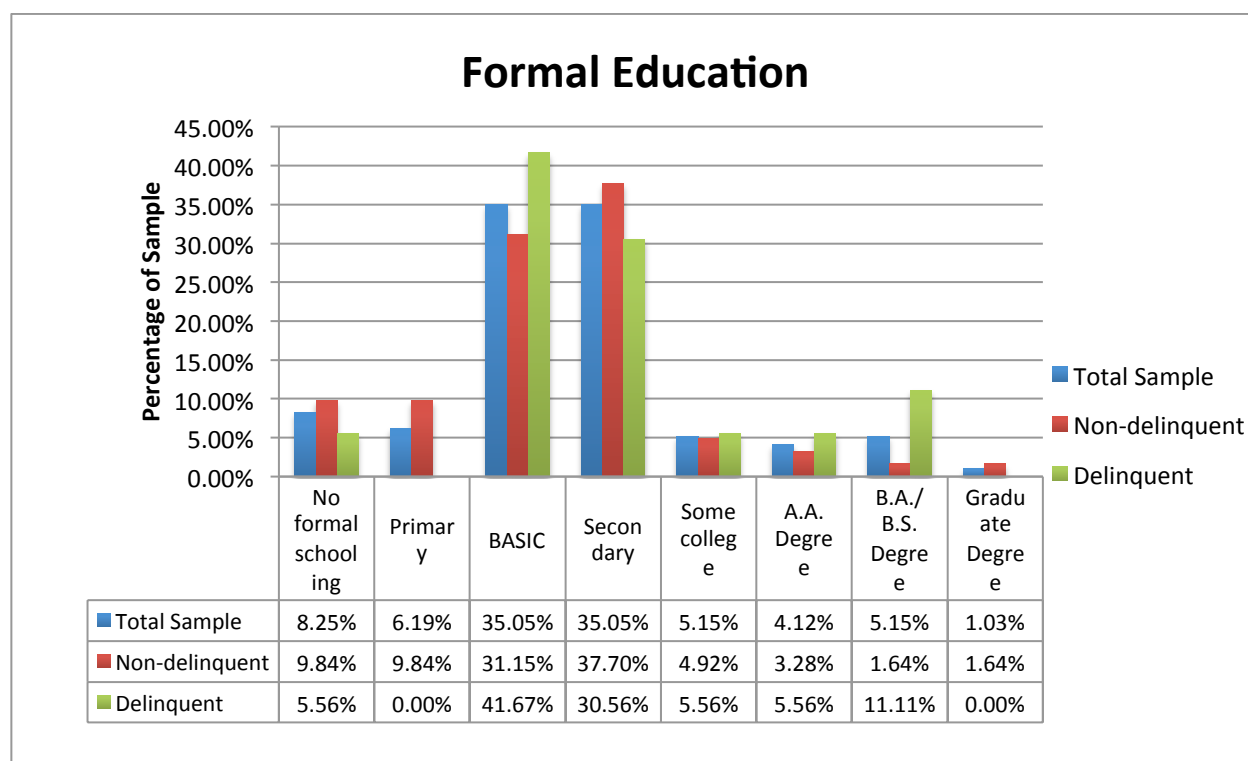
Figure 3B: Percentage of Levels of Formal Education by Sub-Sample

Table 1 — Summary Statistics of Sample by Type of Borrower
(Means, Standard Deviations, Min—Max)

	Total	Non-delinquent	Delinquent	T-Statistic
Age (years)	38.216	37.098	40.111	
	(10.332)	(9.342)	(11.71)	1.353
	20—62	20—58	20—62	
Currently Employed	.381	.393	.361	
	(.488)	(.492)	(.487)	-0.315
	0—1	0—1	0—1	
Education[1]	2.608	2.426	2.916	
	(1.432)	(1.371)	(1.5)	1.605
	0—7	0—7	0—6	
Loan Size	767.391	735.833	826.562	
	(560.682)	(578.945)	(528.537)	0.758
	300—3500	300—3500	300—2200	
HH Income	404.597	382.766	433.914	
	(196.957)	(180.439)	(216.386)	1.135
	150—1000	150—900	155—1000	
Female	.907	.934	.861	
	(.291)	(.249)	(.350)	-1.101
	0—1	0—1	0—1	
Sample Size	97	61	36	

[1]1=Primary, 2=Basic, 3=Secondary, 4=Some College, 5=A.A. Degree, 6=B.A/B.S. Degree, 7=Graduate school

Table 2 — Descriptive Statistics of Experiment *(Means and Standard Deviations)*

	Total	Non-delinquent	Delinquent	T-Statistic
Risk Tolerant	3.639	3.868	3.25	-1.608
	(1.849)	(1.839)	(1.826)	
Strong Present Bias	.454	.492	.388	-0.983
	(.500)	(.504)	(.494)	
Weak Present Bias	.237	.196	.306	1.167
	(.428)	(.401)	(.467)	
Patient Now, Impatient in the Future (Future Time Inconsistency)	.155	.197	.083	-1.633
	(.363)	(.401)	(.280)	
Patient Now, Patient in the Future (Future Time Consistent)	.124	.082	.194	1.486
	(.331)	(.277)	(.401)	
Sample	97	61	36	97

Table 3 — Risk by Type of Borrower

Variables	(1) Non-delinquent	(2) Non-delinquent	(3) Non-delinquent	(4) Non-delinquent	(5) Non-delinquent	(6) Non-delinquent	(7) Non-delinquent
Risk Experiment	0.0427	0.0387		0.0478	0.0588*	0.0590**	0.0558**
	(0.0267)	(0.0288)		(0.0306)	(0.0312)	(0.0240)	(0.0238)
Risk Tolerance Index			-0.244		-0.281*	-0.213**	-0.201*
			(0.151)		(0.150)	(0.105)	(0.102)
Trust Index							-0.0956
							(0.0813)
Female		0.0445	0.0186	0.0595	-0.0263	-0.157	-0.143
		(0.208)	(0.218)	(0.219)	(0.223)	(0.129)	(0.127)
Married		-0.160	-0.200	-0.200	-0.171	-0.0438	-0.0633
		(0.157)	(0.166)	(0.152)	(0.148)	(0.128)	(0.132)
Age		0.0795**	0.0880**	0.0635	0.0850*	0.0433*	0.0502*
		(0.0372)	(0.0412)	(0.0445)	(0.0430)	(0.0251)	(0.0270)
$(Age)^2$		-0.00110**	-0.00123**	-0.000917*	-0.00122**	-0.000647*	-0.000732**
		(0.000439)	(0.000503)	(0.000544)	(0.000517)	(0.000324)	(0.000349)
Education		-0.0369	-0.0732	-0.0671	-0.0855*	-0.0788**	-0.0762**
		(0.0433)	(0.0496)	(0.0477)	(0.0471)	(0.0361)	(0.0375)
Ln (Household Income)		-0.0988	-0.0352	-0.0272	-0.0519	0.0333	0.0685
		(0.129)	(0.134)	(0.139)	(0.140)	(0.104)	(0.105)
Ln (Loan size)			0.0431	-0.000427	0.0449	-0.0283	-0.0578
			(0.120)	(0.122)	(0.114)	(0.0914)	(0.103)
Employed			0.0251	0.0524	0.0716	0.145	0.0907
			(0.122)	(0.118)	(0.124)	(0.0891)	(0.0949)
Rural Branch						0.457***	0.449***
						(0.100)	(0.107)
Ramadan						-0.574***	-0.568***
						(0.0933)	(0.0972)
Constant	0.474***	-0.102	-0.543	-0.116	-0.541	0.319	0.223
	(0.113)	(0.948)	(1.296)	(1.315)	(1.254)	(0.845)	(0.884)
Add'l Controls	NO	NO	NO	NO	NO	YES	YES
Observations	97	82	73	77	73	73	71
R-squared	0.026	0.138	0.160	0.147	0.208	0.611	0.619

Notes: Additional controls are for Researcher and Enumerator influence.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4 — Time Preference by Type of Borrower

Variables	(1) Non-delinquent	(2) Non-delinquent	(3) Non-delinquent	(4) Non-delinquent	(5) Non-delinquent	(6) Non-delinquent
Strong Present Bias	0.0990			0.0197		
	(0.110)			(0.0863)		
Weak Present Bias		-0.0705			0.150	
		(0.129)			(0.104)	
Future Bias Time Inconsistency			0.242*			0.101
			(0.125)			(0.121)
Time Preference Index				0.0631	0.0839	0.0533
				(0.153)	(0.155)	(0.149)
Risk Experiment				0.0506**	0.0476**	0.0490**
				(0.0247)	(0.0236)	(0.0242)
Female	0.0756	0.0488	-0.0105	-0.100	-0.0719	-0.124
	(0.208)	(0.209)	(0.211)	(0.132)	(0.141)	(0.138)
Currently Married	-0.189	-0.178	-0.174	-0.0170	-0.0110	-0.0130
	(0.165)	(0.160)	(0.155)	(0.137)	(0.121)	(0.129)
Age	0.0901**	0.0860**	0.0816**	0.0439*	0.0359	0.0425
	(0.0359)	(0.0363)	(0.0356)	(0.0255)	(0.0264)	(0.0256)
Age^2	-0.00121***	-0.00117***	-0.00113***	-0.000611*	-0.000523	-0.000604*
	(0.000427)	(0.000434)	(0.000425)	(0.000334)	(0.000336)	(0.000334)
Education	-0.0266	-0.0329	-0.0520	-0.0578	-0.0628*	-0.0678*
	(0.0462)	(0.0445)	(0.0441)	(0.0368)	(0.0366)	(0.0367)
Ln (Household Income)	-0.105	-0.100	-0.0673	-0.0213	0.0113	-0.0144
	(0.128)	(0.128)	(0.124)	(0.103)	(0.104)	(0.102)
Ln (Loan Size)				-0.0169	-0.00548	-0.00848
				(0.0877)	(0.0887)	(0.0895)
Currently Employed				0.135	0.169*	0.141*
				(0.0853)	(0.0886)	(0.0818)
Rural Branch				0.366***	0.397***	0.353***
				(0.0999)	(0.0978)	(0.0991)
Ramadan				-0.611***	-0.632***	-0.610***
				(0.0971)	(0.0927)	(0.0952)
Constant	-0.233	-0.0763	-0.114	0.390	0.256	0.387
	(0.947)	(0.957)	(0.963)	(0.824)	(0.815)	(0.815)
Additional Controls	NO	NO	NO	YES	YES	YES
Observations	82	82	82	77	77	77
R-squared	0.127	0.121	0.145	0.576	0.590	0.580

Notes: Additional controls are for Researcher and Enumerator influence. As a robustness check, I dropped the Time Preference Index in columns 4-6 but arrive at the same results.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 — (Robustness Check) Risk by Type of Borrower

Variables	(1) Non-delinquent
Risk Experiment	0.0505**
	(0.0217)
Risk Tolerance Index	-0.218**
	(0.108)
Female	-0.178
	(0.161)
Currently Married	-0.0297
	(0.132)
Age	0.0494
	(0.0314)
$(Age)^2$	-0.000708*
	(0.000391)
Education	-0.0823**
	(0.0376)
Ln (Household Income)	0.0122
	(0.100)
Ln (Loan Size)	-0.0311
	(0.0900)
Currently Employed	0.136
	(0.0849)
Rural Branch	0.521***
	(0.0994)
Researcher	-0.0426
	(0.0319)
Enumerator	-0.00576
	(0.0280)
Ramadan	-0.628***
	(0.0862)
Constant	0.337
	(0.900)
Observations	72
R-squared	0.665

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 6 — Borrowing Behavior by Individual Risk Measures

Variables	Non-delinquent Borrower								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Risk 1	-0.00222								
	(0.0920)								
Risk 2		-0.0456							
		(0.0847)							
Risk 3			-0.0688						
			(0.0923)						
Risk 4				-0.0179					
				(0.0816)					
Risk 5					-0.180*				
					(0.0947)				
Risk 6						0.0154			
						(0.100)			
Risk 7							-0.0109		
							(0.0965)		
Risk 8								0.00254	
								(0.0834)	
Risk 9									-0.0533
									(0.0989)
Risk Experiment	0.0498**	0.0538**	0.0529**	0.0499**	0.0404*	0.0489**	0.0483**	0.0529**	0.0477**
	(0.0246)	(0.0262)	(0.0234)	(0.0238)	(0.0228)	(0.0229)	(0.0238)	(0.0238)	(0.0235)
Female	-0.0994	-0.116	-0.117	-0.101	-0.112	-0.0990	-0.0883	-0.0894	-0.107
	(0.130)	(0.126)	(0.123)	(0.131)	(0.135)	(0.129)	(0.134)	(0.125)	(0.127)
Currently Married	-0.00595	-0.00414	-0.00186	-0.00426	-0.0247	0.000380	-0.00531	-0.00366	-0.0139
	(0.129)	(0.125)	(0.122)	(0.129)	(0.152)	(0.130)	(0.130)	(0.131)	(0.128)
Age	0.0412	0.0421	0.0409	0.0404	0.0450*	0.0412	0.0424	0.0422	0.0440*
	(0.0268)	(0.0254)	(0.0251)	(0.0257)	(0.0246)	(0.0259)	(0.0262)	(0.0263)	(0.0248)
$(Age)^2$	-0.000	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.0572	-0.0558	-0.0635*	-0.0582*	-0.0672**	-0.0559	-0.0575*	-0.0547	-0.0592*
	(0.0350)	(0.0340)	(0.0328)	(0.0340)	(0.0306)	(0.0350)	(0.0343)	(0.0345)	(0.0354)
Ln (Household Income)	-0.0193	-0.0210	-0.0146	-0.0158	0.0637	-0.0188	-0.0202	-0.0233	-0.0192
	(0.106)	(0.101)	(0.101)	(0.105)	(0.0996)	(0.103)	(0.105)	(0.102)	(0.102)
Ln (Loan Size)	-0.0227	-0.0234	-0.00800	-0.0236	-0.0677	-0.0222	-0.00947	-0.0196	-0.0189
	(0.0827)	(0.0844)	(0.0838)	(0.0849)	(0.0739)	(0.0833)	(0.0885)	(0.0860)	(0.0859)
Currently Employed	0.139	0.146*	0.133	0.136	0.123	0.136	0.143	0.127	0.144*
	(0.0840)	(0.0836)	(0.0852)	(0.0849)	(0.0805)	(0.0872)	(0.0855)	(0.0864)	(0.0845)
Rural Branch	0.375***	0.373***	0.381***	0.374***	0.415***	0.373***	0.369***	0.391***	0.385***
	(0.103)	(0.0932)	(0.0972)	(0.0947)	(0.0913)	(0.0951)	(0.0979)	(0.0939)	(0.0926)
Researcher	-0.0648	-0.0648	-0.0641	-0.0646	-0.0609	-0.0656	-0.0650	-0.0641	-0.0630
	(0.0456)	(0.0448)	(0.0446)	(0.0451)	(0.0442)	(0.0460)	(0.0484)	(0.0466)	(0.0449)
Enumerator	-0.0119	-0.0110	-0.00537	-0.0128	-0.00822	-0.0119	-0.0109	-0.0173	-0.0129
	(0.0278)	(0.0277)	(0.0298)	(0.0270)	(0.0277)	(0.0278)	(0.0285)	(0.0278)	(0.0274)
Ramadan	-0.620***	-0.619***	-0.612***	-0.619***	-0.589***	-0.619***	-0.612***	-0.603***	-0.630***
	(0.0913)	(0.0914)	(0.0909)	(0.0911)	(0.0926)	(0.0915)	(0.0927)	(0.0922)	(0.0891)
Constant	0.449	0.456	0.375	0.466	0.390	0.432	0.343	0.440	0.424
	(0.793)	(0.795)	(0.781)	(0.805)	(0.763)	(0.799)	(0.851)	(0.798)	(0.799)
Observations	77	77	77	77	75	77	76	76	77
R-squared	0.574	0.575	0.577	0.574	0.604	0.574	0.567	0.587	0.576

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7 — Borrowing Behavior by Individual Time Preference (Strong Present Bias)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Non-delinquent Borrower					
TP 1	-0.0984								
	(0.105)								
TP 2		0.0905							
		(0.100)							
TP 3			0.101						
			(0.124)						
TP 4				0.208**					
				(0.0926)					
TP 5					-0.0782				
					(0.0934)				
TP 6						-0.0422			
						(0.108)			
TP 7							-0.00576		
							(0.109)		
TP 8								0.0789	
								(0.0982)	
TP 9									-0.113
									(0.141)
Strong Present Bias	0.0190	0.0183	0.0242	0.0283	0.0173	0.0238	0.0183	0.00371	0.0215
	(0.0857)	(0.0869)	(0.0878)	(0.0875)	(0.0885)	(0.0853)	(0.0962)	(0.0855)	(0.0871)
Risk Experiment	0.0565**	0.0495**	0.0523**	0.0428*	0.0462*	0.0502**	0.0502**	0.0491**	0.0449*
	(0.0245)	(0.0245)	(0.0251)	(0.0226)	(0.0259)	(0.0242)	(0.0240)	(0.0238)	(0.0256)
Female	-0.0821	-0.0481	-0.0846	-0.0277	-0.0810	-0.0866	-0.0984	-0.0948	-0.0774
	(0.127)	(0.139)	(0.132)	(0.133)	(0.132)	(0.137)	(0.128)	(0.127)	(0.131)
Currently Married	-0.0357	-0.0309	-0.0237	-0.0692	-0.01000	-0.0145	-0.00842	-0.0312	-0.00479
	(0.136)	(0.128)	(0.143)	(0.131)	(0.127)	(0.134)	(0.134)	(0.142)	(0.134)
Age	0.0422	0.0422	0.0489*	0.0510**	0.0390	0.0410	0.0426	0.0404	0.0463*
	(0.0263)	(0.0259)	(0.0269)	(0.0245)	(0.0264)	(0.0262)	(0.0260)	(0.0263)	(0.0276)
$(Age)^2$	-0.000*	-0.000*	-0.000*	-0.000**	-0.000	-0.000	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.0447	-0.0540	-0.0530	-0.0400	-0.0554	-0.0517	-0.0552	-0.0586	-0.0575*
	(0.0353)	(0.0354)	(0.0345)	(0.0360)	(0.0346)	(0.0373)	(0.0339)	(0.0351)	(0.0328)
Ln (Household Income)	-0.0261	0.00268	-0.0154	-0.0444	-0.00899	-0.0306	-0.0206	-0.0347	-0.0120
	(0.103)	(0.107)	(0.101)	(0.101)	(0.108)	(0.106)	(0.106)	(0.1000)	(0.105)
Currently Employed	0.125	0.122	0.134	0.104	0.120	0.130	0.136	0.140	0.131
	(0.0841)	(0.0816)	(0.0865)	(0.0829)	(0.0899)	(0.0876)	(0.0884)	(0.0840)	(0.0867)
Ln (Loan Size)	-0.0267	-0.00982	-0.0289	-0.00610	-0.0422	-0.0339	-0.0277	-0.0265	-0.0346
	(0.0843)	(0.0843)	(0.0873)	(0.0836)	(0.0857)	(0.0826)	(0.0833)	(0.0872)	(0.0833)
Rural Branch	0.374***	0.360***	0.355***	0.326***	0.369***	0.369***	0.373***	0.372***	0.364***
	(0.0986)	(0.0962)	(0.101)	(0.0979)	(0.0978)	(0.0971)	(0.0991)	(0.0931)	(0.0969)
Researcher	-0.0691	-0.0653	-0.0664	-0.0720*	-0.0636	-0.0663	-0.0659	-0.0621	-0.0703
	(0.0429)	(0.0455)	(0.0442)	(0.0420)	(0.0454)	(0.0450)	(0.0449)	(0.0449)	(0.0480)
Enumerator	-0.00735	-0.0228	-0.00921	-0.0140	-0.0113	-0.00960	-0.0110	-0.0145	-0.0143
	(0.0291)	(0.0308)	(0.0281)	(0.0291)	(0.0273)	(0.0277)	(0.0283)	(0.0281)	(0.0280)
Ramadan	-0.619***	-0.614***	-0.618***	-0.603***	-0.616***	-0.621***	-0.617***	-0.603***	-0.622***
	(0.0930)	(0.0941)	(0.0911)	(0.0892)	(0.0926)	(0.0918)	(0.0917)	(0.0989)	(0.0928)
Constant	0.484	0.186	0.210	0.139	0.570	0.581	0.445	0.586	0.476
	(0.813)	(0.871)	(0.847)	(0.858)	(0.826)	(0.873)	(0.827)	(0.848)	(0.804)
Observations	77	77	77	77	77	77	77	77	77
R-squared	0.581	0.580	0.580	0.609	0.579	0.575	0.574	0.578	0.577

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8 — Borrowing Behavior by Individual Time Preference (Weak Present Bias)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Non-delinquent Borrower					
TP 1	-0.108								
	(0.103)								
TP 2		0.107							
		(0.0946)							
TP 3			0.0945						
			(0.126)						
TP 4				0.207**					
				(0.0905)					
TP 5					-0.0561				
					(0.0860)				
TP 6						-0.0118			
						(0.104)			
TP 7							-0.0314		
							(0.100)		
TP 8								0.127	
								(0.0965)	
TP 9									-0.132
									(0.140)
Weak Present Bias	0.149	0.155	0.139	0.142	0.130	0.140	0.147	0.181*	0.149
	(0.101)	(0.103)	(0.104)	(0.0966)	(0.0966)	(0.0999)	(0.106)	(0.106)	(0.105)
Risk Experiment	0.0539**	0.0461*	0.0490**	0.0395*	0.0445*	0.0471**	0.0476**	0.0453*	0.0408
	(0.0237)	(0.0235)	(0.0243)	(0.0218)	(0.0247)	(0.0233)	(0.0231)	(0.0228)	(0.0250)
Female	-0.0516	-0.00859	-0.0588	-0.000655	-0.0611	-0.0688	-0.0658	-0.0574	-0.0449
	(0.136)	(0.144)	(0.138)	(0.135)	(0.140)	(0.145)	(0.138)	(0.133)	(0.142)
Currently Married	-0.0296	-0.0263	-0.0138	-0.0592	-0.00187	-0.00170	-0.000327	-0.0386	0.00484
	(0.122)	(0.111)	(0.125)	(0.115)	(0.116)	(0.121)	(0.118)	(0.127)	(0.118)
Age	0.0338	0.0335	0.0402	0.0423	0.0326	0.0341	0.0347	0.0306	0.0384
	(0.0276)	(0.0266)	(0.0276)	(0.0254)	(0.0268)	(0.0270)	(0.0269)	(0.0272)	(0.0281)
age2	-0.000	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.0478	-0.0580*	-0.0576*	-0.0449	-0.0591*	-0.0585	-0.0581*	-0.0630*	-0.0622*
	(0.0337)	(0.0342)	(0.0333)	(0.0338)	(0.0338)	(0.0366)	(0.0334)	(0.0342)	(0.0317)
Ln (Household Income)	0.00547	0.0404	0.0146	-0.0126	0.0152	0.00559	0.0179	-0.00707	0.0220
	(0.104)	(0.107)	(0.102)	(0.101)	(0.108)	(0.107)	(0.105)	(0.101)	(0.106)
Currently Employed	0.158*	0.155*	0.166*	0.138	0.154*	0.166*	0.172*	0.179**	0.165*
	(0.0870)	(0.0837)	(0.0894)	(0.0844)	(0.0913)	(0.0898)	(0.0891)	(0.0873)	(0.0889)
Ln (Loan Size)	-0.0188	0.00124	-0.0202	0.00338	-0.0309	-0.0212	-0.0225	-0.0228	-0.0274
	(0.0819)	(0.0812)	(0.0843)	(0.0802)	(0.0859)	(0.0827)	(0.0808)	(0.0860)	(0.0814)
Rural Branch	0.407***	0.391***	0.387***	0.357***	0.398***	0.402***	0.406***	0.408***	0.395***
	(0.0975)	(0.0956)	(0.100)	(0.0979)	(0.0965)	(0.0962)	(0.0974)	(0.0873)	(0.0952)
Researcher	-0.0689	-0.0648	-0.0656	-0.0710*	-0.0637	-0.0653	-0.0662	-0.0605	-0.0704
	(0.0420)	(0.0442)	(0.0438)	(0.0412)	(0.0447)	(0.0446)	(0.0438)	(0.0450)	(0.0479)
Enumerator	-0.00865	-0.0267	-0.0111	-0.0159	-0.0128	-0.0124	-0.0116	-0.0173	-0.0166
	(0.0290)	(0.0308)	(0.0278)	(0.0287)	(0.0273)	(0.0277)	(0.0285)	(0.0277)	(0.0282)
Ramadan	-0.641***	-0.637***	-0.640***	-0.626***	-0.636***	-0.640***	-0.637***	-0.618***	-0.646***
	(0.0891)	(0.0904)	(0.0884)	(0.0857)	(0.0894)	(0.0894)	(0.0881)	(0.0937)	(0.0883)
Constant	0.373	0.0181	0.121	0.0338	0.438	0.382	0.304	0.528	0.367
	(0.794)	(0.847)	(0.833)	(0.829)	(0.802)	(0.864)	(0.810)	(0.831)	(0.787)
Observations	77	77	77	77	77	77	77	77	77
R-squared	0.595	0.596	0.592	0.622	0.590	0.587	0.588	0.598	0.592

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9 — Borrowing Behavior by Individual Time Preference (Future Bias Time Inconsistency)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Non-delinquent Borrower					
TP 1	-0.0882								
	(0.106)								
TP 2		0.0903							
		(0.101)							
TP 3			0.0897						
			(0.122)						
TP 4				0.208**					
				(0.0924)					
TP 5					-0.0932				
					(0.0925)				
TP 6						-0.0643			
						(0.111)			
TP 7							-0.0171		
							(0.0974)		
TP 8								0.0681	
								(0.0968)	
TP 9									-0.0821
									(0.134)
Future Bias -	0.0905	0.105	0.0935	0.109	0.126	0.126	0.108	0.0917	0.0903
Time Inconsistency	(0.122)	(0.115)	(0.119)	(0.114)	(0.119)	(0.119)	(0.120)	(0.123)	(0.120)
Risk Experiment	0.0544**	0.0479**	0.0504**	0.0410*	0.0437*	0.0483**	0.0489**	0.0481**	0.0449*
	(0.0242)	(0.0238)	(0.0246)	(0.0222)	(0.0251)	(0.0236)	(0.0234)	(0.0233)	(0.0252)
Female	-0.105	-0.0731	-0.108	-0.0534	-0.107	-0.109	-0.122	-0.117	-0.105
	(0.136)	(0.146)	(0.140)	(0.136)	(0.138)	(0.140)	(0.136)	(0.133)	(0.137)
Currently Married	-0.0303	-0.0284	-0.0187	-0.0653	-0.00806	-0.0141	-0.00613	-0.0274	-0.00298
	(0.130)	(0.121)	(0.135)	(0.123)	(0.117)	(0.125)	(0.126)	(0.139)	(0.127)
Age	0.0411	0.0411	0.0467*	0.0492**	0.0372	0.0385	0.0416	0.0403	0.0440
	(0.0266)	(0.0262)	(0.0268)	(0.0244)	(0.0263)	(0.0264)	(0.0266)	(0.0262)	(0.0276)
$(Age)^2$	-0.000	-0.000*	-0.000*	-0.000**	-0.000	-0.000	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-0.0552	-0.0647*	-0.0634*	-0.0518	-0.0677*	-0.0628*	-0.0655*	-0.0665*	-0.0665*
	(0.0360)	(0.0348)	(0.0345)	(0.0344)	(0.0344)	(0.0362)	(0.0339)	(0.0349)	(0.0334)
Ln (Household Income)	-0.0192	0.00971	-0.00901	-0.0358	0.00144	-0.0260	-0.0103	-0.0281	-0.00810
	(0.102)	(0.107)	(0.100)	(0.0997)	(0.105)	(0.105)	(0.103)	(0.0990)	(0.104)
Currently Employed	0.131	0.128	0.140*	0.112	0.123	0.136	0.143*	0.142*	0.138
	(0.0812)	(0.0769)	(0.0828)	(0.0778)	(0.0861)	(0.0838)	(0.0833)	(0.0817)	(0.0837)
Ln (Loan Size)	-0.0174	0.000142	-0.0183	0.00626	-0.0342	-0.0245	-0.0186	-0.0201	-0.0229
	(0.0842)	(0.0851)	(0.0866)	(0.0821)	(0.0877)	(0.0824)	(0.0830)	(0.0872)	(0.0839)
Rural Branch	0.362***	0.345***	0.345***	0.311***	0.350***	0.351***	0.359***	0.358***	0.354***
	(0.0994)	(0.0972)	(0.100)	(0.0983)	(0.0988)	(0.0974)	(0.0976)	(0.0931)	(0.0973)
Researcher	-0.0646	-0.0607	-0.0619	-0.0668	-0.0579	-0.0609	-0.0616	-0.0590	-0.0648
	(0.0426)	(0.0451)	(0.0440)	(0.0415)	(0.0447)	(0.0441)	(0.0442)	(0.0450)	(0.0473)
Enumerator	-0.00944	-0.0246	-0.0113	-0.0162	-0.0133	-0.0111	-0.0124	-0.0152	-0.0152
	(0.0296)	(0.0309)	(0.0280)	(0.0288)	(0.0270)	(0.0278)	(0.0284)	(0.0280)	(0.0278)
Ramadan	-0.616***	-0.612***	-0.616***	-0.602***	-0.612***	-0.620***	-0.613***	-0.601***	-0.619***
	(0.0924)	(0.0929)	(0.0900)	(0.0879)	(0.0910)	(0.0898)	(0.0901)	(0.0979)	(0.0924)
Constant	0.469	0.174	0.227	0.126	0.577	0.633	0.418	0.556	0.459
	(0.805)	(0.869)	(0.839)	(0.838)	(0.830)	(0.872)	(0.822)	(0.833)	(0.799)
Observations	77	77	77	77	77	77	77	77	77
R-squared	0.584	0.585	0.583	0.614	0.586	0.581	0.579	0.582	0.580

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

APPENDIX A

Risk Experiment

You will see that on this page there are circles. [**Show the six circles on the paper**] Each circle represents two chances. I am going to explain each circle, and then you will get to make your decision. For this activity, pick the circle that you like the best.

Each circle is divided in half and they have money in them. Each circle has two possible outcomes, the low amount and the high amount. Most of these circles represent the amount of money you can win. However in this top circle it is possible to lose money [**point to the loss**]. You have an equal chance at winning the low and the high amounts.

This is how the game will work. At the end of today's session, **if this activity** is the one picked for payment [**pick a random circle to show them**], then I will flip a coin. There are two sides to the coin. One side is "Heads" and the other is "Tails." [**Show the two sides of the coin**] If you flip "Heads", you will earn the high amount from the circle you picked. If you flip "Tails" you will earn the low amount from the circle you picked [**show participant the coin**].

Let's look at example. [**Only do one to make sure they understand**]

- Look first at the (1 JD, 1 JD) circle. Go ahead and pretend this is the one you want and put a check here [**pretend to mark the circle**]. If you flip "Tails" you will earn 1 JD. If you flip "Heads" you will also earn 1 JD. So, if you choose this circle you will earn 4 JD for sure, no matter what you draw.
- Let's see what you would make if you choose the (0 JD, 3 JD) circle. Put a check here [**pretend to mark the circle**]. If you flip "Tails" you will earn 0 JD. If you flip "Heads" you will earn 3 JD.

[**EXPERIMENTER**]

Now I will give your sheet so you can carefully choose which circle you feel is the best choice. Please circle the choice when you are ready.
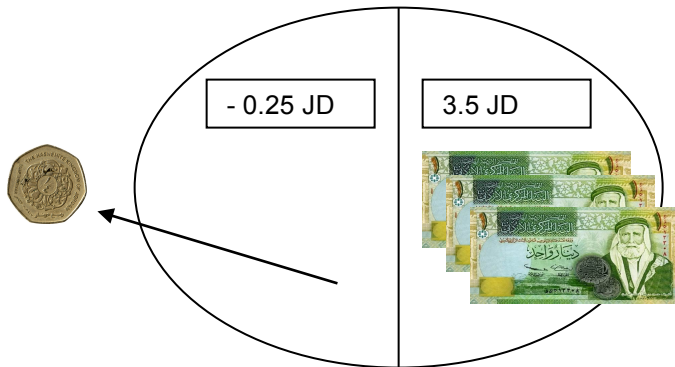
[**EXPERIMENTER**]

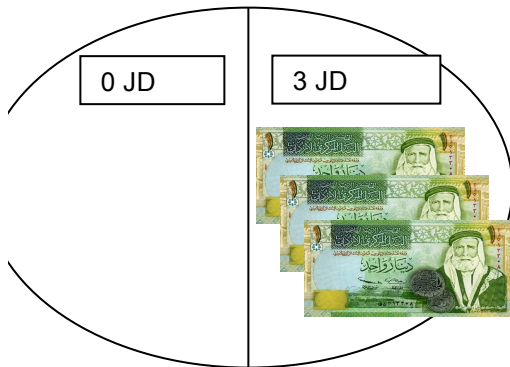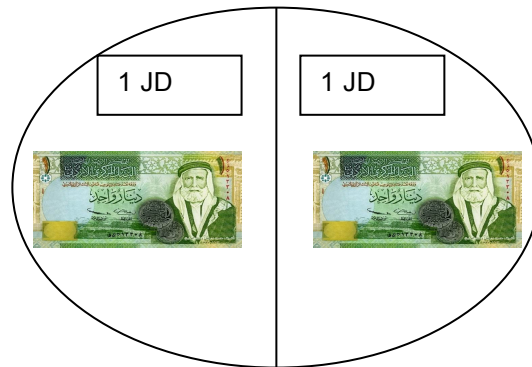This information is for our records only and all answers will remain confidential.

Risk Experiment

PLEASE CIRCLE ONLY ONE

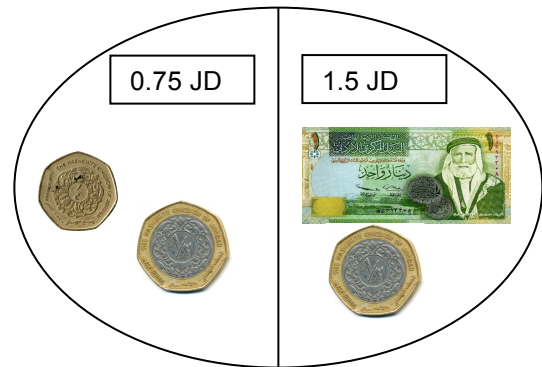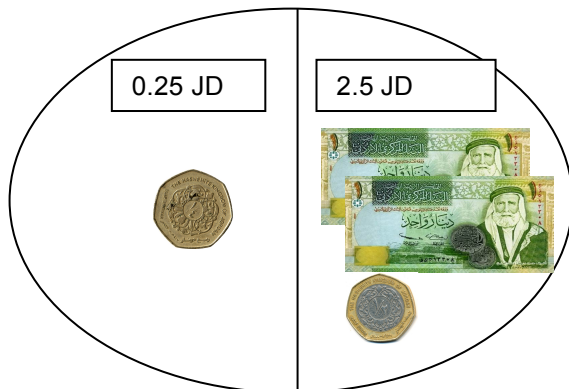16% of borrowers chose choice 6

- 0.25 JD   3.5 JD

21% of borrowers chose choice 1

1 JD   1 JD

0 JD   3 JD

31% of borrowers chose choice 5

0.75 JD   1.5 JD

15% of borrowers chose choice 2

0.25 JD   2.5 JD

9% of borrowers chose choice 4

0.5 JD   2 JD
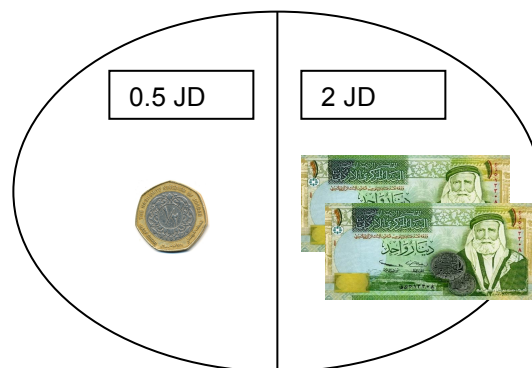
7% of borrowers chose choice 3

APPENDIX B

Time Preference Experiment (Protocol)

I would like to offer you a choice between two types of discount vouchers. The amount of money that your store voucher is worth will depend on the date at which you are able to redeem the voucher. Each type of voucher will not be valid until a specified date. Which of the following would you prefer?

A) A single voucher to [**STORE NAME**] that is worth 1JD that you may redeem for any good purchased at the store beginning 1 week from now.

B) A single voucher to [**STORE NAME**] that is worth 1.50 JD that you may redeem for any good purchased at the store beginning 5 weeks from now.

A) A single voucher to [**STORE NAME**] that is worth 1JD that you may redeem for any good purchased at the store beginning 1 year from now.

B) A single voucher to [**STORE NAME**] that is worth 1.50 JD that you may redeem for any good purchased at the store beginning 1 year and 1 month from now.

*[**EXPERIMENTER**]*

This information is for our records only and confidentiality of your responses is assured. Now, before we begin the survey would you like to take a short break? If no, then lets begin the survey.

Store Voucher

NAME: _____   Mobile:_____   STORE NAME: _____   This voucher is redeemable starting _____   Authorized Signature _____   VOUCHER #: _____

APPENDIX C

A summary index can be constructed in the following manner (Anderson, 2008):

1. Adjust all outcomes by aligning all signs so the positive outcome is always in reference of a better outcome.

2. Convert outcomes to effect sizes by demeaning all outcomes, and then divide each outcome by the group standard deviation[12]. This step normalizes the outcomes to allow for comparability. The transformed outcomes will be referred to as $\tilde{x}$.

3. Define H groupings of outcomes such that every outcome x_{pz} is assigned to one of these H groupings. This provides H_z outcomes in each group z and k indexes outcomes with a group.

4. Create a new variable, $\overline{t}_{ip}$, which is a weighted average of $\tilde{x}_{ipz}$ for individual i in group p. Weight outcomes $\tilde{x}_{ipz}$ by the inverse of the covariance matrix of the converted outcomes in group p when constructing the new variable $\overline{t}_{ip}$.
$\overline{t}_{ip} = (1' \hat{\Sigma}_p^{-1})^{-1} (1' \hat{\Sigma}_p^{-1} \tilde{x}_{ip})$, where 1 is a column vector of ones, $\hat{\Sigma}_p^{-1}$ is the inverted covariance matrix, and $\tilde{x}_{ip}$ is a column vector of all outcomes i in group j.

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[12] The group standard deviation is typically the control group. However, for the purpose of this research I divide the demeaned outcomes by the standard deviation of the entire group.

APPENDIX D

Risk Questions		Coded response as 0	Coded response as 1
Risk 1	Which of the following applies to you more…	You can never be too careful with money	You need to take risks to make money
Risk 2	Do you admire people who…	Takes precautions	Take risks
Risk 3	To have a successful business, it is more important to…	Continue with what has been proven to work	Try new but unproven ideas
Risk 4	If you take a risk and you are successful, would you be more likely to…	Take caution next time	Take the same risk next time
Risk 5	Do you often…	Stick with what you know	Try new things
Risk 6	If your friend owned a successful sewing business, would you think that it is a good idea to start your own sewing business based off of your friend's success?	Yes	No
Risk 7	Is it more important to be…	Cautious	Bold
Risk 8	When your friend is making important decisions for his or her business, is it better for him or her to…	Take precautions	Take risks
Risk 9	If you are in a moving car, do you feel it is necessary to wear your seatbelt?	Yes	No

APPENDIX E

Time Preference Questions		Coded response as 0	Coded response as 1
TP 1	If you have an unpleasant task, would you be more likely to…	Put it off until tomorrow	Do it today
TP 2	If someone were to give you a gift, would you be more likely to prefer…	A modest gift today	An extravagant gift in the future
TP 3	If you have to pay a bill at the end of the month and you have money now to pay for it, would you be more likely to…	Pay it at the end of the month	Pay it today
TP 4	If you have 2 Kanafa, would you be more likely to…	Eat them all today	Eat one today and save the rest for later
TP 5	If you receive 50 dinars today, would you be more likely to…	Spend it today	Save it for a special occasion
TP 6	If you had an important chore to do by the end of the week, would you	Do it later because you want to enjoy today and you know you will get it done before the end of the week	Do it today because you know it is not likely that you will complete it later
TP 7	Would you say that it is better to…	Work and earn 600 JD per month	Earn 400 JD while taking classes that will help you earn 1000 JD per month in two years
TP 8	Do you…	Eat some foods that are delicious even though they may be unhealthy	Always try to eat food that is good for you
TP 9	Overall, how patient would you say you are?	Not patient at all	Patient

APPENDIX F

Table F — Descriptive Statistics of Survey Questions

		Total	Non-delinquent	Delinquent	T-Statistic
		Frequency (Percent)			
If you have an unpleasant task, would you be more likely to…	Do it today *or*	66 (68%)	40 (66%)	26 (72%)	0.6729
	Put it off until tomorrow	31 (32%)	21 (34%)	10 (28%)	
Which of the following applies to you more…	You can never be too careful with money *or*	65 (67%)	23 (64%)	42 (69%)	0.4977
	You need to take risks to make money	32 (33%)	13 (36%)	19 (31%)	
If someone were to give you a gift, would you be more likely to prefer…	A modest gift today *or*	54 (56%)	35 (57%)	19 (53%)	0.4364
	An extravagant gift in the future	43 (44%)	26 (42%)	17 (47%)	
Do you admire people who…	Take risks *or*	24 (25%)	15 (25%)	9 (25%)	0.0447
	Take precautions	73 (75%)	46 (75%)	27 (75%)	
If you have to pay a bill at the end of the month and you have money now to pay for it, would you be more likely to…	Pay it at the end of the month *or*	19 (20%)	10 (28%)	9 (15%)	-1.5650*
	Pay it today	78 (80%)	26 (72%)	52 (85%)	
To have a successful business, it is more important to…	Continue with what has been proven to work *or*	55 (57%)	37 (61%)	18 (50%)	1.0182
	Try new but unproven ideas	42 (43%)	24 (39%)	18 (50%)	
If you have 2 Kanafa, would you be more likely to…	Eat them all today *or*	29 (30%)	14 (23%)	15 (42%)	-1.9101*
	Eat one today and save the rest for later	67 (70%)	46 (77%)	21 (58%)	
If you take a risk and you are successful, would you be more likely to…	Take the same risk next time *or*	33 (34%)	19 (31%)	14 (39%)	0.7718
	Take caution next time	64 (66%)	42 (69%)	22 (61%)	

If you receive 50 dinars today, would you be more likely to…	Save it for a special occasion	57 (59%)	33 (54%)	24 (67%)	
	or				1.2115
	Spend it today	40 (41%)	28 (46%)	12 (33%)	
Do you often…	Stick with what you know	41 (44%)	31 (52%)	10 (29%)	
	or				2.1181**
	Try new things	53 (56%)	29 (48%)	24 (71%)	
If you had an important chore to do by the end of the week, would you	Do it **today** because you know it is not likely that you will complete it later	73 (75%)	46 (75%)	27 (75%	
	or				-0.0447
	Do it **later** because you want to enjoy today and you know you will get it done before the end of the week	24 (25%)	15 (25%)	9 (25%)	
If your friend owned a successful sewing business, would you think that it is a good idea to start your own sewing business based off of your friend's success?	No *or*	34 (35%)	23 (38%)	11 (31%)	
					-0.7074
	Yes	63 (65%)	38 (62%)	25 (69%)	
Would you say that it is better to…	Earn 400 JD while taking classes that will help you earn 1000 JD per month in two years	70 (72%)	45 (74%)	25 (69%)	
	or				-0.4550
	Work and earn 600 JD per month	27 (28%)	16 (26%	11 (31%)	
Is it more important to be…	Cautious *or*	52 (54%)	36 (59%)	16 (46%)	1.2562*
	Bold	44 (46%)	25 (41%)	19 (54%)	
Do you…	Eat some foods that are delicious even though they may be unhealthy	47 (48%)	28 (46%)	19 (53%)	
	or				-0.6493
	Always try to eat food that is good for you	50 (52%)	33 (54%)	17 (47%)	
When your friend is making important decisions for his or her business, is it better for him or her	Take risks *or*	20 (21%)	11 (18%)	9 (26%)	0.8863

to…	Take precautions	76 (79%)	50 (82%)	26 (74%)	
Overall, how patient would you say you are?	Patient *or*	87 (89%)	55 (90%)	4 (11%)	-0.1975
	Not patient at all	10 (10%)	6 (10%)	32 (89%)	
If you are in a moving car, do you feel…	It is necessary to wear your seatbelt *or*	71 (73%)	42 (69%)	29 (81%)	-1.2544*
	It is not necessary to wear your seatbelt	26 (27%)	19 (31%)	7 (19%)	
Generally speaking, would you say that most people you meet for the first time can be trusted or that you need to be very careful in dealing with people that you meet for the first time?	Most people can be trusted *or*	12 (12%)	6 (10%)	6 (17%)	0.9818
	Can't be too careful	85 (88%)	55 (90%)	30 (83%)	
Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?	Would take advantage of you *or*	72 (75%)	45 (75%)	27 (75%)	0.0000
	Would try to be fair	24 (25%)	15 (25%)	9 (25%)	
Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves?	Try to be helpful *or*	14 (15%)	8 (13%)	6 (17%)	0.4438
	Just look out for themselves	82 (85%)	52 (87%)	30 (83%)	
Sample		97	61	36	95

*** p<0.01, ** p<0.05, * p<0.1