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Risk, Religion, and Islamic Microfinance

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Abstract: This research design creates a framework in which the risk preferences and Islamic religiosity of Jordanian borrowers can be estimated. Specifically, this study highlights the different characteristics of conventional and Islamic microfinance borrowers. Although there is extensive literature on the topics of conventional microfinance and Islamic finance individually, few studies characterize borrowers who choose between these financial products. For this study, field research was conducted in conjunction with the National Microfinance Bank (NMB) and the Development and Employment Fund (DEF) in Jordan. Overall, 143 conventional and 78 Islamic borrowers were surveyed for a total sample of 221 borrowers. To estimate the determinants of taking up an Islamic microfinance loan, a linear probability model is utilized. Moreover, to create an index for measuring risk preferences and religiosity, both principal component analysis and summary index are used. Theories behind Islamic microfinance inherently suggest that it will appeal to risk-averse and more religious individuals. Contrary to theoretical propositions, the results indicate that Islamic borrowers tend to have risk-seeking preferences. The results also show that that Islamic borrowers are more religious than conventional borrowers.

1. Introduction

Since its inception in the early 1980s, microfinance has been widely acclaimed as a paradigm for poverty alleviation in addition to enhancing economic and social development in developing countries. As a result, microfinance has rapidly spread to many regions of the world as a potential solution for poverty. One of the most recent areas to adopt microfinance practices is the Middle East, where there is a budding market for financial inclusion in the form of microfinance. Although it has only been implemented within the past two decades, microfinance has already reached millions of those living in poverty in the Middle East and North Africa.

Despite the recent success of microfinance in the Middle East, many argue that outreach is not as effective as it could be and there is the potential to access more clients (Dhumale and Sapcanin, 1999, and Obaidullah, 2008). In Arab countries alone, the outreach gap is estimated to be approximately 53 million (Malkawi et al., 2011). Among other things, some authors argue that the reason for this disparity is a fundamental difference in the clientele that are taking up loans in the Middle East (National Impact Study, 2007). Essentially, many potential Middle Eastern clients practice Islam under Shari'a law, which specifically classifies *riba*, or interest, as prohibited in economic transactions (Obaidullah, 2008). Since interest is a main component of microfinance, several authors argue that many Middle Easterners living in poverty do not participate in credit programs (Abdul-Rahman, 2007, Dusuki, 2008). For this reason, these authors agree that the outreach of microfinance can be significantly more widespread in the region, and it has not reached its full potential (National Impact Study, 2007, Dhumale and Sapcanin, 1999, and Obaidullah, 2008).

To adapt to the alternative preferences of Middle Eastern clientele, Islamic microfinance has been suggested as a remedy (Havel, 2007). Rather than use interest rates as a form of revenue in Islamic microfinance, the borrowers and the sellers of the transaction jointly share risks and profits in a project. In addition, the principles of Islamic microfinance vary from those of conventional microfinance, as they follow the philosophy of Islamic law. Primarily, Islamic microfinance is based on social welfare and justice, fixed prepayment rates, transparency, and risk and profit sharing (IFAD, 2012). Islamic microfinance has consequently been described as an asset-based approach instead of a debt-based approach, like conventional microfinance. Though there are several types of contracts inherent within Islamic microfinance, the overarching goal is that of profit and loss sharing and creating an equity-oriented environment that facilitates participation and frowns upon speculation and moral hazard (Seibel, 2006).

Both conventional and Islamic microfinance are well-developed fields of study within development economics; however, limited research has characterized borrowers who choose

between these two financial products. Whether these programs lack regulatory support or simply lack popular demand, it is clear that a more methodical study of Islamic microfinance will greatly contribute to current literature. Through this study, it is possible to understand what type of client desires the availability of Islamic microfinance. While few studies have distinctly characterized Islamic microfinance clients due to its novelty, the fundamental aspects of this type of financing suggest certain attributes. Mainly, because Islamic microfinance offers a risk-sharing alternative to conventional microfinance, several authors posit that Islamic microfinance will attract risk-averse individuals (IFAD, 2012, Abdul Rahman, 2007 and Dusuki, 2008). Moreover, because Islamic microfinance contracts do not charge interest on loans and the basic appeal of Islamic finance is to attract religious individuals, it can be argued that Islamic microfinance will appeal to more religious individuals. To properly investigate these hypotheses, this research takes advantage of the unique microfinance market in Jordan where both conventional and Islamic microfinance loans are available. Using this information, it is possible to explore the differences between these two types of borrowers. Specifically, this study addresses whether conventional microfinance borrowers are more risk-loving than Islamic borrowers, and whether Islamic microfinance borrowers are more religious than conventional borrowers.

This research was carried out between two microfinance institutions at a total of nine branches throughout Jordan. Overall, the sample consists of 221 participants with 143 conventional borrowers and 78 Islamic borrowers. Each borrower was randomly selected to participate in a survey either in person or on the phone. The survey included questions regarding basic demographics, in addition to questions aimed at eliciting risk preferences and Islamic religiosity. For instance, a set of questions explore an individual's risk preference in the context of personal life, business decisions, relationships with others, and entrepreneurial decision-making. In addition, several questions addressed various features of religiosity. In order to develop a set of questions that accurately captured overall religiosity, this section of the survey was developed during the preliminary period in Jordan. Each question was thoughtfully created through the help of focus groups, native Jordanians, enumerators, and bank employees. Ultimately, these questions emphasize the role of religion in daily life, the extent to which individuals practice religion, and overall sentiments towards financial products, including microfinance loans.

The results of this research indicate that some important factors influence the take-up of Islamic versus conventional microfinance loans. Primarily, the results indicate that higher levels of Islamic religiosity increase the probability of taking up an Islamic microfinance loan

by approximately 20 percentage points. This conclusion holds when controlling for various factors, including time preference, branch location, whether the survey was conducted in Ramadan, and the size of the loan. On the contrary, the results for risk preferences are more sensitive to specification. Although the coefficients are all positive and some have significance, this result varies according to how the model is specified. In general, the results indicate that risk-loving borrowers are more likely to take out Islamic loans. In addition to religiosity and risk preferences, the estimations show that conventional loans are primarily comprised of female borrowers. In other words, men are considerably more likely to participate in Islamic microfinance, and therefore increase the probability of taking up an Islamic microfinance loan. Similarly, Islamic borrowers tend to have larger loan sizes than conventional borrowers. There are also high levels of significance on the dummy variables for a phone interview as well as if the survey was conducted in Ramadan. Although these results are potentially due to the fact that the majority of Islamic borrowers were surveyed on the phone and almost all the Islamic borrower surveys were conducted in Ramadan, the previously mentioned findings hold when controlling for these two factors.

The rest of the paper is organized in the following manner: Section 2 presents the literature review, Section 3 provides a description of the sample and data collection, Section 4 presents the empirical model for this research, Section 5 presents the results, and Section 6 provides a discussion of the results.

2. Literature Review

2.1 Risk Preferences and Decision-Making

A significant portion of this research is dedicated to estimating the risk preferences of Islamic microfinance borrowers. Previously, the poor and their decisions in the face of risk have garnered much attention in economics literature. In developing countries, risk is widespread primarily due to the potential for frequent, unpredictable shocks, and the inability of the poor to provide insurance against these shocks (Banerjee and Duflo, 2007). Theoretically, Islamic microfinance is identified as a model inherently tailored to risk-averse individuals. This is because in Islamic microfinance contracts, the borrower engages in a profit and loss sharing contract with the microfinance institution (MFI). In other words, when undertaking a contract with a borrower, the MFI will bear a portion of the risk, providing the borrower with an opportunity that is less risky overall.

First, it is important to examine the behavior of individuals when faced with "safe" and "risky" prospects. Economists have traditionally used the Expected Utility Theory (EUT) to analyze an individual's actions when they are faced with a decision (Leiberman, 2011). Through

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the use of probabilities, the EUT derives an individual's utility when they espouse different risk preferences (Leiberman, 2011). Neumann and Morgenstern (1953) argue that with the EUT, rational decision-makers will select the payoff that offers the highest utility. In contrast, Kahneman and Tversky (1979) hypothesize that the EUT is not an adequate representation of risk preferences, leading them to modify the EUT in order to incorporate loss aversion into the model. With these changes, Kahneman and Tversky (1979) developed prospect theory. In this theory, the initial stage of decision-making consists of deciding on a particular point in which people consider anything higher as a gain and anything lower as a loss (Kahneman and Tversky, 1979). In the next phase, decision-makers evaluate utility according to the respective probabilities of potential outcomes, taking both gains and losses into account. The authors highlight that people experience more discontent from losing a sum of money than pleasure in gaining an equivalent amount. Still, Leiberman (2011) argues that prospect theory is a simplified, incomplete, and an approximate description of risky prospects, though it "performs as a better evaluator of rationality" than the EUT.

Moving towards risk preferences in the context of microcredit, Stiglitz (1990) introduced a model of *ex ante* moral hazard in microfinance. In the context of peer monitoring, Stiglitz's model reveals that transferring risk to a cosigner improves a borrower's overall welfare (Stiglitz, 1990). Akin to much of the theoretical work on microfinance, Stiglitz's model assumes that safer projects have higher expected returns than riskier projects, leading people to prefer less risky projects. On the contrary, de Meza and Webb (1990) posit that realistically, risky projects have higher expected returns than safe projects. Consequently, they argue that expanding financial access enables borrowers to make risky investments in pursuit of higher incomes (Giné et al., 2006). In contrast, this research explores riskiness in the context of an individual's risk preferences, as opposed to the project's riskiness.

Vereshchagina et al. (2009) further delve into this idea by exploring risk in the context of entrepreneurs. The authors develop a theory of endogenous entrepreneurial risk taking to observe the risk preferences of entrepreneurs (Vereshchagina et al., 2009,). Within their study, the authors find that poor entrepreneurs have a greater tendency to pursue relatively risky projects. Several other studies support this claim, postulating that entrepreneurs embody a set of preferences that encourages them to engage in riskier behavior. Some of these studies suggest that entrepreneurs are simply less risk averse than the rest of the population (Cressy, 2000; Polkovnichenko, 2003; Kihlstrom and Laffont, 1979), while other studies propose that entrepreneurs are overoptimistic and derive extra utility from being their own boss (Moskowitz et al., 2002). While these studies are applicable to microfinance in the sense that

borrowers are innately similar to entrepreneurs, they still present several disadvantages. Vereshchagina et al. (2009) do not take into account individual heterogeneity of preferences or beliefs. This is a key aspect that this study attempts to address by taking into account the different characteristics of borrowers, such as risk preferences and religiosity. Similarly, Cressy (2000) and Polkovnichenko (2003) suggest that entrepreneurs may be less risk averse because they have more human capital, or because they are wealthier. While this assumption may hold for entrepreneurs, it is not representative of microfinance borrowers in developing countries.

In a related study, Pearlman (2012) deals specifically with risk and microfinance selection. By outlining a model involving the risk level of projects and a household's ability to manage risk, the author determines that risk is significant in determining overall microfinance participation. In the context of this study, this idea would hold if Islamic and conventional borrowers had different risk preferences. Similar to choosing between conventional and Islamic microfinance, the microentrepreneurs have the opportunity to engage in a risky or safe enterprise within the model. Here, Pearlman (2011) attributes low microfinance penetration rates (or outreach) to a client's vulnerability, or the difficulty of smoothing their consumption when faced with negative income shocks over time. In contrast to Pearlman's conclusion, this research proposes that minimal outreach previously occurred due to a lack of diverse funding options available to borrowers. With the introduction of Islamic microfinance, however, credit rationing becomes less of an issue for borrowers and more financing options are available.

2.2 Islamic Microfinance

To understand why there may be differences between borrowers who take up conventional loans compared to Islamic loans, it is important to understand the difference between these two loan products. Islamic microfinance can be understood in the context of Islamic attitudes towards wealth distribution, ethics, and social and economic justice (Dhumale and Sapcanin, 1999). Contrary to conventional microfinance, Islamic finance is guided by certain Islamic objectives that circulate wealth to as many people as possible, ensuring that growth and equity promote justice and social welfare (Dusuki, 2008). Consequently, Islamic loan products are substantiated by Islamic code as well as Islamic principles.

Four major principles guide Islamic financing methods, and subsequently play an important role in Islamic microfinance. The first of these principles is the prohibition of *riba*, or usury, in economic transactions. Several key passages in the Qur'an relate to financial regulation, and specifically to *riba*. In Sura 2, Verse 278-282, an English translation of the passage reads: "But God has permitted trading and made usury unlawful…God has laid his curse on usury and blessed almsgiving with increase," (Qur'an, 2:275). The interpretation of

riba has been contested in practice, with some identifying it as exploitative or excessive interest rates, and others basing the definition on the concept of interest as a whole (Abdul Rahman, 2007). Literally translated, *riba* refers to an excess, addition, expansion or growth, all of which are related to the practice of lending (Dhumale and Sapcanin, 1999). In addition to banning *riba*, another requirement of Islamic law is the prohibition of *gharar*. *Gharar* has been defined by Islamic scholars as implying uncertainty and deceit (Obaidullah, 2008). Though *gharar* is a broad concept, it is classified as a form of exposure that leads to uncertainty, deceit, fraud, or undue advantage in business transactions (Obaidullah, 2008). It is mainly associated with speculation and ambiguity in economic transactions. The next principle is the idea of risk sharing between the lender and the borrower. This idea promotes profit and loss sharing between the two during both positive and negative time periods (El-Komi and Croson, 2011). When the MFI becomes a co-owner of the business, it means that both the borrower and the lender have a strong interest in the success of the project (IFAD, 2012). Finally, the fourth principle of Islamic law specifies that money can solely be utilized as a medium of exchange, and cannot be used as an investment towards unproductive activities.

Islamic microfinance models utilize three main contracts: the Mudaraba, the Musharaka, and the Murabaha contracts. These contracts have several things common: they are profit and risk sharing contracts that provide equitable sharing opportunities in microfinance, and of course, are compliant with Islamic code. In addition to banning *riba* and *gharar*, they encourage risk and profit sharing as well as ethical investments that promote social welfare (Jobst, 2007). Accordingly, the Mudaraba contract describes a partnership in which the financial institution invests capital and the client provides his labor and expertise. Here, profit is distributed according to a pre-determined ratio, with the micro entrepreneur "buying back" shares of capital with each loan installment that is repaid (Bhuiyan et al., 2011). When there is a loss, it is borne mainly by the investor in terms of money, while it is also borne by the borrower in terms of services (Saeed and Saqib, 2011). In contrast, the Musharaka contract describes an equity partnership contract between two partners where the parties share in the profits and losses according to predetermined ratios (Bhuiyan et al., 2011). As a result, it is considered to be the purest form of Islamic finance, and is most encouraged by scholars (Dhumale and Sapcanin, 1999). In the last contract, the Murabaha contract, the financial institution purchases goods and resells them to the borrowers for the price of the goods plus a markup for administrative costs (Bhuiyan et al., 2011). For repayment, the borrower often pays back the price of the supplies in equal installments. According to Bhuiyan (2011), this model is the simplest for the borrowers to understand, and abridges loan administration as well as monitoring issues (Bhuiyan, 2011).

Likewise, Dhumale and Sapcanin (1998) conclude that this contract is advantageous to the Mudaraba model. The authors also argue that overall, the Murabaha model is more cost effective, provides immediate collateral for a MFI, and has a lower margin of error. Accordingly, the Murabaha model is the model that is most often used in practice, and is the contract employed by the Islamic borrowers in this study.

While Islamic microfinance fundamentally differs from Western practices of finance, it also varies from traditional microfinance. Primarily, microfinance has not been as widespread in the Islamic world because it violates the basic principles of the Quran, because women are not as independent as in other regions, and because in the Islamic world, average incomes are generally greater than the poverty level (Obaidullah, 2008). Karim et al. (2008) suggest that about 72 percent of Muslims do not access formal financial services because it is interest-based, which is prohibited in Islamic Shari'a law. In contrast, Islamic microfinance is a synthesis between Islamic finance and conventional microfinance that is compliant with the basic principles of the Quran, that meets the needs of the poor by targeting families (not just women), and is an element of poverty alleviation that attempts to reduce social marginalization and poverty. In addition, Islamic MFIs take a different approach to default rates. The main theory outlines that a spirit of brotherhood and mutual help will encourage borrowers to repay their loans, especially because failure of repaying debt is considered unlawful in Islam (Ahmed, 2002). For these reasons, Islamic microfinance has been presented as a viable alternative to conventional microfinance that can appeal to Middle Eastern populations.

2.3 Islamic Microfinance and Outreach

Although empirical research on Islamic microfinance is limited in scope, several studies have presented support for the fusion of Islamic products in the market. Dutta and Magableh (2006) investigate the socio-economic determinants of different stages in the borrowing process in Jordan. Utilizing a probit model, they measure the determinants of an individual taking up a conventional loan. They find that a respondent's religious beliefs followed by lack of information on alternative sources of credit are the biggest barriers to pursuing microcredit (Dutta and Magableh, 2006). Similarly, in Syria, Karim et al. (2008) reveal that 43% of respondents cite religious reasons as a major obstacle to obtaining microfinance loans. Additionally, a survey conducted in the West Bank and Gaza Strip determined that 60% of low-income individuals prefer Islamic products to conventional ones, even if they come at a higher price (Planet Finance, 2007).

While many authors argue that Muslims do not participate in microfinance because of religious reasons, it is important to consider whether they would participate in microfinance at

all. Some authors argue that the moral and ethical values related to Islamic microfinance loans draw a larger client base that will have higher repayment rates as a result. Abdul Rahman (2007) argues that Islamic finance can play an important role in increasing the socioeconomic development of microentrepreneurs without charging *riba*. He asserts that the moral and religious attributes of Islamic finance successfully motivate microentrepreneurs; ensuring that the client will make regular payments, drawing new clients, and also helping them thrive. Additionally, Dusuki (2006) evaluates the idea of Islamic microfinance in terms of social solidarity with an emphasis on loyalty and group efforts over an individual's self-interests. Arguing in favor of Islamic microfinance, he states that it can be supported through group lending to the poor who are generally denied access to conventional banking services (Dusuki, 2006).

Several studies outline the prospect for Islamic MFIs to have greater outreach in many Middle Eastern countries, specifically targeting the poorest of the poor. Primarily, Ahmed (2002) critically evaluates conventional microfinance, presenting Islamic microfinance as an alternative model. Combining a theoretical basis, the groundwork for an operational framework and case studies, he contends that Islamic microfinance has the potential to cater to the needs of the poor (Ahmed, 2002). Focusing on the inherent characteristics of Islamic MFIs, he argues that they have the capability to alleviate common problems faced by conventional MFIs, such as providing financial services to those in extreme poverty, and targeting the family as loan recipients, as opposed to just women (Ahmed, 2002). Furthermore, Karim et al. (2008) conducted a survey spanning 125 institutions in 19 Muslim countries. The researchers found that Islamic microfinance providers access only 380,000 clients, with one-third of clients residing in Bangladesh alone. In order to reach more people and build sustainable institutions, they argue that it is necessary to focus on designing affordable products, training skilled administrators and loan officers, and improving operational efficiency (Karim et al., 2008). In this way, it is possible for Islamic microfinance to be a feasible loan product.

2.4 Islamic Microfinance and Measuring Religion

Similar to risk preferences, religion is also considered a main determinant of economic activity. Examining the link between economics and religion, Ashta (2011) specifies that public and private institutions are influenced by religion, subsequently relating them to economic interests and activity. Though there is significant research on economics and religion individually, few studies specifically observe the link between religion and microfinance. For the most part, discussions related to religion and microfinance are limited to Islamic finance, with many articles centered on the Middle East and North Africa (Ahmad, 2009; Dusuki, 2008;

Seibel, 2008). The majority of these articles contend that religious restrictions are a key impediment to loan take-up because conventional loans charge interest rates, which are prohibited in Islam (Abdul-Rahman, 2007, Dusuki, 2008, and Karim et al., 2008).

The aforementioned studies indicate that through the proliferation of Islamic microfinance, more individuals will choose to access microcredit. The studies also suggest that the main justification for the spread of Islamic microfinance is in order to tap into a more religious population. Consequently, this paper attempts to test the assumption that Islamic microfinance borrowers have stronger religious beliefs than conventional borrowers. In order to test this assumption, it is first important to assess how previous studies have measured Islamic religiosity of individuals.

Albelaikhi's "Development of a Muslim Religiosity Scale" (1997) attempts to measure religiosity through the use of an index. In his study, Albelaikhi's creates a scale using principal component analysis (PCA). Utilizing a questionnaire, the author measured six components of Islamic religiosity representing different dimensions of practice, societal value, and belief in central tenets. Though the multidimensionality of the participants' religiosity was generally supported, the author concedes that further work is necessary in order to establish psychometric robustness. Nevertheless, the author addresses critical issues in religiosity studies, such as measuring the belief dimension, offending participants, and gender of participants. A significant portion of this research is modeled after Abelaikhi's method of measuring religiosity.

In addition, the paper most similar to this study is Anderson's "Multiple Inference and Gender Differences in the Effects of Preschool" (2006). Anderson also utilizes an index to compress a large number of correlated variables to a smaller number of outcomes; however, the subject he explores involves returns to public education investments. Specifically, Anderson investigates various measures of life outcomes as a result of early childhood interventions. Since each of these interventions measures a variety of potential life outcomes, Anderson uses summary index as a method of reducing the total number of tests that are conducted. Essentially, a summary index captures the weighted mean of several standardized outcomes. The main purpose of reducing the number of tests is to prevent over-testing as well as the occurrence of Type I error, which is prevalent when there are multiple outcomes being tested. In addition to preventing false positives, Anderson notes that summary indices are sometimes even more powerful than individual level tests, where each individual outcome is tested. Since both risk and religiosity are measured in this study using a number of survey questions, the

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summary index method can be applied to this study. In this way, an alternative to PCA is provided and it is not necessary to test each of the questions individually.

Other attempts have been made to measure Islamic religiosity. Many of these studies have fallen below adequate psychometric standards and measurement validity. Tessler and Nachtwey (1998) utilized a three-item instrument to measure religiosity; however, their instrument was solely based on behavior. Furthermore, Al-Sabwah and Abdel-Khalek (2006) attempted to measure the importance of religion in one's life, though their study only used a one-item scale. Similarly, Huntington et al. (2001) had shortcomings in that the majority of their questions consisted of yes or no answers, drastically limiting the variability of responses. Finally, two separate studies used a religiosity measure called the Muslim Attitudes Towards Religion Scale (Ghorbani et al., 2002 and Wilde et al., 1997). Though this measure has been developed with an Islamic perspective and contains valid psychometric properties, it is argued to have a predominantly Shiite perspective that would address only a portion of the Muslim population (Jana-Masri et al., 2011).

2.5 Intersection of Conventional and Islamic Microfinance

Two studies specifically focus on the intersection of conventional microfinance and Islamic microfinance, allowing us to draw preliminary conclusions regarding the differences between clients who choose the former versus the latter. Primarily, El-Komi et al. use a game-theoretic experimental design to test Islamic microfinance products in the context of moral hazard and default rates. Specifically, the dependent variable is compliance rates, or the rate at which individuals follow the loan terms, with two Islamic-based contracts and one interest-based contract. In the Islamic-based contracts, solely the borrowers know whether the project was successful or not, raising the issue of moral hazard. The authors find that compliance rates are higher in the joint venture and profit-sharing (Islamic finance) contracts than in the interest-based contract. While this study explores the differences between Islamic and conventional microfinance, the study is implemented through an experiment presenting the choice between one contract and the other. In contrast, a key advantage of this research is that Islamic microfinance is observed in practice, rather than in the context of an experiment.

In addition to El-Komi et al., El-Gamal et. al (2011) test an alternative Islamic finance model against Grameen-style, interest-based microcredit provision. Conducted in Egypt, the experiment utilizes Islamically-accepted indigenous rotating savings and credit associations (RoSCAs) to compare rates of take-up and repayment through game-theoretic analysis. The results significantly show that the Grameen treatment take-up rates were approximately 75%, and the RoSCA take-up rates were 91%. Furthermore, the RoSCA treatment was found to have

a strong statistical effect on take-up and repayment rates, suggesting that subjects prefer this mode of financing compared to conventional microfinance. Again, these authors experimentally test the appeal of an Islamically accepted contract, rather than an actual Islamic microfinance contract. In contrast, this research observes Islamic microfinance contracts that are utilized in practice.

In all, the literature suggests that several different aspects of Islamic microfinance work in favor of its continued implementation in the Middle East, predominantly in order to access a broader client base. The primary goal of this paper is to test the proposed rationale that Islamic microfinance targets risk averse and religious borrowers. Based on the current literature, there is no previous research characterizing conventional and Islamic microfinance borrowers in the same setting. The presence of both of these credit markets in Jordan creates a unique situation in which this is possible. This information will be vital for a MFI in terms of understanding the appeal of Islamic microfinance to a specific population and ultimately determining the demand for Islamic microfinance overall.

3. Data Description

3.1 Subjects

For this study, field research was carried out in conjunction with the National Microfinance Bank of the Hashemite Kingdom of Jordan (NMB) and the Development and Employment Fund (DEF). Household data was collected throughout June, July, and August of 2012. A period of survey collection coincided with the holy month of Ramadan, which is widely practiced in Jordan, and is accounted for within the estimations. The sample size consists of 221 total borrowers with 143 conventional and 78 Islamic borrowers. In addition, a total of nine branches were surveyed from both NMB and DEF.

Information on conventional borrowers was collected from the National Microfinance Bank of Jordan (NMB), a private shareholding nonprofit company. Established in 2006, NMB currently has 11 operating branches throughout Jordan. As shown by Figure 1, the branches are in the following areas: Karak, Zarqa, Deir Allah, Wehdat, Baqa'a, Salt, Marka, Mafraq, Madaba, West Amman, and Irbid. NMB's primary goal is to increase the productivity of entrepreneurs with services targeted towards women and the poor. To meet the needs of their clients, NMB offers both conventional and Islamic loan products ranging from 200 to 25,000JD. Loans are tailored towards specific purposes, including education, home-improvement, durable goods, health, and business loans. In order to emphasize the role of micro borrowers in Jordan, this study mainly focuses on clients who take up conventional business loans under 3,500JD ($\approx$\$4,940.10).

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In addition, information on Islamic borrowers was collected in conjunction with the Development and Employment Fund (DEF) in Jordan. Established in 1989, DEF currently has 12 operating branches throughout Jordan. The branches are located in Ajlun, Amman, Aqaba, Irbid, Jarash, Karak, Ma'an, Mafraq, Marka, Salt, Tafailah, and Wehdat. In the context of microfinance, DEF's main goal is to promote development by financing small business projects. Similar to NMB, DEF also offers both conventional and Islamic loan products, with loan sizes ranging from 150 to 3,500JD. Moreover, DEF offers both direct and indirect financial services, with an emphasis on rural women empowerment and group lending. This study focuses only on Islamic loans offered by DEF, which all fall under the amount of 3,000JD. Though DEF was established 17 years prior to NMB, the MFIs both have approximately 30,000 active borrowers.

One disadvantage of comparing clients at these two institutions is the potential for heterogeneous differences between the borrowers. In order to minimize these disparities, the problem is addressed in two ways. A primary concern is of the eligibility criteria to be as similar as possible at the two institutions. Fittingly, the main eligibility requirements at both NMB and DEF are the same: the individuals must be of Jordanian nationality, and they must have cosigners for their loans. In addition to eligibility requirements, borrowers were randomly selected from all but two NMB branches, Mafraq and West Amman, due to limitations of data collection at the time of the research. To maintain similarities between the borrowers, only common branches between the two MFIs were surveyed. In all, 9 of 11 NMB branches and 5 of 12 DEF branches were selected for this research. Once the branches were chosen, borrowers were randomly selected from the database of conventional borrowers at NMB and Islamic borrowers at DEF.

3. 2 Focus Group and Survey

For the purpose of this analysis, the main variables of interest are alternative measures of risk preferences and Islamic religiosity. Focus groups and surveys were the main instruments utilized to collect this information from borrowers. Focus groups were used to amend questions in the survey while surveys were used to obtain information from borrowers. Through the use of the focus group, it was possible to attain descriptive feedback from a random selection of microfinance clients. Specifically, it was possible to obtain feedback on appropriately measuring risk preferences and religiosity from the perspective of native Jordanians. Focus groups were conducted at three randomly selected branches by enumerators who were trained to supervise and conduct each of the meetings. Acquiring this information ensured that microfinance clients would not be offended by the survey questions on religiosity.

Focus groups also helped to ensure that both of these potentially sensitive topics were approached in an appropriate and thoughtful manner that resulted in an authentic measure of risk preferences and Islamic religiosity.

In addition to the focus group, information was obtained from clients through the use of a survey. The main sections comprising the survey include a measurement of individual and household characteristics as well as sections for risk preferences and religiosity. The survey section on risk preferences explored various aspects of risk and how it may affect the borrowers. Specifically, the questions involved the individual's risk preferences in the context of personal life, business decisions, relationships with others, and entrepreneurial decision-making. Moreover, the focus group assisted in generating questions to measure Islamic religiosity. As this is a sensitive topic, each question was thoughtfully created through the help of various populations. In addition to focus groups, the research team consulted native Jordanians, enumerators, and bank employees in order to attain an appropriate measure of this variable. Ultimately, these questions explore religion in the context of daily life, the extent to which individuals practice religion, and overall sentiments towards Islamic and non-Islamic banking products.

3.3 Data Summary

Table 1 shows summary statistics for this study. Within the sample of 221 borrowers, 65 percent of the respondents took up a conventional microfinance loan, whereas 35 percent have taken up an Islamic microfinance loan. Approximately 76 percent of the respondents are female. The age distribution of the sample shows that the respondents' ages range between 20 and 60 years, with an average of 37 years old. Moreover, the mean age is very similar across both conventional and Islamic borrowers. In terms of formal education, a majority of the respondents have obtained a level of secondary school or less. Very few respondents have obtained an A.A. or B.A./B.S. degree, though Islamic clients boast a slightly higher level of education. Figures 1A and 1B further describe the distribution in the levels of education between conventional and Islamic borrowers. When looking at education levels as a percentage of total borrowers, these graphs reveal that there are no major disparities between conventional and Islamic borrowers. For the most part, across the measures of age, education, household income, employment status, and business ownership, the borrowers in both subsamples have similar characteristics.

In contrast, Table 1 also displays various dissimilarities between conventional and Islamic borrowers. Mainly, a larger portion of female borrowers participate in conventional microfinance. Table 1 indicates that female borrowers comprise 93 percent of conventional

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loans, but only 45 percent of Islamic loans. Similarly, a dummy variable for whether the survey took place throughout the month of Ramadan is included, as this could potentially influence the responses to questions on religiosity. Whereas 57 percent of conventional borrower surveys took place in Ramadan, almost 94 percent of Islamic borrower surveys took place in this time period. Similar results hold for whether the interview was conducted over the phone, with all Islamic borrowers and the majority of conventional borrowers being surveyed in this way. Finally, although loan sizes were capped at 3,500JD for both conventional and Islamic borrowers, Islamic loans have a higher average loan value.

Figures 3A, 3B, 4A, and 4B show the differences between various risk and religiosity measures across the two subsamples. Figures 3A and 3B observe the risk and religiosity measures obtained through Principal Component Analysis (PCA), whereas Figures 4A and 4B display the risk and religiosity measures obtained through summary index. Figure 3A indicates that Islamic borrowers have a higher average level of risk for each of the measures, suggesting that they are more risk-seeking overall. In contrast, the results for Islamic religiosity are not uniform. Figure 3B shows that conventional borrowers have a higher average total for some religiosity measures, and Islamic borrowers have a higher average total for other measures. This dissimilarity justifies the need for a total measure of religiosity that takes into account each of the factors for both conventional and Islamic borrowers, and allows an overall measure of this variable. Fortunately, this is possible through the use of summary index. Figure 4A explores the risk summary index, indicating that Islamic borrowers have a higher average value when compared to conventional borrowers. These are similar to the results of PCA in Figure 3A, where Islamic borrowers have a higher average level of risk for each measure. When observing the religion summary index, Figure 4B indicates that Islamic borrowers also have a higher average value of religion compared to conventional borrowers. Without controlling for other factors, these tables initially suggest that Islamic borrowers are more risk-seeking and more religious than conventional borrowers.

Another important perspective to consider is the relationship between risk aversion and Islamic religiosity, regardless of whether an individual takes up a conventional or an Islamic microfinance loan. The association between risk and Islamic religiosity is addressed in Islamic Shari'a law. Specifically, Islamic law prohibits the principle of *gharar*, or engaging in excessively risky activities with uncertainty, such as gambling (Obaidullah, 2008). As a result, it is possible to hypothesize that more Islamic individuals tend to be more risk averse. The correlations between these concepts are explored using a correlation matrix in Table 2. The results show a generally negative relationship between the risk and religiosity, with

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approximately 65% of the correlations being negative. These findings also suggest that overall, more religious individuals tend to be more risk averse.

4. Empirical Strategy

4.1.1 Principal Components Analysis

The goal of this research is to analyze the risk preferences and religious characteristics of borrowers who choose to take up Islamic microfinance loans as opposed to conventional loans. The purpose is to elicit a framework in which it is possible to analyze the demand for Islamic microfinance in Muslim communities as well as to determine the risk preferences of individuals choosing Islamic microfinance versus conventional microfinance. To obtain appropriate measures of risk preferences and Islamic religiosity, principal component analysis (PCA) and summary index are utilized. These techniques consolidate the number of questions comprising overall risk and Islamic religiosity into a smaller number of variables. Consequently, this analysis explores both indices and their results for risk and religiosity measures.

In general, PCA is a type of factor analysis that exposes the latent dimensions of a set of variables. Essentially, it reduces a large number of variables to a smaller number of factors. To do this, PCA accounts for maximum variance in the data set by identifying linear combinations of raw parameters (McDonald, 1998). The first factor accounts for the largest variance in the data, and each subsequent factor will account for the next largest variance. These factors, or dimensions, are often a combination of two or more items. Therefore, this method results in optimal linear reconstruction of the variable being measured using the fewest number of parameters (McDonald, 1998.) In addition, PCA extracts a number of factors according to different criterion. The default criterion for extracting factors is when the greatest variation, measured by Eigenvalues, are greater than 1 (Hamilton, 2008).

4.1.2 Principal Component Analysis: Risk

To measure levels of risk aversion, nine binary risk preference questions were included in the survey. Values of 0 are coded for risk-averse responses, and values of 1 are coded for risk-loving responses. Section 1 of Appendix A shows the PCA results for alternative measures of risk. Four factors have Eigenvalues greater than 1, suggesting that these factors account for the greatest variation in the data. To estimate the probability of taking up an Islamic loan, three factors were retained. These factors measure business risk, personal risk, and entrepreneurial risk, and are described in further detail in Section 1 of the Appendix. To illustrate the use of PCA, it is possible to examine the factor "personal risk." This variable is comprised of three items: an individual's preferences when trying new but unproven ideas for a

business, the desire to take additional risks when the individual is initially successful, and whether it is more important to be cautious or bold overall. Compared to the other risk preference questions, the theme of this factor can be described as measuring risk when considering one's personal preferences.

4.1.2 Principal Component Analysis: Islamic Religiosity

In order to obtain an appropriate measure of Islamic religiosity, thirteen items were analyzed using PCA. The original item pool consists of various binary indicators of religiosity, including beliefs, attitudes, practices, financial preferences, and knowledge. These questions were generated with the assistance of native Jordanians, enumerators, focus groups, and MFI employees to obtain an authentic measure of Islamic religiosity. Here, values of 0 are coded for less religious, and values of 1 are coded for more religious responses. Section 2 of the Appendix shows the four factors that are identified with Eigenvalues greater than 1. To estimate the probability of taking up an Islamic loan, all four factors are retained. These factors measure financial belief, religious practice, religious attitude, and literary knowledge, and each is described in further detail in Appendix A. To exemplify the use of PCA, it is possible to explore the factor "religious practice". This factor consists of three items predominantly related to the religious practices of individuals. Specifically, this component incorporates whether the individual prefers an Islamic or conventional loan, if they believe consulting a sheikh or imam[1] is an ideal way to verify the validity of Islamic loans, and if they seek advice from a sheikh or imam on a consistent basis.

4.2 Multiple Inference and Summary Index

In addition to PCA, a summary index is constructed as an alternative measure of risk preferences and religiosity. The summary index utilized in this research is largely based on a paper written in 2006 by Michael Anderson, entitled *Multiple Inference and Gender Differences in the Effects of Preschool.* The idea is to correct for the over-rejection of the null hypothesis that is sometimes a result of multiple inference and when there are many outcomes being tested. Essentially, if risk preference and religiosity outcomes were tested individually, it is possible that some outcomes would display significance even if there were no effect. This occurrence is especially likely in smaller samples when there are a large number of outcomes being tested. To address this possibility, this study follows the corrections outlined by Anderson (2006). First, a specific set of risk and religious outcomes are selected based on their *a priori* notions of relevance and importance. In this way, the degree of over-testing is minimized (Anderson, 2006). In total, nine risk preference and thirteen religiosity outcomes are utilized in the model.

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[1] A sheikh or imam is generally understood to be an Islamic leader or scholar, and someone with a thorough understanding of the Islamic religion.

Next, a summary index is constructed for both risk preferences and religiosity. Fundamentally, a summary index is the weighted mean of multiple standardized outcomes, (Anderson, 2006). In addition to outlining a specific set of outcomes for risk and religion, creating a summary index also reduces the total number of tests being conducted in the regression. Anderson (2006) states that summary indices present two distinct advantages over the testing of individual outcomes. Primarily, summary indices are not prone to Type I error, and are actually robust to over-testing. This is because the addition of outcomes to summary index will not increase the probability of Type I error (Anderson, 2006). Furthermore, summary indices have the potential to be even more powerful than individual tests. While multiple outcomes may indicate only marginal significance, aggregating these variables into a single index may result in stronger statistical significance overall.

In general, the goal of summary index is to combine data from multiple measures and outcomes into a single index. This consolidates several individual tests into a single test. To do this, summary indices utilize weights that are calculated to maximize the amount of information that is captured by the index. In essence, outcomes that have high levels of correlation between one another receive less weight in the index. The weighting technique is as follows:

$$\bar{r}_{ij} = \sum_{k \in M_{ij}} \omega_{jk} \frac{o_{ijk} - \overline{o_{jk}}}{\sigma_{jk}^{y}}$$

where $\bar{r}_{ij}$ is the new indexed variable. This variable represents the mean of the normalized, demeaned outcomes for each observation i in area j. To construct $\bar{r}_{ij}$, the outcomes o_{ijk} are weighted by the inverse of the covariance matrix of the outcomes. The row entries are then summed in the inverted covariance matrix to obtain the weight on each outcome. In this equation, M_{ij} signifies the non-missing outcome total for observation i in area j. Moreover, the standard deviation of the group is denoted by σ_{jk}, whereas ω_{jk} is the outcome weight for the covariance matrix. For each observation, the weights are normalized such that they sum to one. Missing outcomes are ignored in the creation of $\bar{r}_{ij}$. In this way, the new index makes use of all available data, in addition to weighting outcomes with fewer missing values more greatly (Anderson, 2006).

4.3   Take-up of Islamic Loans: Linear Probability Model

To assess the probability of taking up a conventional or Islamic loan, a linear probability model is utilized. In linear probability functions, the dependent variable is a binary variable that takes on a zero or one value. For the purpose of this study, the outcome variable is the take-up of an Islamic microfinance loan. Since errors are heteroskedastic in the linear

probability model, robust standard errors are used with each linear probability estimate. As mentioned in the previous sections, PCA and summary index are used to create factors and accurately estimate risk and religiosity. Although probit and logit models are commonly used in conjunction with probability, they are not frequently used with PCA and summary index (Train et al., 1987). Rather, when using PCA or summary index, probit and logit estimation methods are not favored due to the variation in the distribution values surrounding the mean, which result in asymptotic bias (Train et al., 1987). Consequently, the results are more robust when combining PCA or summary index with a linear probability estimator. In addition, the linear probability model is computationally simpler to work with and allows a more straightforward interpretation of marginal effects (Heckman, 1985). The model is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 B_i + \beta_3 RPI_i + \beta_4 RI_i + \varepsilon_i \tag{1}$$

Here, Y_i is a binary variable taking on a value of 1 when the individual has an Islamic microfinance loan and 0 otherwise. X_i denotes a vector of individual and household control variables, B_i represents a dummy variable for each branch, RPI_i denotes a vector of the individual's risk preferences, RI_i represents a vector of Islamic religiosity measures, and ε_i signifies the error term. The model is run under four different specifications. The first two specifications utilize PCA as a proxy for risk and religiosity factors, and the last two specifications utilize summary index as a proxy for risk and religiosity. Through the use of the linear probability model, it is possible to test the main hypotheses of this research:

Hypothesis I: Risk Preferences

H_o: There is no significant difference between the risk preferences of conventional and Islamic microfinance borrowers

H_a: There is a significant difference between the risk preferences of conventional and Islamic microfinance borrowers

Hypothesis II: Islamic Religiosity

H_o: There is no significant difference in the levels of Islamic religiosity between conventional and Islamic microfinance borrowers

H_a: There is a significant difference in the levels of Islamic religiosity between conventional and Islamic microfinance borrowers

4.4 Robustness Checks

To address potential variables that may be affecting the take-up of Islamic loans or the responses to the Islamic religiosity questions, two additional variables are included in the controls. The first control that is included is a time preference index. Mainly, because the structure of conventional and Islamic microfinance loans differ, the application process also

differs. In the Murabaha contract, the MFI must first purchase the goods or product, and then sell it back to the borrower at a fixed marked-up price for the service. For this reason, the application process for Islamic microfinance loans is lengthier than that of conventional loans. To control for this difference, a time preference index is included in the regressions in order to measure whether Islamic borrowers are also more patient than conventional borrowers. If conventional borrowers are simply more impatient than Islamic borrowers, this could be an important reason they choose to take up this type of loan.

The second variable that is included in the regression estimates is whether the survey took place during the holy month of Ramadan. One reason this variable is included is because the majority of Islamic microfinance surveys were conducted in this month. Moreover, the holy month of Ramadan is widely practiced in Jordan, and is considered a month for spiritual reflection and a time to reconnect to religious beliefs. Accordingly, it is possible that individuals who are surveyed during this time period will respond more positively to questions about Islamic religiosity than individuals who were not surveyed in this time period. As a result, a control is included for whether the survey was conducted in the holy month of Ramadan.

It is also important to mention that enumerators are not included as controls in the estimations. Enumerator controls are excluded for two reasons. First, when conducting surveys, enumerators were assigned to a specific type of borrower survey: either conventional or Islamic borrowers. Therefore, their distribution will automatically favor either conventional or Islamic borrowers. The second reason enumerators are not included as a control lies in the similarities between the enumerators. Specifically, the enumerators were alike in terms of their training as well as their personal traits. In order to prevent discrepancies between the survey results, enumerators were trained for three weeks prior to field research. Moreover, the enumerators were native Jordanians, males, and recent college graduates. With this in mind, it is considered unlikely that survey participants will vary their answers according to the enumerator who conducted the survey. Rather, it is more likely that any variation captured by this variable is due to the differences in the distribution of enumerators across conventional and Islamic borrowers.

5. Data Analysis and Results

5.1.1 *Principal Component Analysis: Risk*

The results of the linear probability estimations for risk preferences using PCA are shown in Table 3. In this estimation, different risk factors are observed for their effect on the probability of taking up an Islamic loan, as demonstrated in equation (1). The results show that two out of three risk measures demonstrate a positive effect on the probability of taking up an

Islamic loan. Although two of the risk measures are positive, none of the values are significant. The risk preference measures are still insignificant when adding a dummy variable for whether the survey took place in Ramadan. Overall, the table indicates that different measures of risk preferences have varying effects on the probability of taking up an Islamic microfinance loan, and it is not possible to draw an overall conclusion.

Despite these results, this model also incorporates various controls related to religiosity and socio-economic characteristics. Literary knowledge was used in the estimation as a religious control. With all five measures of risk, literary knowledge is found to have a positive, significant effect on the probability of taking up an Islamic loan. The results also significantly show that female borrowers are approximately 20 percentage points less likely to take up an Islamic loan. Table 1 provides an explanation for these findings in particular, where the female distribution clearly favors conventional loans. Furthermore, both employment status and owning a business are both significant indicators of taking up an Islamic loan.

5.1.2   Principal Component Analysis: Islamic Religiosity

Additionally, Table 4 shows the linear probability estimations with alternative measures of Islamic religiosity using PCA. In this estimation, four different measures of religiosity are included. Two out of four measures have negative coefficients, while the other two have positive coefficients. Also, two out of four measures are significant in these estimations: religious practice and literary knowledge. While religious practice has a negative significant value, literary knowledge has a positive significant value. In addition, although the directions of the coefficients vary, both of these variables are significant at the 5% level. Similar to risk, the components of religiosity have varying effects on the probability of taking up of Islamic loans, making it difficult to draw an overall conclusion. These results hold when controlling for whether the survey was conducted in Ramadan. The only observed change is that religious attitude becomes significant at the 10% level.

In this estimation, individual and household controls are also utilized. As is expected, the results are similar to the previous linear probability estimation. The results show that female borrowers have a lower probability of taking up an Islamic loan, again by approximately 20 percentage points. Each of these values is significant at the 5% level. Moreover, dummy variables for Ramadan during the survey are positive and highly significant at the 1% level. Again, employment status and owning a business are positive, significant indicators for taking up an Islamic loan.

5.1.3 Principal Component An Effective Measure?

The results of the linear probability model when utilizing PCA are conflicting for both risk preference and religiosity measures. Though PCA effectively reduced the number of variables that were utilized in the regression, it was not possible to draw an overall conclusion from the factors. Instead, different factors had opposite effects, though they were measuring the same variable. Therefore, though PCA is advantageous in that it reduces a large number of correlated variables to a smaller number of uncorrelated factors and it identifies underlying themes of a variable, it may not be the best tool to attain an aggregate measure of risk and religiosity. PCA also gives a higher weight to the factors that are most correlated with one another, suggesting why the results vary across different factors. In contrast, summary index gives a smaller weight to factors that are correlated with one another, since they are being measured in multiple ways and are attempting to measure the same thing.

5.2.1 Summary Index: Risk

In this section, three different specifications are observed when using summary index. Initially, risk preferences and Islamic religiosity summary indices are observed individually. Then, a third table includes risk preferences and Islamic religiosity indices in the same estimation. Table 5 shows the results for the risk summary index. For each specification, there is a positive value for the coefficient on risk index. However, none of the equations for risk have significance, despite including a number of different specifications. These results are similar to the risk results using PCA in Table 3, where the coefficients are positive but insignificant. From these results, it is not possible to reject the null hypothesis that Islamic and conventional microfinance borrowers have different levels of risk preferences.

In addition to measuring the risk index, several controls are included in the regression. Similar to the results for PCA, female borrowers are considerably less likely to take up Islamic microfinance loans, and this is significant at the 1% level for each specification. The results in this table show that female borrowers are on average 40 percentage points less likely to take up an Islamic microfinance loan. This is a steep increase from the PCA results, where female borrowers were only 20 percentage points less likely to take up an Islamic loan. In addition to gender, the results indicate that loan size and whether the interview was conducted over the phone are positive and significant for each specification, mostly at the 1% level. Moreover, including a control for Ramadan indicates highly significant and positive results. The significance for each of these variables is likely due to the distribution in the original sample, where the Islamic borrower distribution favors male borrowers, higher loan sizes, phone interviews, and the Ramadan time period. When including the controls for time preference,

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there is little change in the results. In addition, the branch controls do not have any significance when the model is fully specified. For the most part, the branch controls also maintain the directions of their coefficients throughout the different specifications.

5.2.2 Summary Index: Islamic Religiosity

Additionally, Table 6 shows the results for the religion summary index. For each of the five specifications, there is a positive, significant coefficient for the religion index on the probability of taking up an Islamic microfinance loan. As more variables are specified, the coefficients decrease. Moreover, as more variables are added, the significance of the religion index is lower, changing from 5% to 10%. Still, from these results, it is possible to deduce that higher levels of Islamic religiosity increase the probability of taking up an Islamic microfinance loan by an average of 20 percentage points.

These estimations also show comparable results for the control variables. Similar to Table 5, females are approximately 40 percentage points less likely to take up an Islamic microfinance loan, and this variable is significant at the 1% level for each estimation. In addition, the values for loan size and whether the interview was conducted over the phone all present similar, positive influences on the probability of taking up an Islamic loan. There are also corresponding results when including controls for time preference and Ramadan. The time preference index is insignificant, while the dummy variable for Ramadan is significant at the 1% level for each estimation. Finally, the dummy variable for each branch show irregular significance throughout each specification. Despite these additions, the religion index maintains its significance.

5.2.3 Summary Index: Risk and Islamic Religiosity

Table 7 presents the results of the summary index for risk and Islamic religiosity in the same estimation. Although Table 5 demonstrates that the risk index is positive but insignificant, this variable becomes positive and significant when it is tested in conjunction with the religion index. In general, according to these results, the risk index increases the probability of taking up an Islamic microfinance loan by approximately 11 percentage points. Six of the seven risk index values are significant at the 10% level, with the value for equation (6) losing significance. The change in significance occurs through the addition of the risk-religion interaction term. Nevertheless, the addition of the interaction term in column (7) as well as the Ramadan control restores significance to the risk index. Overall, in this table, there are uniformly positive results for the risk index on the probability of Islamic loan take-up.

Likewise, when the religion index is tested in conjunction with the risk index, the results do not change dramatically. Rather, the religion index is robust to different

specifications, and maintains a uniformly positive value for each estimation. The values for the religion index are significant at the 1% and 5% levels for six out of seven specifications. Again, as the equation becomes more specified, the religion index's coefficient and significance decrease. Specifically, the significance is the weakest when including the risk-religion interaction term and the dummy variable for Ramadan. Nonetheless, from this table, it is possible to conclude that religiosity increases the probability of taking up an Islamic microfinance loan by approximately 22 percentage points. This is a similar value to that of Table 6, when the risk index was not included in the model.

The same individual, household, and branch controls are also included, as in the previous estimations. Again, there are similar results across each model specification. Table 7 shows that females are approximately 40 percentage points less likely to take up an Islamic microfinance loan. Contrary to the PCA results, employment status and owning a business are not significant in any of these estimations. However, loan size, Ramadan, and the phone dummy are all positive and significant in these estimations as well. The effect of the time preference index is also insignificant, and the branch controls show irregular significance throughout different specifications.

6. Discussion

6.1 Risk Preferences

The linear probability estimations suggest several conclusions: the first is that risk-seeking individuals have a greater probability of taking up Islamic microfinance loans. These results contradict the null hypothesis that there is no difference in the levels of risk preferences between Islamic and conventional borrowers. Theory suggests that Islamic microfinance will appeal to more risk-averse individuals. This hypothesis stems from the idea that risk is shared between the individual and the MFI in an Islamic profit and loss sharing contract. Because risk is shared in this situation, the borrower will bear less risk in their endeavor. Despite this claim, it can be argued that an Islamic contract can also attract riskier borrowers. As mentioned before, the MFI purchases the financial asset for the individual in an Islamic contract. In this way, the MFI will have legal claim to the financial asset until the borrower "buys back" the asset in installments. Not only does this provide additional collateral for the MFI, but it also has the potential to attract riskier borrowers because of how the MFIs deal with default. In essence, Islamic MFIs rely on spiritual brotherhood and the idea of mutual help to encourage members to repay their loans, or encourage others to assist their counterparts in repaying their loans (Ahmed, 2002). Islamic MFIs also rely on the fact that not repaying debt is considered sinful according to Islam, which will motivate borrowers to repay their loans (Ahmed, 2002).

Since the enforcement mechanisms vary between Islamic and conventional financing, more risk-seeking borrowers may be attracted to Islamic financing. Moreover, in terms of risk-seeking borrowers, this doctrine can also create an opportunity for moral hazard.

Another possibility of why risk-seeking borrowers select into Islamic microfinance considers the idea of credit rationing, and how it plays a role in determining what type of loan to obtain. Credit rationing occurs when there is a limited supply of lending to borrowers, even if there is a high demand for funds (Stiglitz and Weiss, 1981). This market failure does not arise because credit is too expensive; rather, lenders are already maximizing profits, preventing them from loaning more funds or raising the interest rate to attract more borrowers. Some types of credit rationing occur when a specific group of borrowers, who share a common trait, are unable to obtain credit from a given supply of funds (Stiglitz and Weiss, 1981). In the context of this research, it is possible that risk-loving borrowers may not qualify for conventional loans, or that conventional MFIs target female clients. In both of these cases, it is likely that the rejected borrower will turn to Islamic financing as an alternative.

6.2 Islamic Religiosity

The second and stronger conclusion suggested by the linear probability estimations is that more religious individuals are more likely to take up an Islamic loan. This result is not especially surprising, as the main justification for the proliferation of Islamic microfinance is to provide a method of financing to religious individuals without charging interest rates. Along with this idea, an abundance of research argues that Islamic microfinance will intuitively attract more religious individuals (Dutta and Magableh, 2004, Abdul Rahman, 2007 and Ashraf, 2010). The results confirm the hypothesis that more religious individuals will take up Islamic microfinance loans. Still, Islamic microfinance is a novel concept, meaning this hypothesis has not previously been tested. Consequently, these results offer a glance at the potential relationship between Islamic borrowers and their overall levels of religiosity. Since this hypothesis holds empirically, it suggests that Islamic microfinance is another avenue in which the poor can access financial services.

6.3 Gender and Loan Size

The results also indicate that women are much more likely to take up conventional microfinance loans. While there are several possible explanations, one potential motive is that MFIs offering conventional loans specifically target women recipients. Indeed, one of the major goals of NMB is to reach out to women in particular. On the contrary, the purpose of Islamic microfinance loans is arguably more equity-oriented. For instance, a major tenet of Islamic financing is social welfare and justice. While women empowerment is a major part of this, the

true target of Islamic microfinance is the family, and not just women (Ahmed, 2002; Obaidullah, 2011). As a result, it is likely easier as well as more acceptable for men to access Islamic microfinance loans.

Across the different estimations, loan size is an important variable when characterizing conventional and Islamic microfinance loans. Though loan sizes for both clients were capped at 3,500JD, the average loan size for Islamic borrowers is 1,455JD, compared to 661JD for conventional borrowers. One possible reason for this disparity is the nature of Islamic microfinance contracts, particularly in relation to the Murabaha contract that is employed by DEF. In this type of contract, the MFI will purchase the asset or goods, and sell them back to the borrower at a marked-up cost. In this way, the MFI engages in a profit and risk-sharing endeavor with the borrower. Since there are two parties participating, as opposed to just one in the conventional microfinance contract, it may encourage the participants to purchase or invest in a more expensive item. This is especially likely when both parties have a strong incentive for the success of the project, such as with Islamic financing. Overall, larger or more expensive investments would consequently lead to a higher average loan size for Islamic borrowers.

6.4 Principal Component Analysis and Summary Index

Through this study, it is also possible to draw conclusions regarding the use of indices. Principal component analysis (PCA) was initially utilized in conjunction with risk preferences and different measures of Islamic religiosity. Although PCA was successful in reducing a large number of correlated variables to a smaller number of uncorrelated factors, it presents somewhat of a disadvantage when measuring broad ideas. Primarily, since the factors generated by PCA had opposing coefficients in the regression estimations, it was not possible to determine the overall effect of risk preferences or Islamic religiosity on the take-up of Islamic microfinance loans.

A fundamental difference between PCA and summary index is how these indices assess multiple questions measuring the same idea. With PCA, questions addressing the same idea will be weighted more highly because they are correlated with one another, and that is how each factor is generated. In contrast, summary index does quite the opposite. When there are multiple items measuring the same variable, these items will be given a lower weight. In this way, the items comprising a variable are balanced, allowing the index to take advantage of all the given information. Moreover, a major advantage of summary index is that it ultimately results in one variable that be tested in estimations, whereas PCA creates several factors. For these reasons, and because the goal of this study is to obtain an overall measure of risk preferences and Islamic religiosity, summary index is the preferred measure.

6.5 Limitations

Several limitations are apparent for this study. Primarily, the borrowers are chosen from different microfinance institutions in Jordan, and thus do not provide an ideal sample. Variations in the distribution of the sub-samples also provide some weaknesses: gender, loan size, and survey time period all greatly differ between the samples. This makes it difficult to determine causality when testing these factors in the model. Furthermore, since the sample is so small, it is not possible to split the sample according to these distributions. For example, it would be advantageous to observe those borrowers who were surveyed in Ramadan and compare them to borrowers who were not surveyed in Ramadan. Since the sample is already limited, conducting these tests yields little statistical power and meaning. In addition, it is difficult to interpret several of the variables due to the nature of the project. Specifically, this research observes a decision from the past: the take-up of a conventional microfinance loan. In the analysis, current variables, such as Ramadan or household income, are used to explain this decision. As a result, interpreting the meaning of present variables on a past decision is sometimes ambiguous.

6.6 Conclusion

In all, this study attempts to measure the socio-economic characteristics of borrowers who take up conventional and Islamic microfinance loans. An emphasis is placed on eliciting overall risk preferences and Islamic religiosity of borrowers in order to determine if Islamic clients embody alternative preferences compared to conventional borrowers. Contrary to theory, the results suggest that individuals who take up Islamic microfinance loans tend to have more risk-seeking preferences. Moreover, the results also indicate that individuals who take up Islamic microfinance loans are more religious. Overall, these findings are generally consistent when taking into account different measures of risk preferences and Islamic religiosity. To conclude, these preliminary results offer a glance at the relationship between Islamic microfinance take-up and risk preferences as well as Islamic religiosity.

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http://www.ifad.org/operations/projects/regions/pn/factsheets/nena_islamic.pdf.

Figure 1. NMB and DEF Branch Locations throughout Jordan
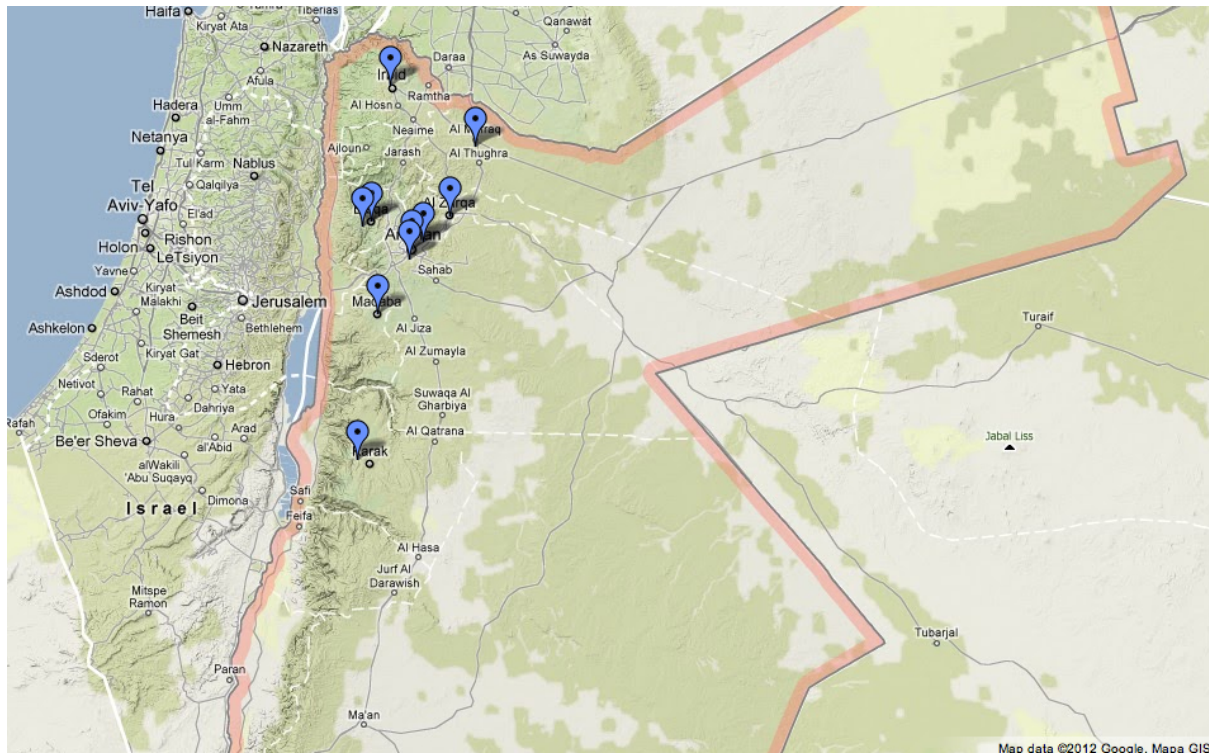
Table 1. Summary Statistics

	Total Sample				Conventional				Islamic				
Individual/Household	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	T-statistic*
Age	37.7	9.9	20	60	37.8	9.7	20	60	37.4	10.2	21	59	0.26
Gender (female=1)	0.8	0.4	0	1	0.9	0.3	0	1	0.4	0.5	0	1	-9.46***
Education	2.9	1.4	0	7	2.8	1.3	0	7	3.1	1.5	0	6	0.33
Business	0.5	0.5	0	1	0.5	0.5	0	1	0.5	0.5	0	1	0.07
Employment	0.6	0.5	0	1	0.5	0.5	0	1	0.6	0.5	0	1	-1.10
Household Income	414.6	288.4	0	2550	421.6	307.4	0	2550	401.8	251.1	100	1500	0.50
Loan size	941.4	847.1	200	3500	661.0	473.0	200	3500	1455.5	1106.3	500	3500	7.4***
Phone	0.8	0.4	0	1	0.6	0.5	0	1	1	0	1	1	-6.84***
Ramadan	0.7	0.5	0	1	0.6	0.5	0	1	0.9	0.2	0	1	-6.50***
Type of Borrower (1=Islamic)	0.35	0.5	0	1									
Risk Preferences													
Risk Index	0.01	0.4	-0.8	1.3	-0.02	0.4	-0.8	1.3	0.1	0.4	-0.8	1.1	-1.28
Business Risk	0.3	0.3	0	1	0.2	0.3	0.0	1.0	0.3	0.3	0.0	1.0	1.95*
Personal Risk	0.4	0.3	0	1	0.4	0.3	0.0	1.0	0.4	0.3	0.0	1.0	-1.40
Entrepreneurial Risk	0.5	0.3	0	1	0.5	0.3	0.0	1.0	0.5	0.3	0.0	1.0	-0.03
Religiosity													
Religion Index	0.01	0.3	-0.8	0.98	-0.03	0.3	-0.7	0.9	0.08	0.3	-0.8	0.98	-2.31**
Religious Practice	0.7	0.3	0	1	0.7	0.3	0	1	0.6	0.3	0	1	1.01
Literary Knowledge	0.3	0.2	0	1	0.2	0.3	0	1	0.3	0.2	0	1	-2.8***
Religious Attitude	0.8	0.3	0	1	0.8	0.2	0	1	0.8	0.3	0	1	.27
Financial Attitude	0.4	0.3	0	1	0.4	0.5	0	1	0.4	0.5	0.0	1	-0.75

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Loan size and household income reported in Jordanian Dinars.

Figure 2A. 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
Total Sample	8	11	66	86	26	2	21	1
Conventional	6	8	43	56	19	1	9	1
Islamic	2	3	23	30	7	1	12	0
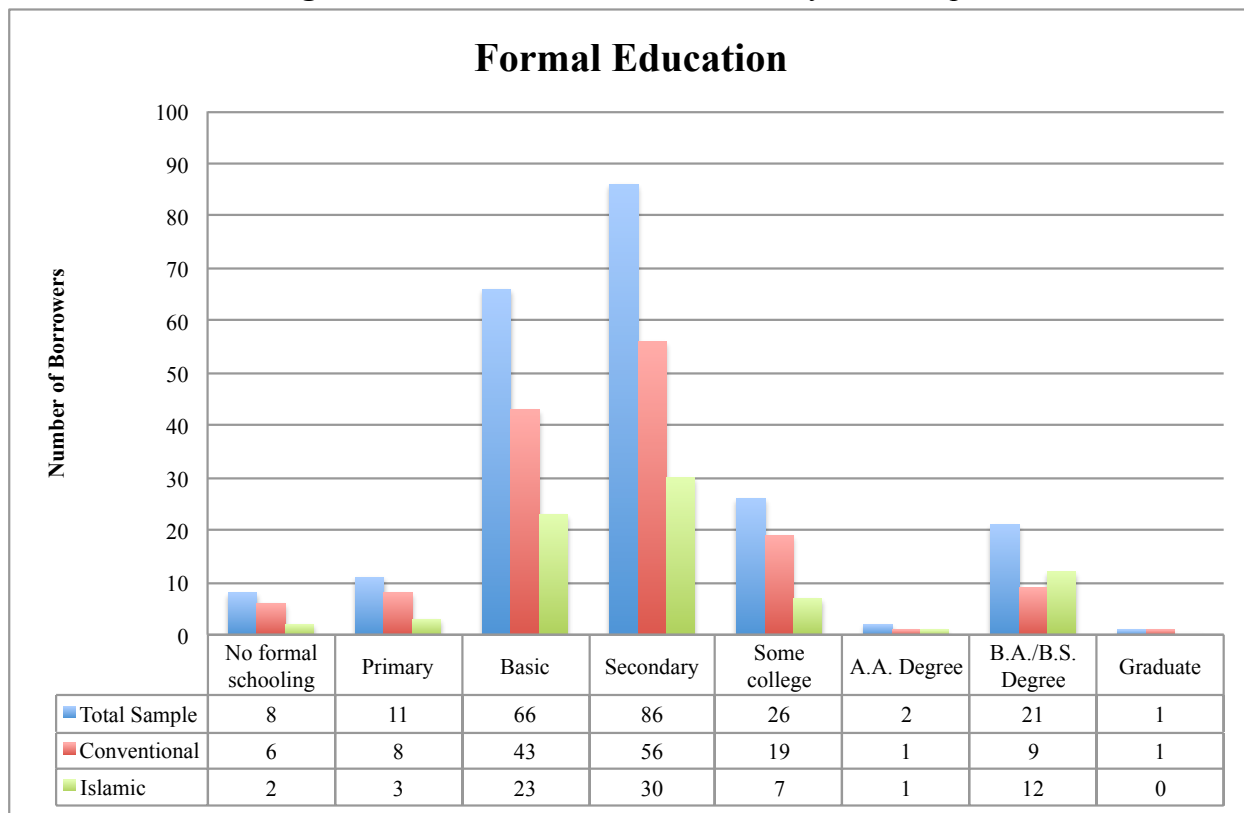
Figure 2B. Percentage Levels of Formal Education by Sub-Sample

Formal Education

	No formal schooling	Primary	Basic	Secondary	Some college	A.A. Degree	B.A./B.S. Degree	Graduate
Total Sample	3.62	4.98	29.86	38.91	11.76	0.9	9.5	0.45
Conventional	4.2	5.59	30.07	39.16	13.29	0.7	6.29	0.7
Islamic	2.56	3.85	29.49	38.46	8.97	1.28	15.38	0

33
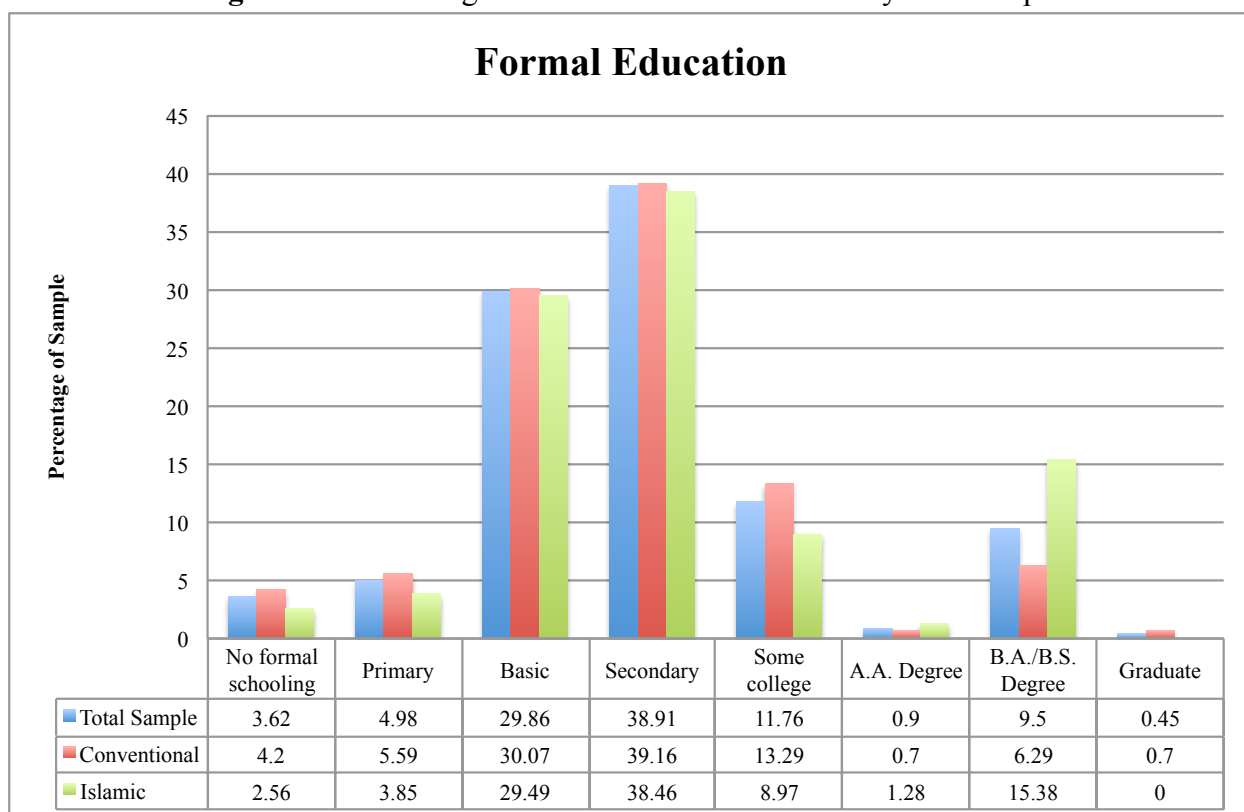
Figure 3A. Risk PCA Factors across Conventional and Islamic Borrowers
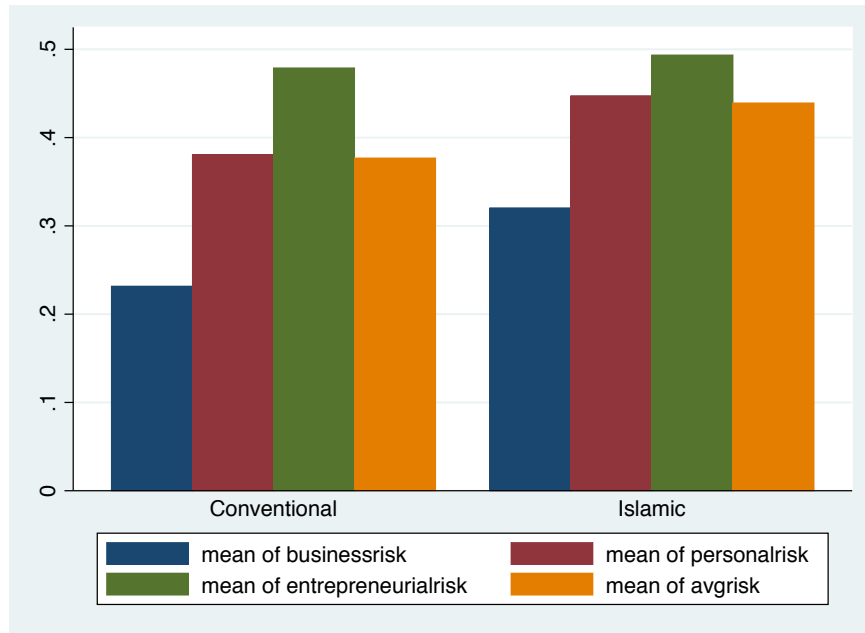
Figure 3B. Islamic Religiosity PCA Factors across Conventional and Islamic Borrowers
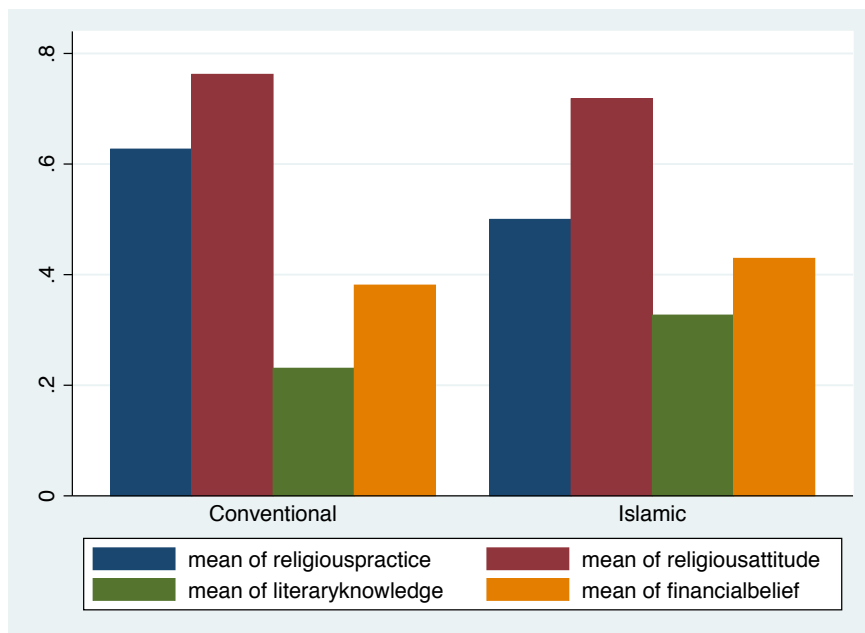
Figure 4A. Risk Summary Index Averages across Conventional and Islamic Borrowers

Figure 4B. Religion Summary Index Averages across Conventional and Islamic Borrowers
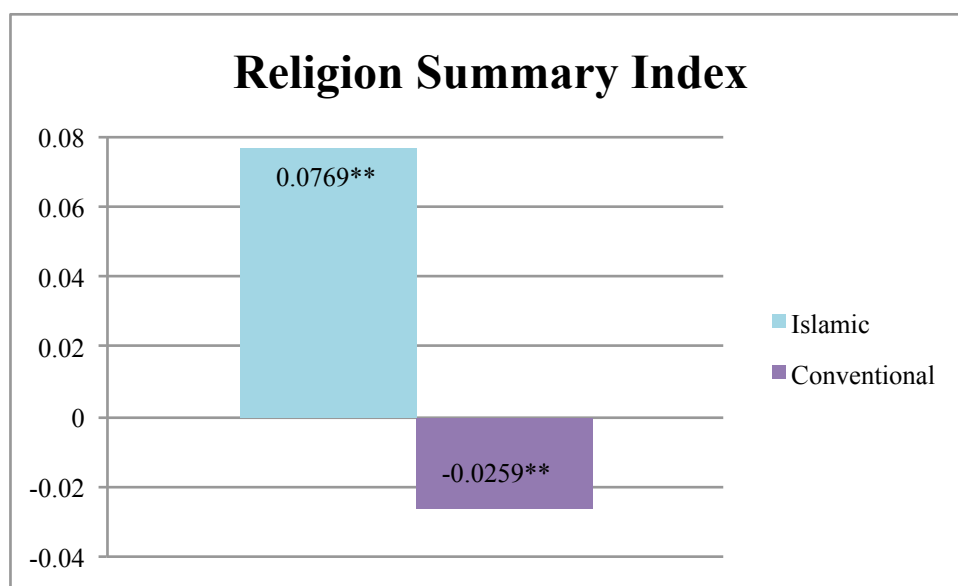
Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

Table 2. Correlation Matrix with Risk Preference and Religiosity Questions

	Risk1	Risk2	Risk3	Risk4	Risk5	Risk6	Risk7	Risk8	Risk9
Religion1	0.0705	-0.0897	-0.0125	-0.2538	-0.0131	-0.0355	-0.1215	0.0174	-0.0006
Religion2	-0.0225	-0.0636	0.0614	0.0495	0.0112	-0.0766	-0.0607	-0.0127	-0.0897
Religion3	-0.1211	-0.0023	-0.146	-0.0341	0.0709	-0.1012	-0.122	0.1251	-0.1747
Religion4	0.1535	0.0156	0.0543	-0.098	0.0175	0.1458	0.04	-0.1819	0.1082
Religion5	-0.1014	-0.1034	-0.0385	-0.0664	0.0385	0.0136	-0.1085	-0.185	-0.0127
Religion6	-0.0382	-0.0619	-0.0767	-0.0758	-0.1702	0.0572	-0.055	-0.0321	0.1173
Religion7	0.0054	0.0126	-0.0755	-0.186	-0.1227	-0.0099	0.0345	0.0912	-0.028
Religion8	0.0341	-0.0544	-0.0644	-0.0875	-0.1664	0.0355	0.0715	0.1137	0.0006
Religion9	-0.1125	-0.0844	-0.242	-0.0506	-0.0053	0.1672	-0.1309	-0.0462	-0.0097
Religion10	0.0245	0.0045	-0.1221	0.0287	-0.1301	-0.0912	0.0059	0.0128	0.0437
Religion11	-0.0173	-0.1384	-0.0044	-0.0125	0.0044	-0.0185	-0.1222	-0.1773	0.119
Religion12	-0.0971	-0.1591	-0.0394	-0.0133	0.0394	-0.0521	-0.0434	-0.1134	0.0127

Table 3. Linear Probability Model with Principal Component Analysis: Risk Factors

	(1)	(2)	(3)	(4)	(5)	(6)
	Islamic	Islamic	Islamic	Islamic	Islamic	Islamic
Business Risk	0.146			0.142		
	(1.57)			(1.54)		
Personal Risk		0.118			0.131	
		(1.26)			(1.42)	
Entrepreneurial Risk			-0.058			-0.051
			(0.66)			(0.58)
Ramadan				0.180	0.188	0.180
				(2.66)***	(2.74)***	(2.66)***
Literary Knowledge	0.289	0.309	0.273	0.268	0.289	0.251
	(2.49)**	(2.59)**	(2.32)**	(2.31)**	(2.42)**	(2.14)**
Gender (female=1)	-0.188	-0.197	-0.201	-0.189	-0.198	-0.202
	(2.14)**	(2.23)**	(2.21)**	(2.13)**	(2.22)**	(2.20)**
Education	0.026	0.017	0.013	0.021	0.011	0.008
	(1.03)	(0.67)	(0.52)	(0.84)	(0.45)	(0.33)
Age	-0.002	-0.003	-0.003	-0.002	-0.003	-0.004
	(0.52)	(0.86)	(0.96)	(0.73)	(1.09)	(1.18)
Employment	0.098	0.080	0.082	0.096	0.077	0.081
	(1.69)*	(1.36)	(1.43)	(1.67)*	(1.32)	(1.43)
Household head	0.040	0.038	0.031	0.038	0.036	0.029
	(0.47)	(0.44)	(0.35)	(0.43)	(0.42)	(0.33)
Owns Business	0.113	0.112	0.141	0.117	0.116	0.145
	(1.70)*	(1.68)*	(2.12)**	(1.78)*	(1.75)*	(2.18)**
Phone	0.430	0.433	0.451	0.312	0.309	0.332
	(5.87)***	(5.94)***	(6.21)***	(3.80)***	(3.70)***	(4.05)***
Log loansize	-0.004	-0.004	0.017	-0.004	-0.004	0.016
	(0.06)	(0.06)	(0.27)	(0.07)	(0.06)	(0.25)
Log household income	-0.020	-0.003	-0.013	-0.030	-0.013	-0.022
	(0.37)	(0.05)	(0.23)	(0.54)	(0.23)	(0.40)
Constant	0.064	0.025	0.026	0.132	0.086	0.091
	(0.13)	(0.05)	(0.05)	(0.26)	(0.17)	(0.18)
R^2	0.26	0.25	0.25	0.28	0.27	0.27
Observations	216	215	217	216	215	217

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. T-statistics reported in parentheses. Loan size reported in Jordanian Dinars.

Table 4. Linear Probability Model with Principal Component Analysis: Religion Factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Islamic	Islamic	Islamic	Islamic	Islamic	Islamic	Islamic	Islamic
Financial Belief	-0.02				-0.061			
	(0.32)				(0.92)			
Religious Practice		-0.208				-0.22		
		(2.51)**				(2.66)***		
Religious Attitude			-0.105				-0.166	
			(1.04)				(1.68)*	
Literary Knowledge				0.253				0.232
				(2.16)**				(1.98)**
Ramadan					0.218	0.209	0.23	0.184
					(2.89)***	(3.32)***	(3.39)***	(2.73)***
Gender (female=1)	-0.212	-0.206	-0.219	-0.197	-0.215	-0.206	-0.224	-0.198
	(2.28)**	(2.23)**	(2.37)**	(2.16)**	(2.30)**	(2.22)**	(2.42)**	(2.15)**
Education	0.023	0.017	0.024	0.02	0.016	0.01	0.017	0.015
	(0.92)	(0.67)	(0.94)	(0.79)	(0.66)	(0.41)	(0.68)	(0.58)
Age	-0.002	-0.002	-0.002	-0.003	-0.003	-0.003	-0.003	-0.004
	(0.77)	(0.76)	(0.75)	(1.02)	(1.03)	(1.04)	(1.04)	(1.25)
Employment	0.099	0.107	0.102	0.086	0.096	0.104	0.1	0.085
	(1.72)*	(1.86)*	(1.77)*	(1.5)	(1.68)*	(1.85)*	(1.77)*	(1.5)
Household head	0.019	0.016	0.015	0.026	0.016	0.014	0.01	0.024
	(0.22)	(0.18)	(0.17)	(0.3)	(0.18)	(0.16)	(0.12)	(0.27)
Owns Business	0.138	0.147	0.132	0.137	0.145	0.152	0.134	0.141
	(2.05)**	(2.23)**	(1.97)*	(2.07)**	(2.18)**	(2.32)**	(2.01)**	(2.14)**
Phone	0.458	0.456	0.452	0.449	0.319	0.318	0.297	0.328
	(6.20)***	(6.25)***	(6.18)***	(6.19)***	(3.77)***	(4.09)***	(3.61)***	(3.98)***
Log loansize	0.01	-0.001	0.005	0.011	0.01	-0.003	0.002	0.01
	(0.15)	(0.02)	(0.08)	(0.17)	(0.16)	(0.04)	(0.03)	(0.16)
Log household income	-0.009	-0.008	-0.004	-0.011	-0.023	-0.02	-0.014	-0.021
	(0.16)	(0.15)	(0.07)	(0.19)	(0.41)	(0.35)	(0.25)	(0.37)
Constant	0.055	0.243	0.139	0.018	0.146	0.332	0.276	0.088
	(0.11)	(0.46)	(0.27)	(0.04)	(0.29)	(0.64)	(0.54)	(0.18)
R^2	0.25	0.27	0.26	0.27	0.27	0.29	0.28	0.29
Observations	219	219	219	219	219	219	219	219

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. T-statistics reported in parentheses. Loan size reported in Jordanian Dinars.

Table 5. Linear Probability Regression with Risk Summary Index

VARIABLES	(1) Islamic	(2) Islamic	(3) Islamic	(4) Islamic	(5) Islamic	(6) Islamic
Risk Index	0.100	0.114	0.064	0.071	0.072	0.074
	(0.078)	(0.078)	(0.063)	(0.068)	(0.065)	(0.068)
Branch 1 = Baqa'a		0.049	0.115	0.029	0.161	0.074
		(0.041)	(0.122)	(0.089)	(0.125)	(0.097)
Branch 3 = Irbid		0.416***	0.008	-0.107	0.045	-0.068
		(0.085)	(0.142)	(0.108)	(0.144)	(0.115)
Branch 4 = Karak		0.379***	0.093	-0.073	0.152	-0.008
		(0.105)	(0.151)	(0.117)	(0.152)	(0.125)
Branch 5 = Madaba		0.431***	0.172	0.058	0.204	0.093
		(0.125)	(0.167)	(0.133)	(0.165)	(0.135)
Branch 6 = Amman		0.425***	0.129	0.016	0.165	0.057
		(0.070)	(0.132)	(0.089)	(0.133)	(0.099)
Branch 7 = Salt		0.038	-0.058	-0.152	-0.150	-0.244**
		(0.035)	(0.133)	(0.096)	(0.130)	(0.099)
Branch 8 = Zarqa		0.464***	0.152	0.033	0.190	0.068
		(0.084)	(0.139)	(0.102)	(0.140)	(0.108)
Gender (female=1)			-0.404***	-0.413***	-0.396***	-0.398***
			(0.076)	(0.079)	(0.075)	(0.078)
Education			-0.050	-0.041	-0.050	-0.043
			(0.058)	(0.066)	(0.054)	(0.061)
Age			-0.025	-0.027	-0.027	-0.029
			(0.021)	(0.022)	(0.020)	(0.021)
Education Squared			0.008	0.008	0.008	0.008
			(0.009)	(0.010)	(0.008)	(0.009)
Age Squared			0.000	0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
Log household income			-0.035	-0.049	-0.042	-0.054
			(0.035)	(0.044)	(0.035)	(0.045)
Log loan size			0.188***	0.183***	0.178***	0.174***
			(0.053)	(0.052)	(0.048)	(0.047)
Employment			0.057	0.059	0.065	0.067
			(0.053)	(0.053)	(0.051)	(0.051)
Business			0.003	0.005	0.006	0.011
			(0.058)	(0.060)	(0.057)	(0.059)
Phone			0.326***	0.328***	0.143*	0.151**
			(0.065)	(0.064)	(0.075)	(0.075)
Time Preference Index				0.017		0.015
				(0.071)		(0.068)
Ramadan					0.250***	0.246***
					(0.067)	(0.068)
Constant	0.348***	-0.033	-0.238	-0.031	-0.152	0.025
	(0.033)	(0.031)	(0.566)	(0.597)	(0.553)	(0.587)
Observations	212	212	212	202	212	202
R-squared	0.008	0.080	0.484	0.485	0.513	0.514

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Robust standard errors in parentheses. Branch 2 (Deir Allah) not included because of collinearity. Branch 6 (Amman) consists of Wehdat, Marka, and West Amman branches. Loan size reported in Jordanian Dinars. Percentile-t method used as a standard error check for asymptotic refinement.

Table 6. Linear Probability Model with Religion Summary Index

VARIABLES	(1) Islamic	(2) Islamic	(3) Islamic	(4) Islamic	(5) Islamic
Religion Index	0.260**	0.295**	0.194**	0.161*	0.144*
	(0.118)	(0.117)	(0.088)	(0.090)	(0.084)
Branch 1 = Baqa'a		0.007	0.127		0.188
		(0.029)	(0.124)		(0.127)
Branch 3 = Irbid		0.377***	0.016	-0.158	0.065
		(0.085)	(0.138)	(0.104)	(0.141)
Branch 4 = Karak		0.334***	0.100	-0.119	0.156
		(0.097)	(0.147)	(0.109)	(0.149)
Branch 5 = Madaba		0.434***	0.187	0.032	0.230
		(0.120)	(0.163)	(0.119)	(0.162)
Branch 6 = Amman		0.384***	0.145	-0.019	0.187
		(0.066)	(0.128)	(0.079)	(0.131)
Branch 7 = Salt		-0.017	-0.067	-0.205**	-0.145
		(0.026)	(0.127)	(0.091)	(0.125)
Branch 8 = Zarqa		0.443***	0.203	0.036	0.240*
		(0.087)	(0.137)	(0.091)	(0.138)
Gender (female=1)			-0.408***	-0.415***	-0.386***
			(0.083)	(0.086)	(0.081)
Education			-0.043	-0.030	-0.053
			(0.067)	(0.074)	(0.061)
Age			-0.030	-0.035	-0.026
			(0.020)	(0.021)	(0.020)
Education Squared			0.007	0.006	0.008
			(0.010)	(0.011)	(0.009)
Age Squared			0.000	0.000*	0.000
			(0.000)	(0.000)	(0.000)
Log household income			-0.045	-0.079	-0.049
			(0.042)	(0.052)	(0.039)
Log loan size			0.179***	0.181***	0.171***
			(0.058)	(0.057)	(0.053)
Employment			0.019	0.015	0.028
			(0.052)	(0.052)	(0.051)
Business			-0.004	0.009	-0.005
			(0.060)	(0.063)	(0.060)
Phone			0.296***	0.305***	0.108
			(0.065)	(0.065)	(0.066)
Time Preference Index				0.045	
				(0.072)	
Ramadan					0.266***
					(0.063)
Constant	0.330***	-0.011	-0.039	0.337	-0.097
	(0.033)	(0.020)	(0.591)	(0.628)	(0.570)
Observations	196	196	196	186	196
R-squared	0.027	0.116	0.499	0.499	0.529

Note: * *p*<0.1; ** *p*<0.05; *** *p*<0.01. Robust standard errors in parentheses. Branch 2 (Deir Allah) not included because of collinearity. Branch 6 (Amman) consists of Wehdat, Marka, and West Amman branches. Loan size reported in Jordanian Dinars. Percentile-t method used as a standard error check for asymptotic refinement.

Table 7. Linear Probability Model with Summary Index: Risk and Religion

VARIABLES	(1) Islamic	(2) Islamic	(3) Islamic	(4) Islamic	(5) Islamic	(6) Islamic	(7) Islamic
Risk Index	0.139*	0.150*	0.111	0.121*	0.113*	0.107	0.121*
	(0.079)	(0.079)	(0.067)	(0.072)	(0.068)	(0.069)	(0.073)
Religion Index	0.299**	0.339***	0.244***	0.216**	0.193**	0.242**	0.166*
	(0.118)	(0.119)	(0.093)	(0.095)	(0.089)	(0.093)	(0.092)
Branch 1 = Baqa'a		0.062	0.176		0.232	0.174	
		(0.052)	(0.139)		(0.141)	(0.140)	
Branch 3 = Irbid		0.408***	0.043	-0.187*	0.089	0.040	-0.186*
		(0.094)	(0.153)	(0.110)	(0.155)	(0.155)	(0.105)
Branch 4 = Karak		0.340***	0.092	-0.204*	0.148	0.091	-0.193*
		(0.107)	(0.159)	(0.112)	(0.161)	(0.160)	(0.103)
Branch 5 = Madaba		0.415***	0.204	-0.018	0.245	0.204	-0.027
		(0.131)	(0.175)	(0.124)	(0.173)	(0.176)	(0.115)
Branch 6 = Amman		0.412***	0.166	-0.055	0.206	0.163	-0.061
		(0.080)	(0.142)	(0.085)	(0.144)	(0.146)	(0.077)
Branch 7 = Salt		0.017	-0.041	-0.242**	-0.132	-0.043	-0.385***
		(0.053)	(0.144)	(0.101)	(0.142)	(0.146)	(0.098)
Branch 8 = Zarqa		0.478***	0.229	0.007	0.264*	0.225	-0.013
		(0.096)	(0.150)	(0.098)	(0.150)	(0.153)	(0.087)
Gender (female=1)			-0.418***	-0.427***	-0.398***	-0.414***	-0.402***
			(0.082)	(0.084)	(0.081)	(0.083)	(0.084)
Education			-0.052	-0.037	-0.062	-0.053	-0.051
			(0.069)	(0.073)	(0.065)	(0.069)	(0.070)
Age			-0.025	-0.028	-0.022	-0.024	-0.024
			(0.022)	(0.022)	(0.021)	(0.022)	(0.022)
Education Squared			0.008	0.007	0.009	0.008	0.009
			(0.010)	(0.011)	(0.009)	(0.010)	(0.010)
Age Squared			0.000	0.000	0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log household income			-0.033	-0.065	-0.041	-0.033	-0.067
			(0.042)	(0.055)	(0.040)	(0.043)	(0.055)
Log loan size			0.170***	0.167***	0.164***	0.171***	0.162***
			(0.054)	(0.050)	(0.049)	(0.055)	(0.046)
Employment			0.005	0.002	0.016	0.003	0.015
			(0.054)	(0.054)	(0.053)	(0.055)	(0.054)
Business			-0.028	-0.021	-0.027	-0.027	-0.019
			(0.061)	(0.063)	(0.060)	(0.061)	(0.062)
Phone			0.273***	0.284***	0.088	0.274***	0.102
			(0.066)	(0.065)	(0.069)	(0.066)	(0.066)
Time Preference Index				0.058			0.057
				(0.071)			(0.069)
Ramadan					0.262***		0.258***
					(0.062)		(0.063)
Risk-Religion Interaction						-0.047	0.057
						(0.219)	(0.218)
Constant	0.324***	-0.046	-0.131	0.276	-0.163	-0.147	0.263
	(0.033)	(0.046)	(0.608)	(0.631)	(0.592)	(0.613)	(0.628)
Observations	189	189	189	180	189	189	180
R-squared	0.044	0.128	0.495	0.505	0.525	0.495	0.534

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Robust standard errors in parentheses. Branch 2 (Deir Allah) not included because of collinearity. Branch 6 (Amman) consists of Wehdat, Marka, and West Amman branches. Loan size reported in Jordanian Dinars. Percentile-t method used as a check for asymptotic refinement.

APPENDIX A

Principal Component Analysis

One aspect of this study explores the various factors generated by the use of principal component analysis (PCA). The purpose of PCA is to combine a number of highly correlated variables into a smaller number of underlying dimensions or factors. The detailed results are presented in this appendix.

Section 1: Risk Preferences Measures

Table 8 shows the different components generated when using PCA in conjunction with the risk preference questions. It is sometimes contested when to retain a factor or not. In general, when the eigenvalue is greater than 1, the factor is retained. Therefore, according to Table 8, the first four risk factors would be retained. This idea is further justified by Figure 5, which displays the scree graph for this data. The scree graph plots eigenvalues against the component number. There is a horizontal line at the point where eigenvalues = 1, marking the usual cutoff for retaining principal components and also emphasizing the unimportance of other components (Hamilton, 2008).

Table 8. Principal Components Table for Risk Factors

Principal components/correlation			Number of obs = 212	
			Number of comp. = 9	
			Trace = 9	
Rotation (unrotated = principal)			Rho = 1.0000	
Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1		2.14579	.978552	0.2384	0.2384
Comp2		1.16724	.0975381	0.1297	0.3681
Comp3		1.0697	.0197047	0.1189	0.4870
Comp4		1.05	.186587	0.1167	0.6036
Comp5		.863413	.0241089	0.0959	0.6996
Comp6		.839304	.0981189	0.0933	0.7928
Comp7		.741185	.141862	0.0824	0.8752
Comp8		.599323	.0752877	0.0666	0.9418
Comp9		.524035	.	0.0582	1.0000

Figure 5. Scree plot of eigenvalues for risk factors
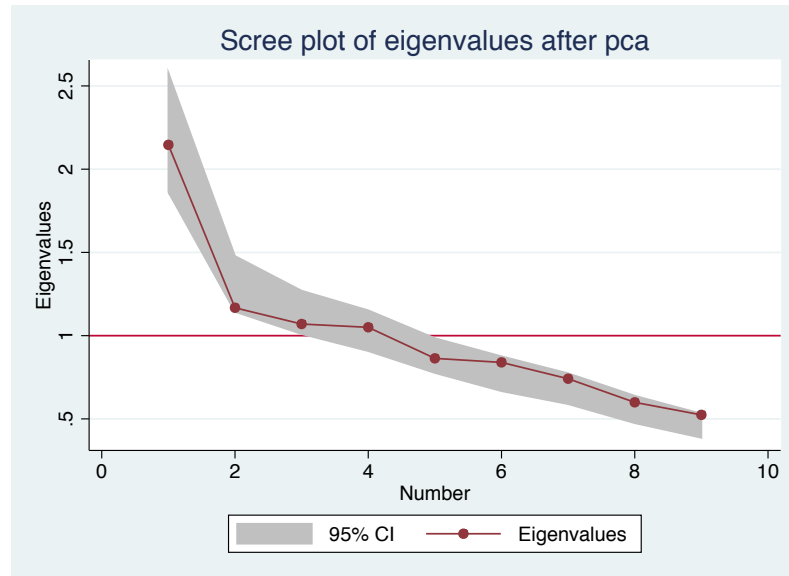
The rotated factor loadings matrix in Table 9 shows a simplified factor structure. In essence, this table clearly shows the relationship of each risk question to the new factors generated by PCA. The higher the load or the weight of the variable, the more important it is in defining that factor's dimensionality (Hamilton, 2008). For example, Factor 1 is most heavily weighted by risk questions 1, 2, and 8. It is possible to use this information to elicit an underlying theme for that factor. For the purposes of this research, Factor 4 was eliminated. Mainly, the reason for eliminating this factor is because the eigenvalue was the lowest of all four factors, and it was only comprised of one risk question. The rotated factor loadings matrix also shows a column labeled "uniqueness." These values explain the portion that is unique to the variable, and not shared with the other variables created through PCA (Hamilton, 2008).

Table 9. Rotated factors loadings matrix for risk factors

Rotated factor loadings (pattern matrix) and unique variances			
Variable	Factor1	Factor2	Factor3	Uniqueness
risk1	0.6349	0.2644	-0.1003	0.5169
risk2	0.7334	0.1757	-0.1053	0.4201
risk3	0.1285	0.6472	0.0544	0.5617
risk4	0.1159	0.6135	-0.1153	0.5969
risk5	0.4099	0.0557	-0.5875	0.4838
risk6	0.1223	-0.0054	0.8333	0.2906
risk7	0.0685	0.7576	-0.0183	0.421
risk8	0.7615	-0.0457	0.1982	0.3787

Table 10. Principal Component Analysis Results: Risk Factors

Risk Factors			
	Personal Risk	Business Risk	Entrepreneurial Risk
	You need to take risks to make money	Try new but unproven business ideas	Try new things often
Components	Admire people who take risks	Take same risk next time if initially successful	Start a new business based on friend's success
	It is better to be risky when making important business decisions	More important to be bold overall	

Table 10 shows the three factors and each of the items that comprise the factors. For the most part, each of the components are related to one other, and one is usually able to elicit a theme among each factor. Using this information, it is possible are able to label the factors as personal risk, business risk, and entrepreneurial risk. When using PCA, varimax orthogonal rotation is the default setting. This means that each of the factors that are produced are orthogonal and uncorrelated to one another (Hamilton, 2008). It is easily observable that there is the potential for overlap in terms of the risk questions that comprise each of the factors. This sometimes makes it difficult to label the factors as unique from one another. PCA has been criticized for being open to interpretability in this regard.

Section 2: Islamic Religiosity Measures

Table 11 shows the different components generated when using PCA in conjunction with the Islamic religiosity questions. When conducting PCA for religiosity factors, there are similar issues as for the risk factors. Again, it is contested as to when a factor should be retained or not. The same scale is utilized: when the eigenvalue is greater than 1, the factor is retained. Therefore, according to Table 11, the first four risk factors would be retained. This idea is further justified by Figure 6, which displays the scree graph for this data. At the horizontal line where eigenvalues = 1, four factors have eigenvalues greater than 1, and five factors have eigenvalues lower than 1.

Table 11. Principal Components table for Islamic religiosity factors

Principal components/correlation			Number of obs = 221	
			Number of comp. = 9	
			Trace = 9	
Rotation (unrotated = principal)			Rho = 1.0000	
Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.05049	.566894	0.2278	0.2278
Comp2	1.4836	.222631	0.1648	0.3927
Comp3	1.26097	.245922	0.1401	0.5328
Comp4	1.01505	.116294	0.1128	0.6456
Comp5	.898753	.116554	0.0999	0.7454
Comp6	.782199	.0899208	0.0869	0.8323
Comp7	.692278	.0961394	0.0769	0.9093
Comp8	.596139	.375616	0.0662	0.9755
Comp9	.220523	.	0.0245	1.0000

Figure 6. Scree plot of eigenvalues for Islamic religiosity factors
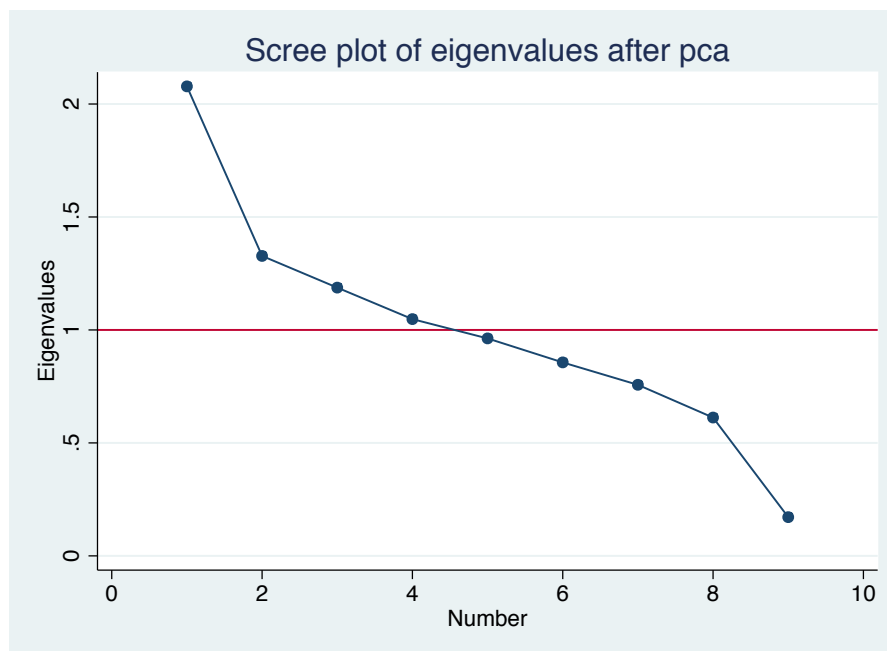
The rotated factor loadings matrix in Table 12 displays the simplified factor structure. In essence, this table clearly shows the relationship of each religiosity question to the new factors generated by PCA. Similar to the risk factors, the higher the load or the weight of the variable, the more important it is in defining that factor's dimensionality. For example, Factor 1 is most heavily weighted by religion questions 8 and 9. It is possible to use this information to elicit an underlying theme for that factor.

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Table 12. Rotated factor loadings matrix for Islamic religiosity factors

Rotated factor loadings (pattern matrix) and unique variances					
Variable	Factor1	Factor2	Factor3	Factor4	Uniqueness
religion1	0.3692	0.3003	0.1897	0.4679	0.5186
religion2	0.2082	0.2016	-0.3578	0.7634	0.2053
religion3	0.4611	0.1671	-0.6500	-0.1136	0.3240
religion4	-0.3037	-0.0920	0.6521	0.3324	0.3636
religion5	0.4764	0.4264	0.2013	-0.2461	0.4902
religion6	0.3011	0.5082	0.3528	-0.1116	0.5142
religion7	0.2527	0.6140	0.1453	-0.1300	0.5212
religion8	0.7738	-0.5075	0.1244	-0.0003	0.1283
religion9	0.7654	-0.4918	0.2183	0.0072	0.1246

Table 13. Principal Component Analysis Results: Religiosity Factors

	Islamic Religiosity Factors			
	Financial beliefs	Religious Practice	Religious Attitudes	Literary Knowledge
	Against interest rates	Prefer Islamic finance	Read Qur'an	Read Qur'an on a daily basis
Components	Religious reasons	Consult a sheikh to verify validity of a loan	Prefer Islamic schooling	Read Qur'an in Ramadan
	Seek advice from a sheikh			

Table 13 indicates the four factors and each of the items that comprise the factors. The results indicate that each of the components are related to one other, and it is possible to elicit a theme among each factor. Using this information, it is possible to label the factors as financial beliefs, religious practice, religious attitudes, and literary knowledge. With PCA, varimax orthogonal rotation is the default setting. This means that each of these factors are orthogonal and uncorrelated to one another. Similar to the issue with risk factors, there is the potential for overlap in terms of the questions that comprise each of the factors (Hamilton, 2008).

APPENDIX B

Bargaining Power

To further examine the disparity between gender participation in conventional and Islamic microfinance, an index was created using questions on bargaining power. These questions explore intra-household decision-making. More specifically, the questions are related to decision-making regarding the choice to take out a loan, small and large purchases, and who has the final say on household decisions in general. To create the index, the same steps for summary index are utilized, taking into account the weighted average of several standardized outcomes. In this case, a positive value for the bargaining power index indicates that the individual has more bargaining power in the household. The purpose of this index is to obtain additional information regarding the differences between males and females who participate in microfinance. Moreover, the goal is to see if there are differences in bargaining power across conventional and Islamic microfinance, especially since the results uniformly show that women are much more likely to participate in conventional microfinance.

The results for bargaining power are shown in Table 14. From the table, bargaining power index does not show any significant effect on the take-up of Islamic microfinance loans. When bargaining power is tested only in conjunction with branches, there is some significance. When demographic controls are included, however, the significance disappears. In addition, there is no change in the coefficient interpretations or level of significance for both the risk and religiosity variables despite the addition of the bargaining power index.

Table 14. Linear Probability Model with Summary Index: Bargaining Power

VARIABLES	(1) Islamic	(2) Islamic	(3) Islamic	(4) Islamic	(5) Islamic	(6) Islamic	(7) Islamic
Risk Index	0.149*	0.163**	0.116*	0.126*	0.116*	0.113	0.123*
	(0.078)	(0.078)	(0.068)	(0.073)	(0.068)	(0.070)	(0.073)
Religion Index	0.307**	0.353***	0.249***	0.220**	0.197**	0.247**	0.170*
	(0.119)	(0.121)	(0.094)	(0.096)	(0.090)	(0.095)	(0.093)
Bargaining Power Index	-0.150	-0.190**	-0.085	-0.088	-0.049	-0.085	-0.051
	(0.098)	(0.092)	(0.072)	(0.073)	(0.068)	(0.072)	(0.069)
Branch 1 = Baqa'a		0.068	0.172		0.228	0.170	
		(0.076)	(0.137)		(0.141)	(0.139)	
Branch 3 = Irbid		0.411***	0.049	-0.173*	0.091	0.045	-0.178*
		(0.095)	(0.156)	(0.099)	(0.157)	(0.158)	(0.100)
Branch 4 = Karak		0.338***	0.095	-0.192*	0.147	0.094	-0.186*
		(0.105)	(0.162)	(0.101)	(0.163)	(0.163)	(0.098)
Branch 5 = Madaba		0.415***	0.209	-0.006	0.246	0.208	-0.019
		(0.132)	(0.179)	(0.119)	(0.176)	(0.180)	(0.114)
Branch 6 = Amman		0.434***	0.179	-0.035	0.212	0.175	-0.049
		(0.082)	(0.146)	(0.073)	(0.147)	(0.149)	(0.073)
Branch 7 = Salt		0.001	-0.047	-0.243***	-0.133	-0.049	-0.380***
		(0.057)	(0.146)	(0.085)	(0.144)	(0.147)	(0.093)
Branch 8 = Zarqa		0.484***	0.237	0.021	0.267*	0.232	-0.004
		(0.097)	(0.153)	(0.087)	(0.153)	(0.156)	(0.083)
Gender (female=1)			-0.409***	-0.418***	-0.393***	-0.405***	-0.397***
			(0.084)	(0.087)	(0.082)	(0.086)	(0.086)
Education			-0.049	-0.039	-0.060	-0.050	-0.052
			(0.069)	(0.073)	(0.065)	(0.069)	(0.070)
Age			-0.026	-0.029	-0.022	-0.026	-0.025
			(0.022)	(0.023)	(0.022)	(0.022)	(0.022)
Education Squared			0.008	0.007	0.009	0.008	0.009
			(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Age Squared			0.000	0.000	0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log household income			-0.034	-0.065	-0.041	-0.034	-0.067
			(0.042)	(0.055)	(0.040)	(0.042)	(0.054)
Log loan size			0.172***	0.169***	0.165***	0.173***	0.163***
			(0.057)	(0.053)	(0.051)	(0.057)	(0.048)
Employment			0.003	-0.001	0.014	0.001	0.013
			(0.053)	(0.053)	(0.053)	(0.054)	(0.053)
Business			-0.021	-0.012	-0.023	-0.020	-0.013
			(0.062)	(0.064)	(0.061)	(0.062)	(0.064)
Phone			0.266***	0.277***	0.090	0.267***	0.105
			(0.065)	(0.064)	(0.069)	(0.065)	(0.067)
Time Preference Index				0.057			0.057
				(0.072)			(0.07)
Ramadan					0.253***		0.248***
					(0.064)		(0.064)
Risk-Religion Interaction						-0.050	0.053
						(0.222)	(0.219)
Constant	0.321***	-0.056	-0.126	0.270	-0.160	-0.144	0.259
	(0.033)	(0.047)	(0.617)	(0.640)	(0.599)	(0.621)	(0.634)
Observations	189	189	189	180	189	189	180
R-squared	0.057	0.148	0.499	0.509	0.526	0.499	0.535

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Robust standard errors in parentheses. Branch 2 (Deir Allah) not included because of collinearity. Branch 6 (Amman) consists of Wehdat, Marka, and West Amman branches. Loan size reported in Jordanian Dinars. Percentile-t method used as a check for asymptotic refinement.