



**AKHUWAT MICROFINANCE: PARTICIPATION,
IMPACT AND GENDER-BASED HETEROGENEITY
IN BUSINESS RETURNS**

Maazullah

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Heterogeneity in Business Returns**

**MICROFINANCIERING DOOR AKHUWAT:
PARTICIPATIE, IMPACT EN GENDERGERELATEERDE
HETEROGENITEIT IN BEDRIJFSOPBRENGSTEN**

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Dedication

To my Family



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Abstract

AKHUWAT MICROFINANCE: PARTICIPATION, IMPACT AND GENDER-BASED HETEROGENEITY IN BUSINESS RETURNS - Maazullah

We conducted this research in collaboration with Akhuwat – a microfinance organization in Pakistan which provides interest free loans to the poor. The research findings are reported in three core essays.

The *first* essay explores reasons of non-participation in Akhuwat microfinance. Overall, microfinance has played an important role in providing basic financial services to the poor. Nonetheless, despite being a popular and well funded innovation, a large number of marginalized poor still do not participate in microfinance programs. It is still not clear whether this failure is because of institutional barriers or self-exclusion by the poor. While supply side barriers to participation are well researched in literature, the demand side is still a puzzle. This essay investigates this puzzle by exploring reasons of non-participation in Akhuwat's microcredit program by comparing group of Applicants and Eligible-non-Applicants. We find that besides personality, both exogenous and endogenous learning significantly affect participation. Our analysis also reveals that when individuals perceive microfinance institutions' loan recovery methods to be coercive or high handed, it significantly reduces the probability of participation.

The *second* essay examines the effectiveness of Akhuwat microcredit. Lately, in the wake of mixed research findings and media reports about suicide of microfinance borrowers in India, there has been an immense debate on the usefulness of microfinance. In this essay, we estimate return to marginal capital which is a good measure for poor's affordability of microfinance loans. In order to remove selection bias, we use an experimental design in which we randomly assign microentrepreneurs to treatment and control groups. The treatment group receives an interest

free loan from Akhuwat. We find that Akhuwat's microfinance really helps. Both monthly profits and capital stock of treatment group significantly increase. Using randomized treatment as an instrument for capital stock, the estimated returns to capital are in the range of 103.2% to 142.8% which are very high compared to market interest rates in Pakistan.

The *third* essay investigates gender-based heterogeneity in treatment effects. It is generally believed that, compared to men, women entrepreneurs are more credit constrained and hence are able to generate relatively higher returns to capital. Recent randomized studies though do not support this theory. Women entrepreneurs in our sample earn 20% less in monthly profits than men. We find that purdah (*veil*), an institution which potentially limits women's access to labor markets, is associated with lower monthly profits. We also find that the labor market price personality traits differently across genders. Though exhibiting large and significant heterogeneity, both male and female entrepreneurs benefit from access to additional capital.



Samenvatting

MICROFINANCIERING DOOR AKHUWAT: PARTICIPATIE, IMPACT EN GENDERGERELATEERDE HETEROGENITEIT IN BEDRIJFSOPBRENGSTEN

Dit onderzoek is uitgevoerd in samenwerking met Akhuwat – een microfinancieringsinstelling in Pakistan die rentevrije leningen vertrekt aan de armen. De onderzoeksresultaten worden beschreven in drie essays.

Het *eerste* essay gaat over redenen om geen gebruik te maken van microfinanciering door Akhuwat. Microfinanciering speelt over het algemeen een belangrijke rol bij het verlenen van elementaire financiële diensten aan de armen. Maar hoewel microfinancieringsprogramma's populair zijn en er veel geld naartoe gaat, maken grote aantallen gemarginaliseerde armen er toch nog steeds geen gebruik van. Het is nog niet duidelijk of dit ligt aan institutionele belemmeringen of dat de armen zelf afzien van deelname. In de literatuur over microfinanciering is veel te vinden over belemmeringen aan de aanbodzijde, maar over de vraagkant is nog weinig bekend. Dit essay gaat daarom in op redenen om niet deel te nemen aan het microkredietprogramma van Akhuwat. Hiertoe is een groep aanvragers vergeleken met een groep die wel in aanmerking komt, maar geen microkrediet aanvraagt. Uit de resultaten blijkt dat behalve persoonlijkheidskenmerken, zowel exogene als endogene vormen van leren een significant effect op deelname hebben. Verder blijkt dat de kans op deelname significant daalt wanneer individuen invorderingsmethoden van de microfinancieringsinstelling dwingend of onsympathiek vinden.

Het *tweede* essay behandelt de effectiviteit van microkrediet van Akhuwat. Naar aanleiding van tegenstrijdige onderzoeksresultaten en verhalen in de media over zelfmoord onder ontvangers van microkredieten in India, staat het nut van microfinanciering de laatste tijd

behoorlijk ter discussie. In dit onderzoek wordt een schatting gemaakt van de opbrengst van het marginaal kapitaal, wat een goede maat is voor de betaalbaarheid van microkredieten voor de armen. Om selectie-effecten te vermijden is een onderzoeksopzet gekozen waarin micro-ondernemers aselekt worden toegewezen aan experimentele en controlegroepen. De experimentele groep ontvangt een renteloze lening van Akhuwat. Uit het onderzoek blijkt dat microfinanciering door Akhuwat echt helpt. Zowel de maandelijkse winst als de kapitaalvoorraad van de experimentele groep neemt significant toe. Met aselechte toewijzing als instrument voor kapitaalvoorraad ligt de geschatte kapitaalopbrengst tussen de 103,2% en 142,8%, wat erg hoog is in vergelijking met marktrentes in Pakistan.

Het *derde* essay betreft gendergerelateerde heterogeniteit in de effecten van de interventie. In het algemeen wordt aangenomen dat vrouwelijke ondernemers moeilijker aan krediet kunnen komen dan mannen en daarom een relatief hogere kapitaalopbrengst kunnen realiseren. In recent gerandomiseerd onderzoek is echter geen steun gevonden voor deze theorie. De maandelijkse winst van vrouwelijke ondernemers in onze steekproef is 20% lager dan die van mannen. Uit het onderzoek blijkt dat *purdah* (*sluier*), een gedragscode waardoor vrouwen potentieel beperktere toegang tot de arbeidsmarkt hebben, samenhangt met een lagere maandelijkse winst. Ook blijkt gender van invloed te zijn op hoe persoonlijkheidskenmerken op de arbeidsmarkt worden gewaardeerd. Ondanks een grote en significante heterogeniteit profiteren zowel mannelijke als vrouwelijke ondernemers van toegang tot extra kapitaal.

1

Introduction

A well-developed financial system is essential for inclusive growth— that is, growth which benefits all sections of society. Some commentators (e.g. Peachy and Roe, 2004) have argued that access to financial services should be viewed as a *'public good'* - just like access to safe drinking water, education and basic health facilities. The reality, however, is different as around the world low-income households are systematically excluded from the financial system. In imperfect markets, financial institutions require collateral to secure lending, which low-income households tend to lack. As a result, such households are systematically rationed out of credit markets and despite having skills and opportunities, lack of capital may lock poor families into a poverty trap.

To bring the unbanked poor into the net of financial services, Prof. Muhammad Yunus established the Grameen bank in Bangladesh in 1976. The Grameen Bank pioneered the idea of group lending in which loans were given to low-income individuals under joint liability contracts. Grameen, through its innovative group lending technology, successfully established that low-income individuals are bankable and that social collateral can be as effective as physical collateral in mitigating problems of moral hazard and adverse selection in imperfect credit markets. Microfinance has changed the philosophy of banking and in recognition of his exemplary services to humanity, Prof. Yunus and the Grameen bank were jointly awarded the Nobel Peace Prize in 2006.

The success story of Grameen Bank has shaped the global discourse on poverty alleviation and now microfinance is regarded as an important development tool. Consequently, microfinance has attracted considerable funds from governments and donor agencies. As the industry has matured, microfinance has been moulded into a more market led intervention where commercial viability and self-sustainability have gained more importance. With this paradigm shift, the microfinance industry has at-

tracted profit seeking investors. This development has had two contrasting implications for the industry - on the one hand microfinance has attracted much needed capital required for its growth and on the other hand the industry has evolved from a development to a commercial paradigm. As a result, the idea of services to the poor has gradually been replaced by profit driven motives resulting in mission drift (Mitra 2009).

Notwithstanding the excitement generated by microfinance, evidence on its effectiveness is mixed (Armendariz and Morduch 2010). There are numerous academic studies and innumerable anecdotes which have established a positive impact of microfinance on various socio-economic outcomes. For instance, recent randomized control studies in Sri Lanka and Mexico have reported large impact of microfinance loans on business returns (De Mel et al. 2008, McKenzie and Woodruff 2008). In contrast, there are also randomized control studies which have not found any impact in India and Morocco. Based on available body of empirical research, scholars are clearly divided on the effectiveness of microfinance. David Roodman¹ is of the opinion that “microcredit rarely transforms lives”. In support of his claim, in addition to research studies, he cites tragic reports on suicide of microfinance borrowers which occurred in 2010. As per reports, 80 poor borrowers of microfinance institutions committed suicides in the Indian state of Andhra Pradesh after defaulting on their mounting debt. While reporting on this tragedy, BBC² termed microcredit as a ‘big curse’ for these borrowers. Guardian, in its March 9, 2011 editorial, posed microfinance as a ‘neoliberal fairytale’. BBC reported that in order to control the situation, besides introducing tough legislation for microfinance industry, politicians in Andhra Pradesh encouraged borrowers to stop repayment of their loans. In the wake of these legislations and incitement, the microfinance industry in the state of Andhra Pradesh faced imminent collapse.

Despite being a staunch critic of microfinance and its ‘vaunted reputation’, David Roodman termed Andhra Pradesh state government’s response to the crisis as a step towards ‘quashing’ rather than ‘reforming’ the microfinance industry. Nine distinguished professors responded and wrote an article in the Financial Times criticizing the state government for enacting a law which encouraged microfinance borrowers to ‘default en masse’. In this article, the scholars opined that lending to the poor alone is not the main novelty of microfinance; the main contribution is rather lending to the poor at ‘lower interest rates’ than informal money

lenders. Some researchers and practitioners (e.g. Dehejia et al. 2005 and, Fernando 2006) believe that poor households need credit but not necessarily ‘cheap credit’. While these are valid points, the debate should not end here. A more relevant question is whether the ‘lower interest rate’ is low enough or cheap credit is cheap enough compared to the repayment capacity of the microfinance borrowers?

The ‘success’ narrative of microfinance is based on a fundamental premise – a premise that once poor entrepreneurs have access to capital, they will be able to generate steep returns (De Mel et al. 2008, Rodrik and Rosenzweig 2009). There are, however, few studies which have investigated this claim in a credible manner. The purpose of this thesis is to fill this gap and to generate evidence on returns to capital from a randomized experiment in Pakistan. The experiment was conducted in cooperation with Akhuwat Microfinance which has been providing interest free microcredit to the poor since 2001. Before establishing the effectiveness of microcredit, we take a step back and examine the reasons of non-participation in Akhuwat’s interest free microcredit program. In this thesis we also investigate gender-based heterogeneity in business returns and treatment effects.

The rest of the thesis is organized as follows. Chapter 2 provides background information on the evolution of microfinance industry in Pakistan, its outreach and performance. Chapter 3 introduces Akhuwat Microfinance and its lending model. The next three chapters comprise the core of the thesis and investigate three different issues. Chapter 4 explores the factors which drive (non-) participation in microcredit programs. Chapter 5 estimates returns to capital. Chapter 6 investigates gender-based heterogeneity in business returns and Chapter 7 provides concluding remarks.

Notes

¹Source: https://www.washingtonpost.com/opinions/microcredit-doesnt-end-poverty-despite-all-the-hype/2012/01/20/gIQAtrfqzR_story.html

² Source: <http://www.bbc.co.uk/news/world-south-asia-11997571>

2

Microfinance Sector in Pakistan

This chapter briefly introduces the microfinance industry in Pakistan. The first section traces the evolution of the microfinance industry in Pakistan in a chronological fashion. The second section analyzes the performance of the microfinance industry in Pakistan in terms of its outreach and sustainability. This second section is based on reports published by Pakistan Microfinance Network from time to time.

2.1 Evolution of the Microfinance Sector in Pakistan

While microfinance as a tool for poverty reduction in developing countries was introduced as early as 1976, the spread of microcredit has a more recent history in Pakistan. Prior to 1980, the focal point of microfinance activities was agricultural loans. One of the reasons for this focus was that historically, the agriculture sector has employed bulk of the labor force in Pakistan (45% of the total employment for year 2010-11). Therefore, the government's development policies were mainly agriculture specific. Agriculture Development Bank of Pakistan and other state-owned banks were the primary conduits for channelling fiscal allocations to the agriculture sector. These banks were given annual targets for lending to small farmers. In the 1980s, the Aga Khan Rural Support Program (AKRSP), in partnership with local community based organizations in the northern areas of Pakistan, initiated various projects in health, education and infrastructure development for the welfare of local residents. Later on, AKRSP introduced projects for improving access to financial services. AKRSP's success greatly influenced the government of Pakistan's poverty alleviation policies. To replicate AKRSP's model, the government of Pakistan established regional RSPs in all four provinces (i.e. Sarhad Rural Support Program, Punjab Rural Support Program, Thardeep Rural Development Program) and one National Rural Support Program.

In the 1980s, microfinance services were mainly delivered by the aforementioned government-funded rural support programs. At the start of the 1990s, Pakistan initiated structural reforms especially in the financial sector and formulated a comprehensive strategy for poverty reduction. These reforms were marked by greater openness and liberalization of financial markets. State-owned banks were privatized which further helped in creation of healthy competition. In 1999, the government of Pakistan, in its poverty reduction strategy paper, recognized microfinance as a key to poverty alleviation policies. In another step in that direction, in February 2007, the government formulated a National Microfinance Strategy in consultation with the State Bank of Pakistan (central bank of the country), Consultative Group to Assist the Poor (CGAP), Pakistan Microfinance Network (PMN) and other international agencies. One of the targets under this initiative was to increase the number of microfinance borrowers to three million by 2010. To achieve this target, the National Microfinance Strategy identified three prerequisites.

The first prerequisite related to sustainability of microfinance industry. The National Microfinance Strategy emphasized the importance of transition from a grant based model to a more market led approach. The desire for this transition pushed the industry towards commercialization of microfinance activities. Although credit delivery costs are globally competitive, Pakistan's microfinance industry has not yet achieved financial self-sufficiency³ though it is slowly moving in that direction. The average microfinance lending rate is 26.1% per annum with financial self-sufficiency of 74% (Source: Pakistan Microfinance Review 2007). The microfinance strategy proposed that Pakistan Poverty Alleviation Fund, as an apex institution and wholesale provider of concessional funds to the microfinance industry, should lend to those microfinance institutions that are willing to graduate to a sustainable model⁴. The strategy also envisioned transformation of National Rural Support Program, the largest government-funded microfinance provider, into a nationwide microfinance bank.

The second prerequisite identified the infusion of private capital as a critical component for development of microfinance sector. It was estimated that in order to reach three million poor borrowers by 2010, the microfinance industry would need an additional US \$ 700 million. The National Microfinance Strategy proposed the creation of a vibrant bond market for attracting capital and emphasized the need for innovative sav-

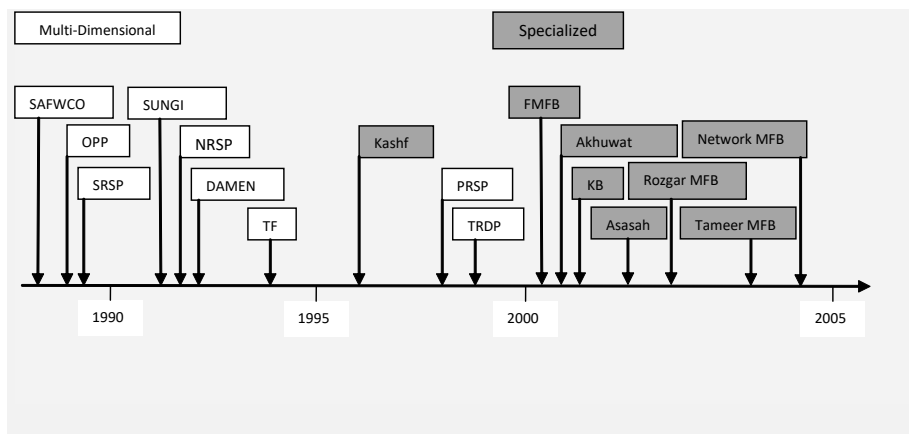
ing products. The strategy also encouraged microfinance industry to enhance leverage by raising debt from bond markets and commercial banks.

The third prerequisite dealt with the importance of qualified human resources. To support the stated growth targets, the microfinance industry would need 20,000 trained workers comprising 1% senior management, 15% middle management and 84% field staff. The strategy emphasized microfinance industry to devise transparent recruitment, training and retention policies.

2.2 Performance of the Microfinance Sector in Pakistan

The deregulation of financial markets, at the start of 1990s, greatly benefited the microfinance industry in Pakistan. Entry barriers into financial markets were gradually removed. As a result, the microfinance sector started attracting private capital which contributed to microfinance industry growth. The chronological evolution of microfinance institutions in Pakistan can be seen in Figure 2.2-1. In the 1990s, the microfinance sector was dominated by multi-dimensional institutions which, besides microfinance products, focused on health, education and infrastructure development. The start of new millennium though saw emergence of specialized institutions. These institutions are primarily responsible for microfinance activities.

Figure 2.2-1: Evolution of Microfinance Sector in Pakistan



List of Acronyms

SAFWCO: Sindh Agricultural and Forestry Workers Coordinating Organization
 OPP: Orangi Pilot Project
 SRSP: Sarhad Rural Support Program
 SUNGI: Sungi Development Foundation
 NRSP: National Rural Support Program
 Damen: Development Action for Mobilization and Emancipation

TF: Taraqee Foundation
 PRSP: Punjab Rural Support Program
 TRDP: Thardeep Rural Development Program
 FMFB: First Microfinance Bank
 KB: Khushhali Bank
 MFB: Microfinance Bank

Though access to financial services has improved in the 1990s, financial exclusion is still high. The private sector credit to GDP ratio is 26.2% which is one of the lowest in the region⁵. Table 2.2-1 shows that rural areas do not get its fair share in the financial system. 67.0 % of Pakistan's population live in rural areas but their shares in total bank deposits and loans are only 25% and 17% respectively. Formal financial institutions have reached only 5.9% of 3.17⁶ million small and medium enterprises⁷. Key statistics on some outreach indicators are summarized in Table 2.2-1.

Table 2.2-1: Financial Penetration in Pakistan Rural vs. Urban

Statistics	Rural	Urban	Total
% of Population	67.0	33.0	100.0
% Poverty Incidence	28.1	14.9	23.9
% of Bank Branches	33.0	67.0	100.0
% of Population with bank accounts	6.0	37.0	17.0
% of adult population (+19 years) having account	14.0	75.0	100.0
% of deposits holders	25.0	75.0	100.0
% of deposits amount	9.9	91.9	100.0
% of borrowers	17.0	83.0	100.0
% of advances	7.1	92.9	100.0

Source: SBP's Governor speech delivered at Financial Inclusion Conference, London on June 19, 2007

2.2.1 Tapping the Potential

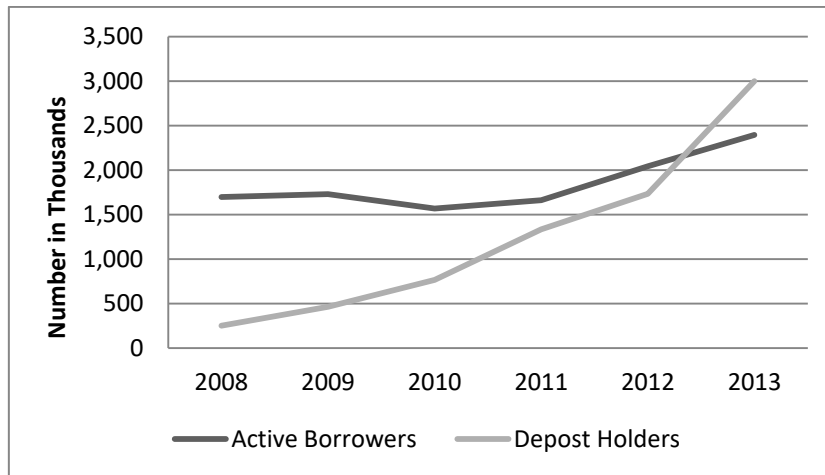
According to Economic Census of Pakistan Report of May 2005, almost 94% of 3.17 million small and medium enterprises have no access to formal financial institutions. Microfinance industry is gradually moving towards tapping this huge potential. The microfinance providers in Paki-

stan are divided into three different types. The first type is called Microfinance Institutions (MFIs). MFIs are non-bank institutions which operate under Societies Act, Trust Act and Companies Ordinance. These institutions are not allowed to mobilize deposits and their main sources of funding are local and foreign loans and grants. The second type of microfinance providers fall under a broader category of rural support programs (RSP). Similar to MFIs, RSPs operate under Societies Act, Trust Act and Companies Ordinance. Their main source of funding is fiscal allocations and loans from the government and loans and grants from local and foreign donors to some extent. The third category is called Microfinance Banks. These are specialized banks which are allowed to mobilize deposits from the general public. In recent years microfinance banks have contributed considerably to the growth of the microfinance industry in Pakistan. The following sections summarize key performance statistics of the microfinance industry.

2.2.2 Outreach is Improving

Over the years, the microfinance industry in Pakistan has witnessed tremendous growth both in size and outreach. Figure 2.2-2 shows that during the period from 2008 to 2013 the number of active borrowers increased from 1.7 million to 2.4 million. During this period, the number of savings accounts has shown an even more impressive growth recording an increase from less than a quarter million to approximately 3 million. This growth has been driven mainly by the geographical expansion of microfinance institutions' branch network. According to the Pakistan Microfinance Network, during the period from June 2005 to December 2014, the number of microfinance institutions' retail branches increased from 488 to 2,538.

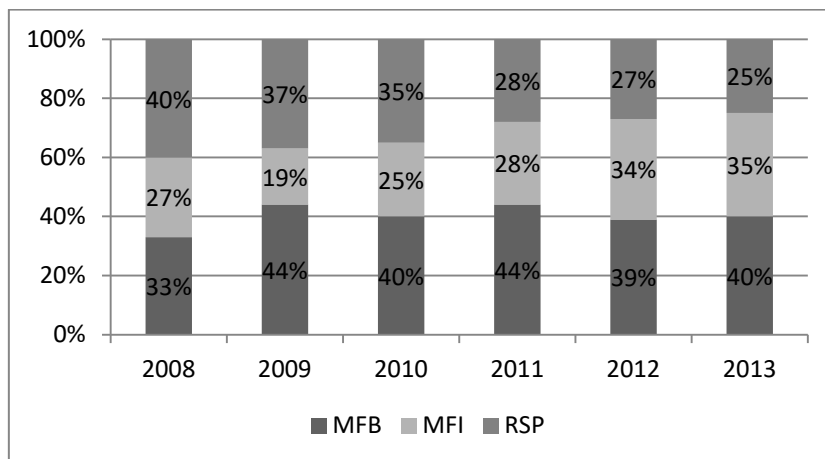
Figure 2.2-2: Growth in number of Microfinance Borrowers and Savers



Source: Pakistan Microfinance Review 2013

Figure 2.2-3 shows that over the 6 years period from 2008 to 2013 the share of Microfinance banks in the number of active borrowers rose to around 40% while the share of the rural support programs declined.

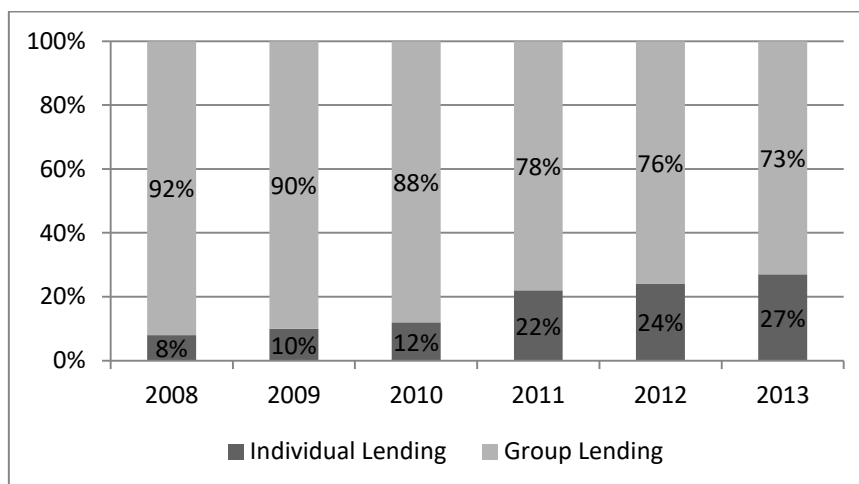
Figure 2.2-3: Market Share in the number of Microfinance Borrowers



Source: Pakistan Microfinance Review 2013

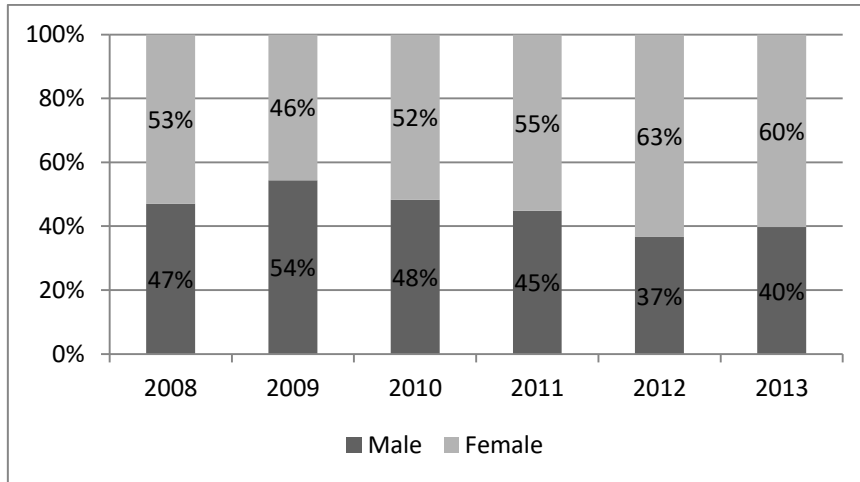
Microfinance is known for Grameen style group lending. Consistent with global trends, group lending also prevails in Pakistan. The trend in Figure 2.2-4, however, shows that the industry is gradually moving towards individual lending. Figure 2.2-5 show that women account for a larger share of microcredit beneficiaries, however, they account of a minority of saving accounts. Female clients own only 28% of micro-saving accounts (see Figure 2.2-6). 67% of Pakistan population lives in rural area. Although the incidence of poverty in rural areas is high, only 58% of total microfinance lending goes to rural areas (see Figure 2.2-7). The nominal average loan size is on consistent rise. For the period from 2008 to 2013, the average loan size increased⁸ from PKR 14,487 to PKR 26,838 (see Figure 2.2-8). The lending rates in Pakistan, though globally competitive, are still on the higher side. The nominal yield on gross portfolio is a good proxy for microfinance lending rates. The data suggests that microfinance industry in Pakistan charges on average 33.5% on microcredit (see Figure 2.2-9).

Figure 2.2-4: Distribution of Microcredit by lending methodology



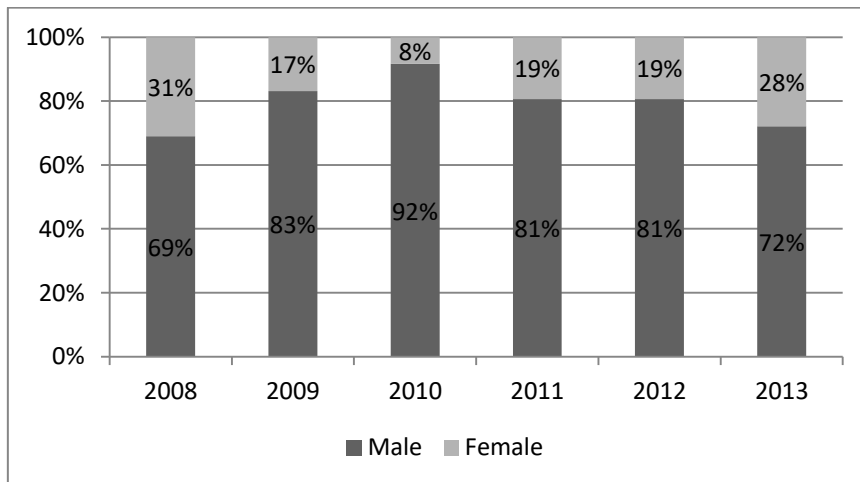
Source: Pakistan Microfinance Review 2013

Figure 2.2-5: Gender Distribution of Microcredit Borrowers



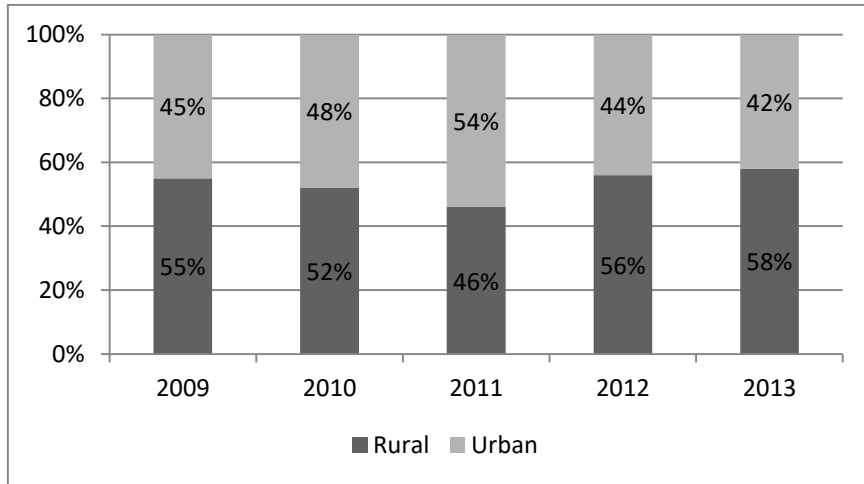
Source: Pakistan Microfinance Review 2013

Figure 2.2-6: Gender Distribution of Microsavings



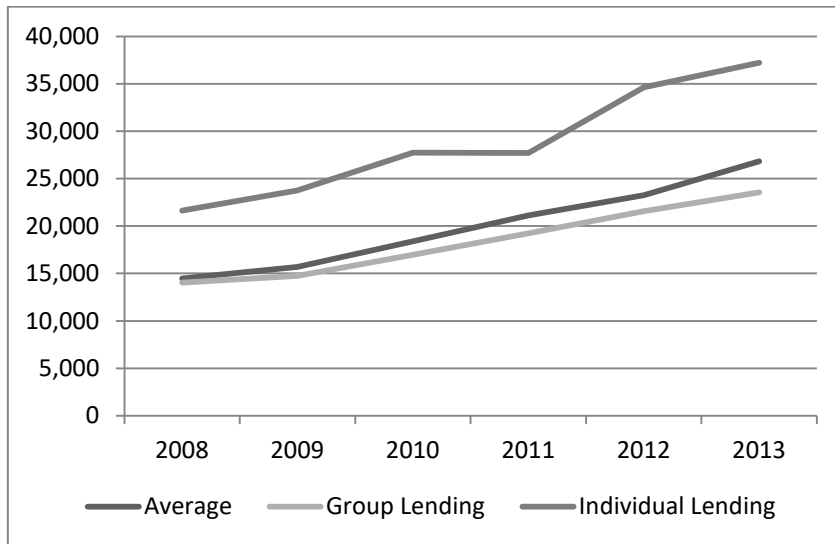
Source: Pakistan Microfinance Review 2013

Figure 2.2-7: Geographic Distribution of Microcredit Borrowers



Source: Pakistan Microfinance Review 2013

Figure 2.2-8: Average Loan Size

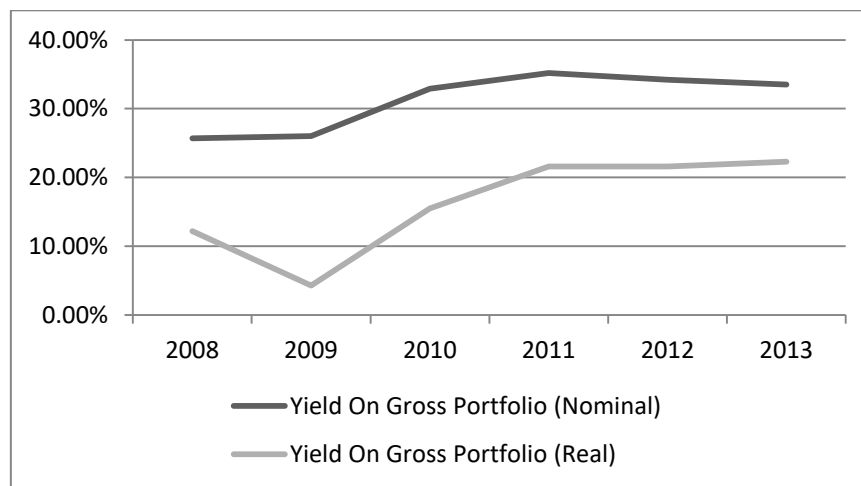


2.2.3 Industry Moving Towards Sustainability

Since 2009, the yield on gross revenues of the microfinance industry are on consistent rise (See Figure 2.2-9). The industry earns 78% of its income from its core activity which is micro-lending. The productivity in terms of loans and deposit per staff member during 2009-2013 showed a rising trend. Operating expenses slightly declined. With increased outreach overtime, the portfolio at risk (PAR)⁹ improved. PAR>30 measure dropped from 3.4% in 2009 to 1.5% in 2013. The operational self sustainability measures are positive which shows that the industry is gradually moving towards sustainability.

With deregulation of financial markets in Pakistan, the microfinance industry has shown promising growth. As a result the industry is gradually moving towards a more market led approach. According to The Economist Intelligence Unit¹⁰, Pakistan has the third most enabling environment for microfinance sector in the world based on regulatory and institutional frameworks.

Figure 2.2-9: Yield on Gross Loan Portfolio



Source: Pakistan Microfinance Review 2013

Notes

³ Microfinance Information Exchange (MIX) defines financial self-sufficiency as organization's ability to fully cover its operational costs

⁴ Sustainability refers to an organization's ability to survive on its own without subsidies and financial assistance

⁵ Private sector credit to GDP ratio is 40% in India, 50% in Indonesia and 75% in Thailand

⁶ Economic Census of Pakistan Report of May 2005

⁷ Small and medium enterprises accounts for approximately 99% of total enterprises in Pakistan (Source: Economic Census of Pakistan Report of May, 2005). State Bank of Pakistan defines Small and Medium Enterprise an entity, ideally not a public limited company, which does not employ more than 250 persons (if it is manufacturing / service concern) and 50 persons (if it is trading concern) and also fulfills the following criteria of either 'a' and 'c' or 'b' and 'c' as relevant:

(a) A trading / service concern with total assets at cost excluding land and building up to Rs 50 million.

(b) A manufacturing concern with total assets at cost excluding land and building up to Rs 100 million.

(c) Any concern (trading, service or manufacturing) with net sales not exceeding Rs 300 million as per latest financial statements.

⁸ This trend alludes to a phenomenon which suggests that with passage of time, the microfinance industry is leaning towards lending to relatively less poor (see Figure 7).

⁹ PAR>30 shows the percentage of gross loan portfolio which are past due (no installment paid) for more than 30 days. Higher ratio shows higher non-performing loans.

¹⁰

http://www.citigroup.com/citi/citizen/community/data/EIU_Microfinance_2013_Proof_08.pdf

3

Akhuwat Microfinance

3.1 Historical Background of Akhuwat

Akhuwat Microfinance was established in 2001 by a group of volunteers, spear headed by Dr. Amjad Saqib, with a view to extending interest free loans¹¹ to poor households. The word Akhuwat is derived from '*mua-khaat*' which means fraternity in Arabic. *Mua-khaat* refers to an event in Islamic history in which citizens of Madina shared their wealth with needy immigrants from Makkah. According to the founding chief executive, Akhuwat was established to revitalize the same spirit in society. With a motto of "microfinance with a difference" Akhuwat bases its microfinance model on mobilizing communities for self-reliance, mutual support and sharing financial and intellectual resources with the needy. In an interview with Berkley Center for Religion, Peace & World Affairs on November 1, 2010¹² Dr. Saqib stated that Akhuwat is gradually becoming a cooperative movement. In this interview Dr. Saqib spelled out the following four guiding principles for Akhuwat.

The first principle forbids charging of interest on loans. This principle is derived from Islamic teachings on interest. There are injunctions¹³ in Quran, the holy book of Islam, which strictly prohibits charging of interest¹⁴. Besides prohibition of interest, Quran encourages those who have money to give interest free loans¹⁵ to the needy. Apart from ideological reasons, the founders of Akhuwat are of the opinion that charging high interest rates, as is done by most conventional MFIs for various reasons, is not judicious as it adds to the predicament of the poor.

The second principle recognizes the role of religious centres in development. Each branch of Akhuwat is linked with a religious centre i.e. Mosque or Church. Besides reducing delivery cost, the involvement of these religious centres addresses issues of adverse selection and moral

hazard in the credit process. It presumably ensures high repayment rates and thus adds to the sustainability of Akhuwat's model.

The third guiding principle capitalizes on volunteerism which encourages flow of capital from rich to the poor and sharing of knowledge, skills and time for social emancipation in general and poverty alleviation in particular. Akhuwat's reliance on volunteerism ensures community participation and thus benefits from local knowledge to poverty alleviation.

The fourth principle is based on self-reliance. Although Akhuwat does not charge any interest, it encourages its borrowers to donate towards Akhuwat's cause. These donations are voluntary. Dr. Saqib is of the view that voluntary contributions instil a value of helping others in its borrowers.

In 2001, Akhuwat started its business with an initial donation of Rs.10,000 (approx: \$ 96)¹⁶ and the first loan was given to a widow. Since then it has registered remarkable growth. As of Feb 28, 2015, Akhuwat now has 343 branches in 210 cities and towns. To recover its administrative expenditures, Akhuwat initially started levying a membership fee of 5% of the loan amount; however, this practice was abolished in 2009. As of February 28, 2015, Akhuwat had disbursed more than Rs. 13.6 billion in revolving credit to more than 0.8 million families. The progress of Akhuwat as on February 28, 2015 is summarized in Table 3.1-1.

Table 3.1-1: Progress Report up to Feb 28, 2015

PROGRESS INDICATOR	TOTAL
Total Benefiting Families	797,148
Male	61%
Female	39%
Amount Disbursed	PKR 13,613,206,842
Percentage Recovery	99.89%
Active Loans	345,690
Outstanding Loan Portfolio	PKR 4,226,267,871
Number of Branches	343
Number of Cities and Towns	210

3.2 Microfinance Model of Akhuwat

Akhuwat has a wide range of products tailored to the different needs of the low-income households. Table 3.2-1 summarizes the products offered by Akhuwat. A common feature of all these products is that they are all interest free. Family enterprise Loan is the flagship program of Akhuwat in which they target poor microentrepreneurs. Akhuwat follows a poverty based eligibility criteria¹⁷. One of the criteria is that the monthly percapita income of the household should not be more than Rs.1,000. A distinguishing feature of Akhuwat is that it uses mosques and churches for marketing and implementation of its program. Mosques play a key role in Pakistani society where people congregate five times in a day for 15-20 minutes to offer collective prayers. In essence a mosque is a community centre and provides a focal point for community outreach.

Table 3.2-1: Products of Akhuwat Microfinance

Loan Product	Purpose	Amount in Rupees
Family Enterprise Loan	For starting or expanding business	10,000 - 30,000
Liberation Loan	To help repay loans taken from money lenders	Normally up to 50,000 but higher amounts also possible with approval of executive director.
Education Loan	Financing of education related expenses	Up to 25,000
Health Loan	Health related expenses	10,000 - 20,000
Emergency Loan	For meeting various emergencies	5,000 - 10,000
Housing Loan	Construction or renovation of house	30,000 - 70,000
Marriage Loan	Marriage related expenses	Up to 20,000
Silver Loan	Medium size loan for mature businesses who have completed 3 or more of Akhuwat's loan cycles.	Up to 50,000

Source: Adapted from http://www.akhuwat.org.pk/loan_products.asp [Last accessed: June 22, 2016]

Each branch of Akhuwat is attached with at least one mosque in its area of operations and most of the times the branch is physically located inside or just outside the mosque. In the first stage of the application process, the microentrepreneurs fill out a two page application form. This application contains basic personal and business information, references and the intended utilization of a loan. In addition to the borrower, at least one family member, spouse in case of married applicants, signs the application form and that is why it is called a family enterprise loan. If a borrower meets the initial criteria, the applications enter the second stage. In this stage, the branch managers conduct a rigorous economic and social appraisal. In the appraisal phase, personal and family information, income and expenditure of the household, viability of the business plan, assessment of credit needs and the credentials of the guarantors are verified. The appraisal process may also include in-depth interviews with the applicants and guarantors. For first-time applicants, the normal loan amount is Rs. 10,000. After passing through the second stage, successful applications are submitted to a credit committee for final approval.

The whole appraisal process takes approximately three weeks. Once a loan is approved, the actual disbursement takes place in a mosque in front of at least one guarantor, Imam¹⁸ and community members. This creates community pressure on the borrower for effective utilization and timely repayment of loans. In each mosque, loan disbursements take place twice a month and normally 100-150 loans are given out. Borrowers are required to pay their loans in 10 equal monthly installments. As per their operational manual, Akhuwat staff regularly visits residences/work places of the borrowers. If an installment is not paid in time, borrowers are reminded of their duty to pay on time. If this effort does not result in successful recovery, then Akhuwat's management contact guarantors for collection.

3.3 Akhuwat vs. Conventional MFIs

Since its inception in 2001, Akhuwat Microfinance has substantially departed from conventional MFIs¹⁹ in many ways. First, Akhuwat does not charge any interest on loans, second it uses an individual instead of a group lending²⁰ approach, third it involves religious institutions in the lending process, and fourth, it raises financial resources from the community and its own borrowers through voluntary contributions. The fol-

lowing sections provide a brief exposition of the areas where Akhuwat differs from conventional MFIs.

3.3.1 Mitigation of Moral Hazard and Adverse Selection

The conventional microfinance model is based on group lending. There is ample evidence in the literature²¹ that group lending is superior to individual lending in terms of repayment rates. Akhuwat's model though has challenged this conventional wisdom. Despite individual lending, Akhuwat has consistently maintained higher repayment rates than conventional MFIs. Akhuwat has a very low default rate of 0.15% compared to 2.29% for other MFIs²² in Pakistan. The success of microfinance institutions is attributed mainly to their innovative group lending technology in which credit discipline is enforced through a joint liability contract (Morduch 1999). The incentive structure under group liability mitigates the problem of adverse selection and moral hazard in credit markets. In joint liability contracts, the group members share the burden of adverse selection and moral hazard.

In the absence of collateral, adverse selection is one of the main problems faced by lenders. Adverse selection arises from MFIs' lack of information on repayment capacity of the borrowers. Group lending, which creates joint liability for group members, provides a good low-cost solution. Instead of gathering information directly on borrowers, MFIs leave this aspect to group members who are expected to utilize their local information networks to separate good risks from bad ones. In group lending, potential borrowers form groups and jointly assume the responsibility of repaying loans. Using an adverse selection framework, Varian (1991) argues that group members know each other's characteristics more than the MFI. To lower the expected joint liability, each member likes to have safe partners in the group. In equilibrium, the same *type* of members will partner to form a group and in this process the bad risks are screened out. The second benefit of joint liability contract is its ability to address the issue of *moral hazard*. The problem of moral hazard mainly refers to borrowers' unwillingness to repay, underutilization of loan and excessive risk taking. In joint liability contracts, group members equally share the cost of others' failures and thus group members have an incentive to exert peer pressure on each other for observing credit discipline.

Akhuwat tackles the issue of adverse selection and moral hazard in a different way. Akhuwat has apparently overcome the problem of adverse

selection and moral hazard with the help of embedded incentives in its unique microfinance model. Akhuwat has made the involvement of religious centers as an integral part of their lending model. Involvement of religious centers discourages willful defaults because borrowers supposedly attach religious sanctity to the loans which are disbursed in the places of worship. In essence, Akhuwat uses religious sanctity as collateral. Besides religious sanctity, there is also pressure from the family member (who signs the application) and the guarantor(s). Involvement of religious centers and guarantors may explain rather high repayment rates of Akhuwat.

The main differences in lending technology, credit discipline enforcement, incentive mechanisms and outreach philosophy between Akhuwat and conventional MFIs are summarized in Table 3.3-1.

Table 3.3-1: Akhuwat vs. Conventional MFIs

Akhuwat	Conventional MFIs
Individual Lending ²³	Group Lending
Interest free lending	Normally charges more than 30% interest
Charity from community and voluntary donations from borrowers as a main source of funding	Deposits, loans and grants as a main source of funding
Marketing and implementation of program through mosques and churches	Program implementation through their own branch networks
Community, family pressure, religious sanctity	Mainly peer pressure
Depth of outreach	Breadth of outreach

3.3.2 Interest vs. Zero-interest

Conventional MFIs follow a standard market based approach to sustainability. To achieve this end, MFIs normally charge high interest rates. There are two main reasons for this. First, due to small loan sizes, the transaction costs of MFIs is generally high. In order to cover these costs, MFIs charge high interest rates. Second, in the absence of physical collateral, lending to the poor is considered more risky. MFIs price their

microfinance loans commensurate with the risk and therefore charge high interest rates. In contrast to conventional MFIs, Akhuwat approaches sustainability in a different way. It uses the physical network of mosques and churches as a cost reduction strategy and spirituality or religiosity as collateral. For sustainability, Akhuwat's model of microfinance relies on volunteerism and religious traditions, which encourages flow of capital from rich to the poor and sharing of knowledge, skills and time for social emancipation. Although, Akhuwat was mainly founded on ideological grounds, its operations are secular. It partners with mosques and other places of worship such as churches. Akhuwat uses the infrastructure of these centres which helps it to reduce delivery cost. Further, virtues and rewards of munificence and volunteerism are preached at the loan distribution ceremonies held in these places of worship which helps Akhuwat mobilize donation from the local communities.

3.3.3 Funding Sources

Conventional MFIs generally rely on savings/deposits, equity, loans and grants to finance their operations. Akhuwat has two main sources of funding, one is charity from community members and the other one is voluntary donations from borrowers. Despite troubled economic situation, in 2010, people in Pakistan contributed approximately Rs. 140 billion²⁴ to charity of which 58% was contributed by individuals. A major chunk of financial resources for Akhuwat comes from these avenues. As per Audited Accounts for the period ending June 2015, Akhuwat received Rs. 405 million in donations²⁵. In addition to donations, initially Akhuwat used to charge a one-time administration fee of 5% of the loan amount. In an interview with the author of this thesis, the CEO of Akhuwat revealed that the management of Akhuwat did not consider charging a fee to be in accordance with its vision. The fee was abolished in 2009 and instead Akhuwat asked its borrowers to make voluntary contributions to Akhuwat. As per practice, at the time of credit disbursal, each borrower is given a donation box in which they are asked to deposit their voluntary contributions and deposit it along with payment of instalment. This practice turned borrowers into donors. Therefore, apart from lender-borrower relationship, this step has defined a new relationship of donee-donor between Akhuwat and its borrowers. In the same interview, the CEO of Akhuwat stated that besides interest-free lending, through

the practice of voluntary donations Akhuwat intended to create institutional ownership and feel-good-factor because it relieved borrowers from obligatory service fees and also gave them an institutionalized way of helping others.

Notes

¹¹Besides microfinance products, Akhuwat has recently announced establishment of Akhuwat University. Akhuwat telemedicine clinics

¹²<http://berkeleycenter.georgetown.edu/interviews/a-discussion-with-dr-amjad-saqib-executive-director-akhuwat> [Last accessed: June 22, 2016]

¹³In Quran Surah Al Baqarah verse 2:278-9 says "O those who believe; fear Allah and give up what still remains of the Riba if you are believers. But if you do not do so, then be warned of war from Allah and His Messenger. If you repent even now, you have the right of the return of your principal; neither will you do wrong nor will you be wronged." Further in the same chapter, verse 2:275 says "[...]Allah has permitted trade and has forbidden interest[...]."

¹⁴Besides interest free loans, there are numerous permissible market based asset and liability products for profit seeking investors. Obaidullah (2005) is a good reference for understanding system of Islamic financial services and its implications for poverty alleviation strategies.

¹⁵In Quran, interest free loans are referred to as Qarz-e-Hasana literally meaning the beautiful loan. Surah Al-Baqarah (2:245) says "Who is it that would loan Allah a goodly loan so Him (Allah) may multiply it for him many times over? And it is Allah who withholds and grants abundance, and to Him (Allah) you will be returned." Surah At-Taghābun (64:17) says "If you loan Allah a goodly loan, He (Allah) will multiply it for you and forgive you. And Allah is most appreciative and forbearing."

¹⁶ Source:

<http://www.xe.com/currencyconverter/convert/?Amount=1&From=PKR&To=USD> [Last accessed: June 22, 2016]

¹⁷Akhuwat's average loan size of Rs. 11,300 (approximately 120 US\$) is very small compared to Rs. 20,238 for all other MFIs in Pakistan (Pakistan Microfinance Network Jul-Sep 2011). Coleman (2006) argues that by setting smaller loan sizes, apparently the cost of participation for wealthy individuals is high and as a result only lower-income households participate.

¹⁸A person/cleric who leads the prayer

¹⁹Conventional MFIs refer to those institutions which follow standard group lending approach like Grameen Bank.

²⁰ Besides Akhuwat, there are many MFI around the world who are engaged in individual lending. This shift from group to individual lending is intended partly to make rapid expansion and partly to get rid of some of the disadvantages associated with group lending e.g. exertion of excessive peer pressure resulting in violence, social isolation and incentive for free-riding.

²¹For detail review please refer to Morduch (1999) and Armendariz de Aghion and Morduch (2005)

²²<http://www.sbp.org.pk/SME/pdf/DFG-Mar.pdf>: [Last accessed on September 26, 2009]

²³ In addition to individual lending, Akhuwat has recently started group lending in some of their branches again, however, their focus still remains on individual lending. Group lending was mainly started to reduce transaction cost and facilitate effective loan supervision and recovery.

²⁴Source: <http://tribune.com.pk/story/18318/philanthropy-doubles-to-rs140b> published on June 3, 2010 [Last accessed on January 18, 2012]

²⁵ Source: <http://www.akhuwat.org.pk/pdf/AuditReportfortheyearendedJune302015.pdf> [Last accessed: June 22, 2016]

4

Determinants of Participation in Akhuwat Microfinance: The Effects of Learning, Personality and Perceptions

4.1 Introduction

Microfinance institutions (MFIs) have played an important role in expanding financial services to poor households. By the end of 2009, microfinance had reached more than 190 million clients (Daley-Harris 2009). Despite being a popular and well-funded innovation, this figure represents only a small proportion of the 2.5 billion²⁶ unbanked adults (Armendáriz and Labie 2011). One study reports that, globally, the poorest 20% are systematically excluded from formal financial services (Hulme and Mosley 1996)²⁷. In Bangladesh alone, 76% of households are eligible but only 27% took part in microfinance programs (Evans et al. 1999). Similarly, in Thailand, MFIs serve relatively less poor households (Coleman 2006). All these studies show that a large number of the poor do not participate in microfinance programs. It is not, however, clear whether such high non-participation rates are due to institutional barriers or self-exclusion.

Most microcredit programs aim to target credit-constrained poor microentrepreneurs. In order to do so, MFIs generally use income-based criteria for ascertaining eligibility of applicants. Although many microentrepreneurs potentially meet these criteria, only some decide to apply, while others, although eligible, do not apply for microcredit. An intriguing question is, *what factors drive participation or to be more precise, why don't eligible credit-constrained microentrepreneurs apply for microcredit?*

Reasons for non-participation cited in the literature may be broadly categorized into supply and demand side barriers. Supply side barriers emanate from institutional policies or the regulatory environment which may lead to exclusion of the poor. These barriers include inappropriateness of the product design, MFIs' mind-set of considering extreme poor

as risky clients, insufficient supply of microcredit, formalities required for group formation, forced savings, mandatory participation in some activities, group exclusions and institutional incentives encouraging lending to relatively less poor (Evans et al. 1999, Wright 2000, Rutherford 2000, Rahman 2000). On the demand side, barriers may include, among others, insufficient resources (time and resources for group membership), household vulnerability to different shocks, female as a household head and lack of education (Evans et al. 1999, Hashemi and Rosenberg 2006, Webb et al. 2002). In addition to the aforementioned household and business characteristics, there may be a range of other important reasons which may explain participation in microcredit programs. This paper brings new insights from literature in social networking and psychology to examine the demand-side drivers of participation in a microfinance program in Pakistan.

Specifically, the paper examines the role of *learning effects* on participation. Learning is conceptualized at two levels, that is, learning from *experimentation* and learning as a result of *peer effects*. In experimentation, an endogenous process, individuals learn from their own past actions. The gap between actual and expected outcome feeds back into the decision making process. As a result, past decisions associated with positive outcomes are more likely to be repeated than those culminating into negative outcomes (Sagi and Friedland 2007). In response to failures, human beings *learn* from the past and make *adjustments* to their future decisions (Hayek 1976, p.124-25)²⁸. Folk wisdom says it all, *once bitten twice shy*. Individuals who did not benefit from previous loans are expected to shy away from applying for microcredit. In addition to experimentation, individuals also learn by observing payoff related information of their peers in a social network (Gale 1996). Peer effects may sometimes lead to herd behaviour²⁹. The decision of microentrepreneurs whether or not to apply for microcredit may potentially be influenced by others in their social network. Taking microcredit entails various risks. Of these risks the most obvious one is the uncertainty whether a loan will translate into a profitable proposition. In order to reduce uncertainties, individuals may seek information from their peers. Based on their own experience or observational learning, the consulted peers may present microcredit as an *opportunity* or as a *threat*. Such exposé results in *framing effects* – a cognitive bias in which microentrepreneurs may react differently to microcredit depending on whether it is presented as an opportunity or a threat. While

there are a few papers that have focused on the effects of learning on participation in welfare schemes and investment in retirement plans, the effects of learning on participation decisions in microcredit programs has not been analyzed³⁰. In this paper we study whether the decision to take microcredit is affected by the credit histories of microentrepreneurs and their peers.

Besides differences in learning, individuals have different personality traits in terms of the way they think, feel and act (Borghans et al. 2008). These traits shape the way individuals *perceive* and *process* information and as a result variation in traits may induce idiosyncratic responses when they face the decision whether or not to apply for microcredit. There is a rich strand of literature which establishes strong links between different personality traits and time allocation and risk-taking behavior (Borghans et al. 2008, Almlund et al. 2011, Heckman 2011). We expect that, through preference parameters, personality traits may also be one of the determinants of participation in microcredit programs, therefore, in addition to learning we also control for differences in personality traits.

This study has been conducted in collaboration with Akhuwat micro-finance in Pakistan. The study explores non-participation in Akhuwat's *family enterprise loans*³¹—a product which accounts for 91% of its total loan portfolio. For this study, we gathered data from 488 *Applicants* of Akhuwat and 199 *Eligible-non-Applicants*. The data was collected from these two groups through a survey questionnaire consisting of detailed sections on household and business level information, questions to measure personality traits of microentrepreneurs, their credit histories and perceptions about loan and credit enforcement mechanisms. For personality traits, we used the Urdu-language³² version of the Big Five personality inventory.

The rest of the paper is organized as follows. Section 4.2 provides a brief literature review. Section 4.3 relates to sampling and delineates operationalization of personality, learning and perceptions. Section 4.4 provides theoretical grounding to this study from literature in management, economics and psychology. Section 4.5 outlines the empirical specification. Section 4.6 estimates the model and discusses results and section 4.7 concludes.

4.2 Literature Review

Despite the commendable success of MFIs in terms of outreach, a number of studies have reported high rate of exclusion of the poor. An interesting dimension of this problem is that despite being eligible for microcredit, some individuals still do not participate. The limited evidence on the reasons for non-participation may be broadly mapped into supply side and demand side barriers³³. Supply side barriers normally stem from institutional dynamics in which microfinance institutions purposively screen out some applicants as they are considered high-risk clients. Demand side barriers, on the other hand, refer to self-exclusion where eligible individuals decide not to participate.

In this paper we are interested in the demand side of non-participation. The evidence on reasons for non-participation mainly comes from studies done on the microfinance sector in Bangladesh. Hashemi (1997) cites lack of confidence, group exclusion and the fear of violating social norms³⁴ as the main reasons for non-participation. Hashemi and Rosenberg (2006) state that the non-participating poor are generally risk-averse and lack confidence in their own entrepreneurial abilities. Because of their uncertain and vulnerable income, poor entrepreneurs may be reluctant to enter into a binding contract which involves regular payment of instalments. Webb et al. (2002) are of the opinion that reasons for non-participation include poor's low aspirations shown by their high discount rate; lack of confidence and lack of entrepreneurship because of their risk averse nature.

In addition to the aforementioned reasons, the literature on social networking and psychology provides useful theoretical grounding for exploring reasons for non-participation in microfinance programs. The differences between participants and eligible-non-participants may emanate from two sources. First, the differences may emanate from within the social networks in which individuals are exposed to learning from their peers. Second, the differences may also arise from personality traits which capture the way individuals think, feel and act (Borghans et al. 2008). Differences in learning from social networks and personality traits may be a key driver of participation decisions in microcredit programs.

Peer effects operate through channels of *information* and *norms* (Luttmer et al. 1998). Whenever individuals seek information about microcredit programs, their search normally starts within their social networks

in an effort to minimize their search costs. Thereafter, the decision whether to participate or not depends on norms which gives social sanction to microcredit. For example, if some microentrepreneurs raise their needed capital through microcredit, it signals a social approval for such forms of raising capital to his/her peers. Peer effects sometimes result in herding. By analyzing sequential decision model, Banerjee (1992), in his seminal work, showed that individuals exhibit '*herd behavior*' in their decision making. The push for joining the herd comes from '*informational externalities*' where individuals join the herd by assuming that others, who are already in the herd, have superior information (Gale 1996). According to Gale, by observing others' payoff related information in the network, individuals engage in *social learning*.

Individuals have the ability to learn from their peers³⁵. Various studies have examined peer effects on different socio-economic outcomes. Zimmerman (2003) used a quasi-experimental design and measured peer effects in academic outcomes. The peers were identified as roommates. The paper argues that upon arrival of new students the allocation of student housing is random and hence the process of peer formation is orthogonal to individual's characteristics. The paper found that students in the middle of the SAT score distribution earn relatively lower grades if they share rooms with students in the lower 15% of the SAT verbal score distribution. The effects were small but statistically significant. Similarly, Bayer et al. (2009) examine peer effects on criminal behavior. Based on data of 169 juvenile correction facilities, the paper found that the crimes committed after the release of inmates exhibited strong evidence of peer effects. Some studies have estimated peer effects on participation in social programs. For example, Dahl et al. (2012) studied the influence of peers on participation in paternity leave program in Norway. The study used regression discontinuity design to address problems of reflection, correlated observables and endogenous group formation. The Norwegian government introduced a government paid paternity one-month leave policy for fathers who had their children born after April 1, 1993. The policy was intended to bring a gender balance. The paper found that the co-workers and brothers of the beneficiaries of this policy were also more likely to avail paternity leave. The paper claimed that the increased participation of co-workers and brothers was mainly induced by peer effects. Similarly, Duflo and Saez (2002) studied the role of peer effects on participation in a retirement plan and the choice of a particular

investment scheme. The study was conducted in a large university in the United States. The paper finds that ‘peer effects’ may be an important factor in saving and investment decisions. Luttmer et al. (1998) also find a strong influence of social network on participation in state welfare schemes.

The literature on peer effects in the microfinance sector is scarce. A study on women’s participation in microfinance programs in India concluded that the presence of other microcredit programs or self-help groups in the same or nearby villages had a significant positive impact on the participation of women in the microfinance programs through what the paper calls “*demonstration effect*” (Anjugam and Ramasamy 2007). Breza (2011) investigated peer effects on microfinance loan repayments. A massive default occurred when a government official in Krishna District of Andhra Pradesh, India asked microfinance borrowers to stop repayment of their loans. After some time, the situation gradually improved as the borrowers started repaying their loans. The paper finds that borrowers are indeed influenced by repayment behavior of their peers. Borrowers were more likely to repay if their peers shift from full default to full repayment.

Banerjee et al. (2011) study the process of information diffusion in social networks and its effects on participation in Bharatha Swamukti Samsthe (BSS) microfinance program in India. Besides other contributions, this study systematically examines peer effects on participation decisions in a microfinance program. The paper identifies two types of information diffusion models. In *pure information models*, the primary driver of diffusion is ‘mechanical information’, for example information about the existence of microcredit opportunities. In *peer effects models*, individuals interact and learn from each other. Banerjee et al. (2011) collected social networks data from 75 villages. BSS introduced their microfinance program to a set of individuals in the community what the paper calls ‘injection points’ in 43 villages. The injection points were the first ones to receive this information. After getting information, some individuals in the injection points participated and others did not. The information about BSS then diffuses in the villages through these injection points. The papers finds that participation rates in BSS are high in those villages where information injection points have higher importance measured in terms of eigenvector centrality. The paper also finds that participants are more likely to share information than informed non-

participants; however, the paper did not find peer effects on participation decisions, that is, peers' participation does not influence the participation decision of other peers in the network. Banerjee et al. (2011) mainly examine the diffusion of information and its effect on participation decisions. In this paper we go one step further. In addition to information about loans, we also capture outcomes associated with these loans (i.e. whether the loans taken by relatives and friends are associated with positive or negative outcomes). Sharing such information leads to learning which may potentially influence the participation decision of other peers in the network. While doing so, we follow Duflo and Saez (2002) and make no distinction whether variation in participation decisions come from effects of learning or conformity with norms.

In addition to learning, behavioural economists acknowledge the role of individual's personality in affecting different socio-economic outcomes. Heckman (2011) views personality as a response function which generates individual-specific enduring patterns of actions in response to set of constraints, endowments and incentives. Broadly speaking, individuals differ from each other in the way they think, feel, and act (Borghans et al. 2008). These differences have the ability to influence personal choices (Benartzi and Thaler 2002). Muller and Plug (2006) conceptualize personality as a bundle of productive traits which are traded in the labor market. Tett et al. (1991) find that people choose professions which pay highest rewards on their possessed traits and as a result, in equilibrium state, labor market observes occupational sorting based on personality traits. Other studies try to explain non-participation from a different angle. For example, De Mel et al. (2008) mention that one possible reason of not applying for a loan might be that individuals/firms overestimate the probability of rejection of their loan application. The probability of rejection is based on individual's perception.

The literature review in the preceding paragraphs has important implications for our work. In this paper we bring new insights from the fields of social networking and psychology to explain reasons of non-participation. As far as we know, this is the first study which controls for learning, personality traits and individuals' perception about institutional barriers.

4.3 Sample and Data Collection

The main research question is, what factors drive individuals to apply for Akhuwat's microcredit? Or in other words, why do some microentrepreneurs, although eligible, not apply for credit? To empirically examine reasons for non-participation, we compare *Applicants* and *Eligible-Non-Applicants*. We selected a group of *Applicants* from a pool of Akhuwat's applications. Group of *Eligible-Non-Applicants* consists of those eligible microentrepreneurs who did not apply for Akhuwat loan. Due to lack of information, finding eligible-non-applicants was a challenge. To overcome this problem, the fieldwork was conducted in two stages. In the first stage, a shorter version of survey was administered to those microentrepreneurs who were eligible based on Akhuwat eligibility criteria but did not apply for microcredit; and in the second stage, we conducted a detailed survey. We used the following sampling strategy.

4.3.1 Sampling

In the first stage, we are interested in those microentrepreneurs who could meet the eligibility criteria of Akhuwat but did not apply for a loan. To identify them, we used the application form of Akhuwat as screening instrument. The application form is simple and mainly contains household and business related information and planned utilization of loan. Application forms were distributed among potentially eligible microentrepreneurs in the neighbourhood of mosques (through which Akhuwat operates) and branches of Akhuwat. The search was purposive and businesses similar to that of applicants were targeted. The target group was approached at either home or business addresses. A total of 317 applications were filled out. These applications (from non-participants) were then mixed with those actual loan applications which Akhuwat received. Akhuwat officers were asked to evaluate all applications and decide about their eligibility based on Akhuwat's existing criteria. To avoid any possible bias in favour or against the actual applicants, the identity of *those applied* and *those who did not apply* were kept confidential from the officers. Furthermore, the applications received in one branch were evaluated by officers of other branches. Among 317 non-applicants, 207 were eligible based on information provided in the application. Most of the

rejected 110 applications were deemed ineligible based on income criteria.

In the second stage, a detailed survey was conducted. The survey instrument consisted of eight sections including a dedicated section on personality. Mueller and Plug (2006) argue that announcement of benefits may change expectations of the respondents and as a result it may create a bias on personality domains. To address this concern and remove any possible contamination, the detailed survey was conducted before announcement of eligible applicants. The target group of the detailed survey comprised of 488 participants (selected from Akhuwat's pool of applications) and 207 non-applicants. Among 207 non-applicants, 8 refused to cooperate and did not fill the detailed questionnaire. The flowchart of sampling strategy is summarized in Figure 4.8-1 in the appendix.

The fact that one group applied for Akhuwat's loan and the other did not, implies that both groups are inherently different. We only claim that both *Applicants* and *Eligible-Non-Applicants* meet Akhuwat's loan eligibility criteria. To test if our sampling strategy has created a valid group of *Eligible-Non-Applicants*, we compared both groups based on following three core eligibility criteria of Akhuwat. Although Akhuwat implements their program through mosques, they claim that their program is secular. Since individuals with higher mosque attendance may have better networks and access to information regarding Akhuwat program, nevertheless we hypothesize that the number of prayers in a day may have an effect on probability of participation. Due to its importance, in addition to the three core eligibility criteria of Akhuwat, we add the fourth one for comparison purposes.

1. *Whether households in both groups have same percapita income level.*
2. *Whether both groups are able to provide personal guarantees.*
3. *Whether both groups are willing to go to mosque. We captured their willingness by asking them a direct question and also gathered data on the number of prayers that they attend in a day.*
4. *The number of prayers attended by respondents in a day*

As it is evident in Table 4.3-1, we cannot reject the null hypothesis of equal means. It implies that our sampling strategy created a valid group of non-Applicants who are eligible but did not apply.

Table 4.3-1: Comparison of Applicants and Eligible-Non-Applicants based on Akhuwat Eligibility Criteria

Variable	Applicants	Eligible- Non-Applicants	t-test t-statistic
Percapita income	2,716	2,610	0.643
Can provide guarantees	83.4%	82.9%	0.155
Have problem visiting mosque	3.9%	4.0%	0.077
Number of prayers in a day	2.45	2.3	1.030

Significance levels (*=10%, **=5%, ***=1%)

4.3.2 Data and Operationalization of Key Variables

This study uses a cross-sectional survey data gathered from 687 respondents (488 applicants and 199 eligible-non-applicants). The survey was conducted in June 2010 in four branches of Akhuwat microfinance headquartered in Lahore, Pakistan. The data on household and business characteristics, NEO-FFI personality traits, learning and perceptions were gathered through a survey questionnaire. Table 4.8-11 in the appendix provides a short description on the different sections of the survey instrument. Table 4.3-2 provides descriptive statistics and comparison of selected variables for Applicants and Non-Applicants.

Table 4.3-2: Comparison of Means-Applicants vs. Non-Applicants

H_0 : Both Groups have Equal Means					
Variables	Applicants (N=488)		Non-Applicants (N=199)		t-test t-statistic
	Mean	Std. Dev.	Mean	Std. Dev.	
Household percapita monthly income	2,716	2,031	2,610	1,774	0.643
Sex of the entrepreneur	0.76	0.43	0.79	0.41	0.840

Education of the entrepreneur	4.89	4.12	5.21	4.70	0.883***
Age of the Entrepreneur	38.60	10.30	35.00	10.20	4.220**
HH with at least one chronic patient (Yes=1, No=0)	0.17	0.38	0.10	0.30	2.440
Number of prayers in a day	2.45	1.69	2.30	1.65	1.030
Family business	0.10	0.30	0.10	0.30	0.168
Doing business for survival	0.13	0.33	0.07	0.25	1.110
Profit and growth opportunities	0.34	0.48	0.39	0.49	2.290**
Direct monthly business income	8,170	1,365	8,244	1,354	0.647
Credit requirement	23,557	17,193	21,025	14,900	1.820*
Neuroticism	2.48	0.65	2.54	0.71	1.050
Extraversion	3.51	0.65	3.50	0.64	0.083
Openness	3.27	0.78	3.26	0.76	0.205
Agreeableness	3.61	0.66	3.58	0.71	0.455
Conscientiousness	3.86	0.68	3.71	0.71	2.480**
Positive Internal Learning-Internal	0.26	0.44	0.15	0.35	3.270***
Neutral Internal Learning-Internal	0.13	0.33	0.15	0.36	0.902
Negative Internal Learning-Internal	0.09	0.29	0.19	0.39	3.460***
Positive External Learning-Relatives	0.32	0.47	0.21	0.41	2.860***
Neutral External Learning-Relatives	0.09	0.29	0.11	0.31	0.537
Negative External Learning-Relatives	0.09	0.29	0.18	0.38	3.210***
Positive External Learning-Friends	0.26	0.44	0.18	0.39	2.220**

Neutral External Learning-Friends	0.08	0.28	0.10	0.30	0.482
Negative External Learning-Friends	0.06	0.24	0.13	0.33	2.710***
Think that MFI takes bribe(Yes=1, No=0)	0.46	0.50	0.50	0.50	0.986
Consider loan bad (Yes=1, No=0)	0.55	0.50	0.61	0.49	1.460
Perception that loan enforcement is non-institutional	0.52	0.50	0.57	0.50	1.080

Significance levels (*=10%, **=5%, ***=1%)

4.3.2.1 Household

The household section relates to detailed information on household characteristics. In this section we collected basic demographic data (age, sex, marriage, education etc), health status, income and its sources, household assets, access to different amenities and prevalence of dowry in the household etc. 86% of the households in our sample are male-headed families. The microentrepreneurs in our sample have an average education of 4.98 years.

Based on bivariate analysis of subsamples, both Applicants and Non-Applicants are significantly different from each other on some household characteristics. Applicants have larger family with 5.64 members compared to 5.50 members in family of Non-Applicants. Entrepreneurs in group of Applicants are 39 years old compared to 35 years in non-applicants. Similarly, Applicants reported significantly higher rates of chronic illness than Non-Applicants.

4.3.2.2 Business

The business section of the questionnaire comprises of detailed information on microenterprises and its owner's characteristics. In our sample, most microenterprises work in retail (34%) and services (35%). Microentrepreneurs in our sample reported limited access to formal financial services. 8% of microentrepreneurs have a bank account in their name and only 2% has business account. Applicants reported a slightly lower monthly business income (Rs. 8,170) compared to non-applicants (Rs. 8,243). For evaluation of business assets, we recorded value of tools and

equipments, vehicles, immovable property, inventories and unfinished goods etc at market price and net of depreciation. The average assets owned by a microenterprise were Rs. 29,309 and both groups did not show any significant differences on this variable.

In the business part of our survey instrument, profitability of microenterprise is the key variable of interest. Like other developing countries, the activities of microenterprises in Pakistan are not well documented. In our sample 45% of the businesses did not maintain any record and 15% relied on personal notes/chits. Remaining 40% used informal registers for record-keeping and none of the microenterprises in our sample prepared formal financial statements. McKenzie and Woodruff (2008) state that due to lack of proper record keeping, responses on business profitability are based on recall and personal notes which may result in reporting errors.

De Mel et al. (2009b) find that data on profits obtained by asking a direct question provides more reliable measure than using revenue minus expenses approach. The study reveals that firms tend to underreport their revenues by 31% and similarly they overestimate their expenses which results in discrepancy between both approaches. We measure profitability of microenterprises in two different ways. First, we employ revenues minus expenses approach and second we ask a direct question on business profitability. In our sample, data on income obtained through both methods were significantly correlated with coefficient of 0.86 which is higher than the surveys done in other countries. Correlation between direct profits and profits derived from revenue minus expenses approach was 0.26 in Côte d'Ivoire, negative and close to zero in Ghana (Vijverberg and Mead 2000) and 0.24 in Zimbabwe (Daniels 2001).

4.3.2.3 Personality Traits

Literature in psychology shows that personality traits are partly heritable and partly shaped by environment through social roles and cultural milieu (Loehlin et al. 1998, McGue et al. 1993, Helson et al. 2002). To address the cultural malleability of personality traits, we use the Urdu version of NEO-FFI test developed by National Institute of Psychology, Islamabad, Pakistan³⁶. Definitions of each domain and associated characteristics are given Table 4.3-3.

Table 4.3-3: Definition of Personality Domains

Domain	Definition	Characteristics
Neuroticism	The degree to which a person experiences the world as threatening and beyond his/her control.	High Fear, sadness, embarrassment, anger, guilt and disgust.
		Low Emotional stability, generally calmness, feeling relaxed, even-temperament, feeling secure, self-satisfied, able to face stressful situations
Extroversion	The degree to which a person needs attention and social interaction.	High Assertive, active, talkative, enjoy excitement and stimulation, cheerful in disposition, sociable, gregarious
		Low Reserved, quiet, independent rather than follower, even paced
Openness	The degree to which a person needs intellectual stimulation, change, and variety.	High Imaginative, creative, complex, intellectual curiosity, daring, independent, analytical, untraditional, artistic, liberal and independence of judgment
		Low Uncreative, simple, not curious, non-adventurous, conforming, non-analytical, inartistic, traditional, conservative and narrow interests
Agreeableness	The degree to which a person needs pleasant and harmonious relations with others.	High Sympathetic, altruistic, warm
		Low Egocentric, skeptical, cold, competitive and non-cooperative
Conscientiousness	The degree to which a person is willing to comply with conventional rules, norms, and standards.	High Scrupulous, punctual, consistent, persevering, organized and reliable
		Low Careless, low assertiveness, unorganized, impulsive, irresponsible, undependable and lazy

Source: Characteristics taken from NEO-FFI (2002) booklet of National Institute of Psychology and definitions taken as verbatim from Borghans et al. (2008)

Urdu version of NEO-FFI is a multiple construct Big Five personality inventory and is fully adapted to local environment. The test is comprised of 60 questions with 33 positive and 27 negative scoring items. We choose to use NEO-FFI³⁷ because it adequately describes personality at the broadest level (Goldberg 1971). Urdu version of NEO-FFI has been tested on large number of participants for its reliability. Langdrige and Hagger-Johnson (2009) are of the view that tested scales can be implemented directly in the field without pretesting. Borghans et al. (2008) argue that anticipation of future benefits may increase present self-esteem; therefore, we expected that announcement of beneficiaries or eligibility of applicants might contaminate responses on the personality measures. To tackle this issue, we conducted survey prior to announcement of eligibility. The enumerators asked questions on NEO-FFI test from the respondents and recorded their responses. We are aware that the responses may have been contaminated by the way the questions were put to the respondents.

For each domain, the NEO-FFI test resulted in alpha reliability³⁸ ranging from 0.76 to 0.84. Table 4.3-4 provides reliability coefficients and average inter-item covariance. Usually, reliability of 0.70 or higher are considered adequate (Nunnally and Bernstein, p. 265)³⁹. Since psychological scales require more introspection than cognitive tests, Youngman (1979) considers reliability of as low as 0.60 acceptable.

Table 4.3-4: NEO-FFI Reliability Test (Full Sample N=687)

Domain	No. of items in scale	Average inter-item covariance	Scale reliability coefficients
Neuroticism	12	0.351	0.78
Extroversion	12	0.320	0.77
Openness	12	0.500	0.84
Agreeableness	12	0.348	0.76
Conscientiousness	12	0.379	0.80

Each personality domain was measured with 12 questions on a scale from 1 (strongly disagree) to 5 (strongly agree)⁴⁰. Table 4.8-7 in the appendix shows that Neuroticism is negatively correlated to Extraversion, Openness, Agreeableness and Conscientiousness. Besides Neuroticism, remaining four domains are positively correlated to each other. Respondents scored an average of 2.50 on Neuroticism, 3.51 on Extraversion, 3.27 on Openness, 3.60 on Agreeableness and 3.82 on Conscientiousness. Using a two-tailed t-test, bivariate analysis reveals that on Conscientiousness scale Applicants scored significantly higher than Non-Applicants. For Neuroticism, Extraversion, Openness and Agreeableness variables, we cannot reject null hypothesis of equal means. Table 4.8-4 in the appendix provides comparison of NEO-FFI for applicants and non-applicants (*see* Figure 4.8-2 for boxplots); and Table 4.8-5 in the appendix provides comparison of NEO-FFI for male and female entrepreneurs (*see* Figure 4.8-3 for boxplots).

4.3.2.4 Learning

Individuals take loans for easing different credit requirements and attach various expectations to it. Any gap in the expected and actual outcome of the loan sends a positive or negative feedback. We conceptualize learning relating to credit histories and recognize it to be emanating from two different sources. The first one is endogenous (i.e. experimentation) which we call internal learning and the other one is exogenous (i.e. learning from others) which we call external learning. In the context of social network, we capture exogenous learning from two types of bonds i.e. *relatives* and *friends*. With such conceptualization, we divide learning in three categories i.e. learning through experimentation, learning from relatives and learning from friends. Intuitively individuals value each type of learning differently depending on the strength of interdependence of each bond. Each category of learning is then measured at four levels. For example, we asked following question from the respondents to measure internal learning.

Q: If you ever took a loan, what was the impact of the loan on your socio-economic conditions?

(1) Never took a loan [No Learning] (2). Took a loan and condition improved [Positive Learning] (3). Took a loan and condition did not change [Neutral Learning] (4). Took a loan and condition deteriorated [Negative Learning]

Compared to *No Learning*, *Neutral Learning* has additional informational content. Individuals with *Neutral Learning* had gone through the loaning process in the past whereas individuals with *No Learning* did not have such experience. Neutral learning might negatively affect the participation decision especially in those situations where the respondents consider loans as a social stigma. External learning from relatives and friends were also operationalized in the same manner. For detail (*see* Table 4.8-9 in the appendix).

In full sample, internal learning, external learning from relatives and external learning from friends were reported by 48%, 50% and 41% of the respondents respectively. Compared to Non-Applicants, group of Applicants has significantly higher proportion of individuals with positive learning and significantly lower proportion of individuals with negative learning.

4.3.2.5 Perception

Institutional barriers are supply side phenomena; however, perception of these barriers makes them a demand side problem. In our research design, both Applicants and Eligible-Non-Applicants face same institutional barriers because eligibility of both groups was decided on same selection criteria. This implies that we treat institutional barriers as *given* but at the same time acknowledge that individuals might have different perceptions of these barriers. For example, one of the criticisms on microfinance is that MFIs sometimes resort to non-institutional mechanisms for enforcing credit discipline (e.g. use of threats and violence). Similarly, MFIs consider extreme poor as risky clients and hence poor are excluded (Rahman 2000). We capture individual variations in perceptions by asking different questions. For example;

Q: Do you think that MFIs lend to the poor? [Yes] [No]

The above question was intended to capture individual's perception about MFI's mindset. In our sample, both groups perceive institutional

barriers differently. Significant differences include perception about employees' behaviour, MFIs' credit policy/mind-set towards the poor and microentrepreneurs' confidence in their own entrepreneurship skills. 36% of the Non-Applicants and 29% of the Applicants perceive that employees of MFIs are unfriendly. 39% of the Applicants and only 32% of the Non-Applicants think that MFIs lend to the poor. 87% of the Applicants were confident that they could payback their loan compared to only 81% of Non-Applicants.

4.4 Theoretical Framework

Various studies have found that the marginal returns to capital for microenterprises are well above the market interest rate. While investigating heterogeneity of treatment effects, De Mel et al.(2008) raise an interesting question as to why firms are not taking advantage of these high returns. Is it because of the imperfect markets; or is it because of self-exclusion driven by different risk propensity of entrepreneurs or is it because of both?

There is no simple answer. Although, numerous research studies have established positive impact of microcredit, at the same time, microcredit does not always provide panacea of all problems for the poor⁴¹. The benefits accrued to microcredit are not visible in short run and similarly they are subtle and not clear to everyone alike. In other words, microcredit also carries a degree of risk. For example, Montgomery (1996) argues that some poor consider credit as a potential burden; Webb et al. (2002) mention that poor avoids credit when economic conditions are volatile and Hashemi and Rosenberg(2006) report that large number of new startups fail and hence investment in new startups is a risky proposition. So the pertinent question is that how do entrepreneurs make decisions which involves risk?

For providing theoretical grounding to our research, we benefit from two strands of literature. The first one is motivated by literature in management science and the second one builds on cross disciplinary research in the field of economics and psychology.

4.4.1 Management Science

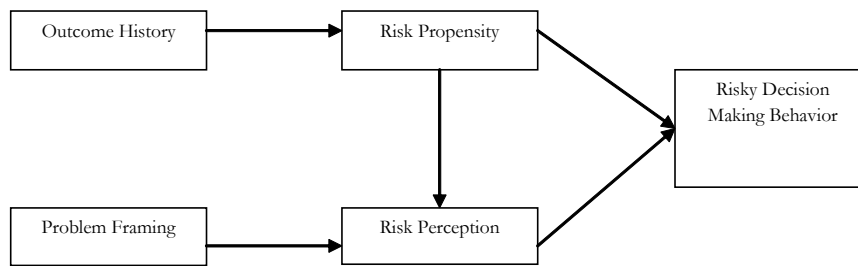
According to social networking theory, individuals make a rational choice of developing an interdependent bond with other individuals in

the network. The nature of bond is defined by type of interdependence (e.g. kinship, friendship, common belief or interest etc.). Individuals pursue their own goals and informally participate in information and risk sharing. In this process, individuals learn both from their own past actions and actions of other individuals in the network.

Hayek(1976, p.124-25)⁴² argues that individuals set different goals and attach various expectations to them. Some of the expectations are not met and in the process of striving, individuals learn by trial and error. In response to failure, like any other self-organizing system, individuals learn and make adjustments. As a result, past decisions resulting in positive outcomes are more likely to be repeated than those resulting in negative outcomes (Sagi and Friedland 2007). Besides repetition of decisions, successful outcome history increases risk seeking propensity (Thaler and Johnson 1990). With a positive outcome history, decision makers are more likely to make similar decisions when confronted with a similar situation.

In addition to experimentation (learning from own actions), feedback also comes from exogenous arrival of information by observing actions of others. Sitkin and Weingart(1995) provide a conceptual framework showing the effect of feedback on decision making behavior. The core proposition of Sitkin and Weingart is that variation in exogenous variables - *outcome history* and *problem framing* - affects decision making behavior. The effects of outcome history and problem framing on decision making behavior are mediated by *risk propensity* and *risk perceptions*. According to this model, the sources of variations in decision making come from two different levels. The first source of variation relates to individual differences in risk preferences in terms of seeking or avoiding risks. The second source of variation in decision making behavior is caused by idiosyncrasies in risk perception, that is, decision makers have different assessment of situational uncertainty. According to this model, outcome history alters risk propensity of the decision maker; however, risk perceptions of the decision maker is shaped both by risk propensity and problem framing (see Figure 4.4-1).

Figure 4.4-1: Mediated Model of the Determinants of Risky Decision-Making Behaviour



Source: Sitkin and Weingart (1995)

The above model shows that exogenous information resulting from interaction within social network are factored in the decision making process through problem framing. Individuals confront various uncertainties which they try to resolve by getting feedback from other individuals in the network. For example, before applying for a loan, an entrepreneur may discuss its pros and cons with her family and friends. The process of consultation involves *framing*. The consulted members in the network frame the problem the way they see or perceive it resulting in a feedback contagion. Positive or negative framing of the problem influences the risk perception of the decision maker and as a result some individuals may consider loan-taking as an *opportunity* and others may see it as a *threat*. In this framework, we hypothesize that negative credit histories of individuals and their peers in the network will discourage them to apply for Akhuwat's microcredit. Similarly, positive credit histories will encourage them to apply.

4.4.2 Economics and Psychology

The second strand of literature builds on the intuitive link between the field of psychology and economics. In their argument against external imposition of preferences, Mullainathan (2008) argues that economic decisions have more deep-rooted psychological underpinnings than what standard economic models suggest. Standard models rely on assumption

of unbounded rationality of economic agents; however, in reality agents have bounded rationality. In a more realistic setting, individuals differ from each other in the way they think, feel, and act (Borghans et al. 2008) and hence due to these differences, they react *differently* to same situation.

Personality may be viewed as a response function which generates individual-specific enduring patterns of actions in response to the constraints, endowments and incentives faced by the individuals (Heckman 2011). Personality psychologists measure the individuality of these patterns through personality traits which are “*relatively*” stable, person-specific determinants of behaviour. Almlund et al. (2011) consider preferences as natural counterpart of these traits in economics. Muller and Plug (2006) conceptualize personality as a bundle of productive traits. They argue that individuals trade these traits against equilibrium price which is determined by market return on each component of the trait vector. Individuals choose professions which pay highest reward on their traits and as a result, in equilibrium, labor market observes occupational sorting based on personality traits (Tett et al. 1991).

Besides affecting behavior, personality traits influence the way individuals *perceive* and *process* information and thus personality affect personal choices (Benartzi and Thaler 2002). Individuals make certain choices based on their information sets which are generated by a production function in which traits enter as key input. Information sets are updated through a feedback mechanism in response to learning from experimentation as well as arrival of exogenous information (Almlund et al. 2011). Knowing their own preferences, productivity rewards, prices, consumption outcomes, traits and endowments of effort, individuals make personal choices (Almlund et al. 2011).

In simple words, individuals will make choices which potentially maximizes their reward and that the choices, beside other factors, are influenced by personality traits. Among the big five personality traits higher score on Extroversion, Openness, Agreeableness and Conscientiousness are socially desirable (Wichert and Pohlmeier 2010). Neuroticism, on the other hand, has a negative connotation and higher score on this domain shows a neurotic personality. We frame our hypotheses on the assumption that socially desirable traits will encourage and Neuroticism, on the other hand, will discourage individuals to apply for Akhuwat’s microcredit.

4.5 Empirical Specification

There are certain costs and benefits associated with microcredit, therefore, a utility maximizer entrepreneur will apply for microcredit if the expected utility of applying for microcredit is more than expected utility of not applying. Let A_i^* represents the latent utility⁴³ associated with Akhuwat microcredit.

$$A_i^* = \beta_H HH_i + \beta_B B_i + \beta_P P_i + \beta_L L_i + \beta_{IB} IB_i + \varepsilon_i \quad 4.5-1$$

A_i^* is unobserved and we can only see whether or not an individual has applied for Akhuwat microcredit. Let A_i be a binary outcome variable taking values 1 if individuals applied for the loan and 0 otherwise. A_i can be considered as a function capturing variations in the household characteristics HH_i , business characteristics B_i , personality of the entrepreneur P_i , learning L_i and perception about institutional barriers IB_i . The probability of participation in Akhuwat program may be estimated using following model.

$$\text{Prob}(A_i = 1 | X_i) = \text{Prob}(A_i^* > 0 | X_i)$$

Where X_i represent vector of covariates on the right side of Equation 4.5-1.

$$= \text{Prob}(\beta_H HH_i + \beta_B B_i + \beta_P P_i + \beta_L L_i + \beta_{IB} IB_i + \varepsilon_i > 0)$$

$$= \text{Prob}(\varepsilon_i > -[\beta_H HH_i + \beta_B B_i + \beta_P P_i + \beta_L L_i + \beta_{IB} IB_i])$$

$$= 1 - G(-[\beta_H HH_i + \beta_B B_i + \beta_P P_i + \beta_L L_i + \beta_{IB} IB_i])$$

$$\text{Prob}(A_i = 1 | X_i) = G(\beta_H HH_i + \beta_B B_i + \beta_P P_i + \beta_L L_i + \beta_{IB} IB_i) \quad 4.5-2$$

For any real number z , $G(z) \in [0,1]$. HH_i is a vector of household variables which included household size, sex of household head (dummy), household monthly income and expenditure, number of school going children in the household, number of unemployed and not school going HH members, presence of chronic patient in the household (dummy), value of dowry and presence of unmarried female member in the household (dummy). B_i is a vector of business and entrepreneur related information which included variables like education, age, prayers in a day (dummy), reasons of choosing this particular business (dummy), monthly net business income and credit requirement. P_i is a vector of personality traits comprising of NEO-FFI big five domains i.e. Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. All forms of learning L_i and perception of institutional barriers IB_i were entered as dummy variables.

The error term ε_i represents other unobserved factors which may affect participation in Akhuwat. Assuming that error term is normally and randomly distributed i.e. $\varepsilon_i \perp (HH_i, B_i, P_i, L_i, IB_i)$, we use probit model to estimate vectors of parameter β_{HH} , β_B , β_P , β_L and β_{IB} associated with household, business, personality, learning and perception of institutional barriers respectively. To find out the differential effects of covariates on probability of participation, we estimate probit marginal effects. We also run Logit and LPM to ascertain sensitivity of our estimates assuming different functional forms of G .

4.6 Results

We estimate four specifications in which we combine different exogenous sets of covariates one by one. In specification1, we only control for household and business characteristics of microentrepreneurs. In specification2, we include additional control for personality traits by adding

vector of five domains of NEO-FFI. In specification3, we add different learning episodes of microentrepreneur in our model. Finally in specification4, we bring perception of the microentrepreneurs into the equation. Probit marginal effects of all four specifications are presented in Table 4.6-1. We also estimated our model in Equation 4.5-2 under different distributional assumptions of G . Sensitivity analysis in Table 4.8-2 in the appendix shows that our estimates are stable.

Using dummy variables approach, we start our analysis by investigating branch specific effects to see if pooling of data is reasonable. Branch dummies and its interaction with other covariates were introduced into the model. The joint significance test on equality of slopes and intercepts resulted in non-significant p-value ($\text{Prob} > \text{Chi}^2 = 0.1390$). Based on the test statistic, we cannot reject null hypothesis of parameter stability across branches and, therefore, run pooled regressions.

Our analysis shows that older microentrepreneurs have higher tendency to apply for Akhuwat loan, however, the effect of age is non-linear. Ucbasaran et al. (2008) find that entrepreneurs with higher human capital are more likely to identify opportunities and subsequently pursue them. We expected that more educated microentrepreneurs would be more likely to participate in Akhuwat microcredit program; however, our results did not show any impact of education on participation. In developing countries, women entrepreneurs are thought to be relatively more credit constrained than male entrepreneurs (Khandker 1998). We expected the same in Pakistan and posited that female entrepreneurs would be more likely to apply for Akhuwat microcredit. Based on our sample, however, we did not find such evidence. The presence of at least one chronic patient in the household increases the probability of applying by 13-15 percentage points. Although, the presence of chronic patient in the household is not significantly correlated to health related expenditures, the increase in probability of participation may either mean that loan amount is intended to be spent on health or it may show a desire to meet health related expenditures in future as a result of improved profitability. Evans et al. (1999) reported similar evidence from Bangladesh. Evans et al. found that members of an MFI in Bangladesh reported higher rates of chronic illness than non-members.

One of our main findings is that Akhuwat attracts survivalist enterprises. We asked a direct question from the respondents regarding their main motivation behind running this particular business. We divided

these responses into four categories. The first category consists of those entrepreneurs who *inherited* their business, the second category consists of those entrepreneurs who said to be doing business for *survival* of their family, the third category reported to be doing business for *growth opportunities* and the fourth category consisted of those entrepreneurs who cited *other reasons*. In all four specifications, our analysis shows that *survivalists* are 11-13% more likely to apply for Akhuwat loan compared to those entrepreneurs who cited *other reasons*. Microentrepreneurs who *inherited* their business and those who are doing business for *growth opportunities* have no effect on probability of participation.

Our results show that Neuroticism, Extraversion, Openness and Agreeableness do not significantly explain participation as hypothesized. Among five domains, only Conscientiousness has a significant positive effect on participation. In all specifications, a unit increase on Conscientiousness scale increases the probability of applying by 5.8-5.9% (at $\alpha = 5\%$). Conscientiousness accentuates goal oriented behaviour and it affects the participation decision through one or more of its facets i.e. scrupulousness, punctuality, consistency, perseverance, ability to organize and reliability.

In the theoretical part, we argued that historical outcomes and problem framing affects risk propensity and risk perception of an individual and as a result they have the ability to influence decision making behaviour. We expected that positive learning will increase and negative learning will decrease probability of participation in Akhuwat. Our analysis shows that on internal learning part, both positive and negative learning have significant effect on probability of participation. Microentrepreneurs with positive internal learning are 8.6-8.7 percentage points more likely to apply for Akhuwat loan than microentrepreneurs with no learning. Similarly, negative learning decreases probability of participation by 16.4-17.2 percentage points. This is an interesting finding. On average, the absolute effect of negative learning (i.e. decrease in probability of participation) is more than the effect of positive learning. In simple words, discouragement from negative learning is more than the encouragement from positive learning. In some ways, our finding concurs with Prospect Theory which fundamentally posits that “losses loom larger than gains” (Kahneman and Tversky 1979). The paper explains that the fear of losing a sum of money is more than the pleasure of gaining the same amount of money.

In case of external learning from relatives, the positive learning has a small and less significant effect. Negative learning, on the other hand, had a larger effect. Compared to no learning, negative external learning from relatives decreases participation by 7.5-8.0 percentage points at significance level of 10%. Overall learning from friends, on the other hand, has no effect on participation. These findings show that individuals attach more weight to learning from relatives than to learning from friends.

To ensure parameter stability of different learning episodes, we simulated Specification 4 one thousand times by randomly dropping 1% observations in each draw (see Figure 4.8-4, Figure 4.8-5 and Figure 4.8-6). The simulation shows persistent effects of positive and negative internal learning on participation. In other words, we do not see any unusual outliers.

MFIs use different methods for enforcement of credit discipline. Contrary to the success narrative of microcredit, different studies have also documented negative impact of microcredit. Some of the adverse effects are related to the way credit discipline is enforced. For example, at times, in order to ensure loan repayments, borrowers are subjected to physical and emotional violence. In our sample, perception about enforcement of credit discipline significantly affects participation decision. We divided perceptions about loan enforcement into institutional and non-institutional mechanisms. Institutional mechanisms consisted of recovery through litigation, pressure of guarantors and pressure from within the family. Non-institutional mechanisms entail recovery through coercive methods e.g. actual or threats of physical and emotional violence, confiscation of assets and damaging reputation etc. We find that entrepreneurs fearing non-institutional enforcement of credit discipline are 6 percentage points less likely to apply for Akhuwat loan than those entrepreneurs who believe that MFIs use institutional enforcement mechanisms for loan recovery.

Table 4.6-1: Determinants of Probability of Participation in Akhuwat—Probit Marginal Effects

Variable	Specifica- tion1	Specifica- tion2	Specifica- tion3	Specifica- tion4
Age of the Entrepreneur	0.026** (0.01)	0.025** (0.01)	0.027** (0.01)	0.026** (0.01)
Age square	-0.000 (0.00)	-0.000 (0.00)	-0.000* (0.00)	-0.000 (0.00)
HH with at least one chronic patient	0.126*** (0.04)	0.128*** (0.04)	0.148*** (0.04)	0.149*** (0.04)
<u>Choice of business</u> (Ref: others reasons)				
Family business	-0.037 (0.06)	-0.024 (0.06)	-0.043 (0.07)	-0.035 (0.07)
Profit and growth opportunities	-0.030 (0.04)	-0.026 (0.04)	-0.028 (0.04)	-0.027 (0.04)
Survival	0.110** (0.05)	0.113** (0.05)	0.130*** (0.05)	0.126** (0.05)
<u>Personality</u>				
Neuroticism		-0.038 (0.04)	-0.039 (0.04)	-0.042 (0.04)
Extraversion		-0.029 (0.04)	-0.022 (0.04)	-0.026 (0.04)
Openness		0.007 (0.03)	0.007 (0.03)	0.011 (0.03)
Agreeableness		-0.004 (0.03)	-0.019 (0.03)	-0.017 (0.03)
Conscientiousness		0.058** (0.03)	0.058** (0.03)	0.059** (0.03)
<u>Internal Learning</u> (Ref: No Learning)				
Positive Internal Learning			0.087** (0.04)	0.086** (0.04)
Neutral Internal Learning			-0.038 (0.05)	-0.041 (0.06)
Negative Internal Learning			-0.164*** (0.06)	-0.172*** (0.06)

External Learning-Relative
(Ref: No Learning)

Positive Internal Learning	0.080** (0.04)	0.075* (0.04)
Neutral Internal Learning	-0.029 (0.06)	-0.037 (0.06)
Negative Internal Learning	-0.128** (0.06)	-0.123* (0.06)

External Learning-Friends
(Ref: No Learning)

Positive Internal Learning	0.052 (0.04)	0.060 (0.04)
Neutral Internal Learning	-0.048 (0.06)	-0.058 (0.07)
Negative Internal Learning	-0.108 (0.07)	-0.105 (0.07)

Perception that loan enforcement is non-institutional -0.060*
(0.04)

N	687	687	687	687
LL	-396.729	-393.148	-373.218	-370.396
(Pseudo) R-squared	.041	.049	.097	.104

Standard errors are reported in parentheses. (** p<0.01, ** p<0.05, * p<0.1)

We also controlled for other household and business variables which resulted in insignificant coefficients. These variables included Household percapita monthly income, Sex of the entrepreneur, education, monthly business profits, and their perceptions about whether MFIs take bribe for loan approvals and whether loan generally helps.

4.7 Conclusions

Various studies have tried to explain reasons of non-participation in microfinance programs; however, the term ‘non-participation’ brings together two important but opposing phenomena. Non-participation may stem from either demand or supply side barriers or both. This paper explores the demand side barriers to participation in Akhuwat Microfinance in Pakistan. To do so, we use cross-sectional data of 488 Akhuwat applicants, and 199 non-applicants who did not apply for a loan, yet are eligible on Akhuwat lending criteria. We use unique research design to

unravel and focus only on the demand side barriers. The survey instrument gathers detailed information on household and business level indicators, personality traits of microentrepreneurs, different learning episodes relating to credit histories of microentrepreneurs, and their perceptions about institutional barriers. The paper estimates four specifications using probit model to see the effect of different sets of covariates on probability of applying for Akhuwat microcredit. We also conduct sensitivity analysis and find that our estimates are stable under different distributional assumptions.

The paper finds that older microentrepreneurs and microentrepreneurs having at least one chronic patient in the household are more likely to apply. Similarly survivalist microentrepreneurs –those reported to be doing business for survival of their family—are more likely to apply for Akhuwat microcredit. In this study, we measured personality of microentrepreneurs with the Urdu version of NEO-FFI which is a multiple construct Big Five personality inventory. Among five personality domains, only conscientiousness, which is a measure of scrupulousness, punctuality, consistency, perseverance, ability to organize and reliability, comes out significant. We find that increase in conscientiousness increases the probability of applying for Akhuwat microcredit.

The effect of learning on participation shows very interesting but intuitive patterns. We focus on learning related to credit histories only, and capture it from three different sources. The first one, referred to as internal learning, comes from experimentation. The other two, relates to external learning both from relatives and friends which take place within the social network. Individuals take loans for meeting different credit needs and attach various expectations to it. They experience negative learning if their expectations are not met; conversely, they experience positive learning if their expectations are met. Our analysis show that probability of applying increases with positive learning and decreases with negative learning both in case of internal learning and learning from relatives. In case of internal learning, the effect sizes are large and highly significant compared to learning from relatives. None of learning episodes from friends was significant. There is strong evidence that microentrepreneurs value negative learning more than positive learning which is consistent with Prospect Theory. Our analyses reveal that individuals attach more importance to relatives than friends in a social network.

There is evidence that microentrepreneurs who perceive enforcement of credit discipline to be non-institutional are less likely to participate.

Overall we find that participation is mainly driven by non-business needs. Businesses with survivalist motives and with at least one chronic patient in the household are more likely to apply for Akhuwat's micro-credit. This may well mean that the loan amount is partially spent on meeting some non-business needs. Clients may benefit if microfinance institutions, along with microcredit, provide affordable insurance products to cover household risks and vulnerabilities. Based on our findings, we also believe that in order to encourage participation in microfinance programs, MFIs may benefit from improving their loan recovery methods or at least try to dispel their impression of coercive loan enforcement.

Notes

²⁶ Chaia, A., A. Dalal, T. Goland, M.J. Gonzalez, J. Morduch and R. Schiff (2009) 'Half the World is Unbanked', *Financial Access Initiative Framing Note*.

²⁷ Evans, T.G., A.M. Adams, R. Mohammed and A.H. Norris (1999) 'Demystifying Nonparticipation in Microcredit: A Population-Based Analysis', *World Development* 27(2): 419-430.

²⁸ I could not access the original paper. This reference is taken from: DeCanio, S.J. (1979) 'Rational Expectations and Learning from Experience', *The Quarterly Journal of Economics* 93(1): 47-57.

²⁹ Bikhchandani et al. (1998) narrates an interesting story about a book *The Discipline of Market Leaders* authored by Michael Treacy and Fred Wiersema. Despite ordinary reviews, the book hit the New York Times bestseller list after the authors slyly purchased fifty thousand copies of their own book from those stores whose sales data are used for compilation of bestseller list. Bestseller list arguably signals quality which has the ability to influence the decision of customers. Bloomberg Businessweek termed this strategy as dirty trick. After creating an artificial demand for the book through the so called 'dirty trick', the book continued as a bestseller for some time.

Source: <http://www.businessweek.com/stories/1995-08-06/did-dirty-tricks-create-a-best-seller> Posted on August 06, 1995 [Last accessed: June 22, 2016]

³⁰ A few studies have examined the effects of learning on decision making behavior. For example, Luttmer et al. (1998) find a strong influence of social networks on participation in state welfare schemes. Using language and geography as proxy

for social networks, the paper finds that people who speak the language of high welfare-using groups are more likely to participate in welfare schemes. Duflo and Saez (2002) study the role of 'peer effects' on participation and investment decisions in a retirement plan offered to employees of a large university. They find that enrolment in the retirement plan and the choice of vendor may be influenced by their peers working in the same department.

³¹ Other products include liberation loan (for repayment of loans taken from money lender), education loan, marriage loan, emergency loan (e.g. family contingencies like hospitalization), silver loan (larger business loans for those who have previously taken three times or more family enterprise loan) and housing loan (only repairs and renovation)

³² Urdu is the national language of Pakistan.

³³ Evans et al. (1999) provide a conceptual framework for barriers to participation in microfinance. Based on a large survey of more than 24 thousands households in Bangladesh, Evans et al. (1999) show that 76% of the households are eligible for microcredit, however, only 27% participates. Non-participants were mostly landless, had smaller family, lower dependency ratios, less education, fewer assets, lower income and more reliance on wage labor. Based on 7% random sample of this population, the paper finds that non-participation is characterized by low female education, smaller family size and lack of landholding.

³⁴ This is especially true for female borrowers in countries which have gender segregated labor markets.

³⁵ Manski (1993) discusses various issues around identification of peer effects. The potential bias in estimating peer effects in a group arise mainly from two sources. First, the peer groups are endogenously formed and, therefore, any estimate of peer effects will be biased due to self-selection. Second, the individual's behavior may be influenced not only by peers but also partly by the common environment shared by all peers. To tackle the problem of self-selection, researchers, to-date, have relied on natural experiments in which the peer groups are formed as a result of random process. For isolating the effects of shared environment, researchers have used panel datasets and have treated common environment as time invariant fixed effects in their models.

³⁶ <http://www.nip.edu.pk/> [Last accessed: June 22, 2016]

³⁷ Variables used in most personality assessment tests can be mapped into one or more dimensions of Big Five (Costa and McCrae 1992).

³⁸ Chronbach's alpha is a measure of internal consistency.

³⁹ Source: Stata 11 Manual

⁴⁰ One of the criticism of self-reported tests are that they might be contaminated by two sources of fake responses (Paulhus 1984). (i) fake responses arising from the intent of the respondent to signal positive image (ii) fake responses arising from self-deception. Ones and Viswesvaran (1998) find that these contaminations does not pose any problem because they have minimal effect on predictive validity of the tests. Mueller and Plug (2006) mentions that ex post self-reported assessment of personality used in different studies can be both cause and consequence of labor market outcomes. In other words the causal relationship is not clear.

⁴¹ In the spate of Indian state of Andhra Pradesh suicides, microcredit, especially its market-led approach towards poverty alleviation, has been vigorously criticized. In Andhra Pradesh, borrowers, who were unable to pay their mounting debt, are increasingly committing suicides. To address this problem, the state of Andhra Pradesh introduced tough legislation for the conduct of microfinance business especially recoveries of loan. Such stories have also been reported from other parts of the world.

Sources:

http://www.ssireview.org/blog/entry/akhuwat_making_microfinance_work
<http://www.nytimes.com/2010/11/18/world/asia/18micro.html?pagewanted=all> [Last accessed: June 22, 2016]

⁴² Reference taken from: DeCanio, S.J. (1979) 'Rational Expectations and Learning from Experience', *The Quarterly Journal of Economics* 93(1): 47-57.

⁴³ Our formulation of latent utility function is based on Wooldridge (2009).

4.8 Appendices

Table 4.8-1: Determinants of Participation-Probit

Variable	Specifi- cation1	Speci- fication2	Specifi- cation3	Specifi- cation4
Age of the Entrepreneur	0.077** (0.04)	0.073** (0.04)	0.081** (0.04)	0.079** (0.04)
Age square	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)
HH with at least one chronic patient	0.411*** (0.16)	0.422*** (0.16)	0.512*** (0.16)	0.517*** (0.16)
<u>Choice of business</u> (Ref: others reasons)				
Family business	-0.107 (0.18)	-0.070 (0.18)	-0.126 (0.19)	-0.103 (0.19)
Profit and growth opportunities	-0.087 (0.11)	-0.078 (0.12)	-0.084 (0.12)	-0.080 (0.12)
Survival	0.357* (0.19)	0.372* (0.19)	0.450** (0.20)	0.432** (0.20)
<u>Personality</u>				
Neuroticism		-0.113 (0.12)	-0.118 (0.12)	-0.128 (0.12)
Extraversion		-0.086 (0.12)	-0.065 (0.12)	-0.078 (0.12)
Openness		0.021 (0.08)	0.020 (0.08)	0.033 (0.08)
Agreeableness		-0.013 (0.09)	-0.058 (0.10)	-0.052 (0.10)
Conscientiousness		0.174** (0.08)	0.177** (0.08)	0.180** (0.08)
<u>Internal Learning</u> (Ref: No Learning)				
Positive Internal Learning			0.280* (0.14)	0.275* (0.14)
Neutral Internal Learning			-0.114 (0.16)	-0.123 (0.16)
Negative Internal Learning			-0.457*** (0.17)	-0.478*** (0.17)
<u>External Learning-Relative</u> (Ref: No Learning)				

Positive Internal Learning			0.252*	0.237*
			(0.13)	(0.13)
Neutral Internal Learning			-0.086	-0.109
			(0.18)	(0.18)
Negative Internal Learning			-0.361**	-0.349**
			(0.17)	(0.17)
<u>External Learning-Friends</u>				
(Ref: No Learning)				
Positive Internal Learning			0.162	0.188
			(0.14)	(0.14)
Neutral Internal Learning			-0.142	-0.168
			(0.18)	(0.19)
Negative Internal Learning			-0.306	-0.299
			(0.20)	(0.20)
Perception that loan enforcement is non-institutional				-0.183*
				(0.11)
Constant	-1.386*	-1.439	-1.468	-1.227
	(0.79)	(1.11)	(1.12)	(1.12)
N	687	687	687	687
LL	-396.729	-	-373.218	-370.396
		393.148		
(Pseudo) R-squared	.041	.049	.097	.104

Standard errors are reported in parentheses. (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We also controlled for other household and business variables which resulted in insignificant coefficients. These variables included Household percapita monthly income, Sex of the entrepreneur, education, monthly business profits, and their perceptions about whether MFIs take bribe for loan approvals and whether loan generally helps.

Table 4.8-2: Determinants of Probability of Participation in Akhuwat—Sensitivity Analysis

Variable	Probit	Logit	OLS
Age of the Entrepreneur	0.079** (0.04)	0.133** (0.06)	0.027** (0.01)
Age square	-0.001 (0.00)	-0.001 (0.00)	-0.000* (0.00)
HH with at least one chronic patient	0.517*** (0.16)	0.890*** (0.29)	0.149*** (0.04)
<u>Choice of business</u> (Ref: others reasons)			
Family business	-0.103 (0.19)	-0.173 (0.32)	-0.031 (0.06)
Profit and growth opportunities	-0.080 (0.12)	-0.165 (0.20)	-0.030 (0.04)
Survival	0.432** (0.20)	0.748** (0.36)	0.110** (0.05)
<u>Personality</u>			
Neuroticism	-0.128 (0.12)	-0.220 (0.20)	-0.040 (0.04)
Extraversion	-0.078 (0.12)	-0.141 (0.21)	-0.026 (0.04)
Openness	0.033 (0.08)	0.073 (0.13)	0.013 (0.02)
Agreeableness	-0.052 (0.10)	-0.099 (0.17)	-0.016 (0.03)
Conscientiousness	0.180** (0.08)	0.302** (0.14)	0.054** (0.03)
<u>Internal Learning</u> (Ref: No Learning)			
Positive Internal Learning	0.275* (0.14)	0.489* (0.25)	0.076* (0.04)
Neutral Internal Learning	-0.123 (0.16)	-0.201 (0.27)	-0.039 (0.05)
Negative Internal Learning	-0.478*** (0.17)	-0.784*** (0.28)	-0.165*** (0.06)
<u>External Learning-Relative</u> (Ref: No Learning)			
Positive Internal Learning	0.237* (0.13)	0.408* (0.23)	0.067* (0.04)
Neutral Internal Learning	-0.109	-0.202	-0.038

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	(0.18)	(0.30)	(0.06)
Negative Internal Learning	-0.349** (0.17)	-0.593** (0.29)	-0.123** (0.06)
<u>External Learning-Friends</u> (Ref: No Learning)			
Positive Internal Learning	0.188 (0.14)	0.306 (0.24)	0.050 (0.04)
Neutral Internal Learning	-0.168 (0.19)	-0.323 (0.31)	-0.053 (0.06)
Negative Internal Learning	-0.299 (0.20)	-0.518 (0.33)	-0.104 (0.07)
Perception that loan enforcement is non-institutional	-0.183* (0.11)	-0.317* (0.19)	-0.061* (0.03)
Constant	-1.227 (1.12)	-2.061 (1.90)	0.097 (0.37)
N	687.000	687.000	687.000
LL	-370.396	-370.327	-388.422
<i>(Pseudo) R-squared</i>	.104	.104	.435

Standard errors are reported in parentheses. (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$)

We also controlled for other household and business variables which resulted in insignificant coefficients. These variables included Household percapita monthly income, Sex of the entrepreneur, education, monthly business profits, and their perceptions about whether MFIs take bribe for loan approvals and whether loan generally helps.

Table 4.8-3: Sensitivity Analysis-Marginal Effects

Variable	Probit	Logit	OLS
Age of the Entrepreneur	0.026** (0.01)	0.026** (0.01)	0.027** (0.01)
Age square	-0.000 (0.00)	-0.000 (0.00)	-0.000* (0.00)
HH with at least one chronic patient	0.149*** (0.04)	0.146*** (0.04)	0.149*** (0.04)
<u>Choice of business</u> (Ref: others reasons)			
Family business	-0.035 (0.07)	-0.034 (0.07)	-0.031 (0.06)
Profit and growth opportunities	-0.027 (0.04)	-0.032 (0.04)	-0.030 (0.04)
Survival	0.126** (0.05)	0.124** (0.05)	0.110** (0.05)
<u>Personality</u>			
Neuroticism	-0.042 (0.04)	-0.042 (0.04)	-0.040 (0.04)
Extraversion	-0.026 (0.04)	-0.027 (0.04)	-0.026 (0.04)
Openness	0.011 (0.03)	0.014 (0.02)	0.013 (0.02)
Agreeableness	-0.017 (0.03)	-0.019 (0.03)	-0.016 (0.03)
Conscientiousness	0.059** (0.03)	0.058** (0.03)	0.054** (0.03)
<u>Internal Learning</u> (Ref: No Learning)			
Positive Internal Learning	0.086** (0.04)	0.088** (0.04)	0.076* (0.04)
Neutral Internal Learning	-0.041 (0.06)	-0.040 (0.05)	-0.039 (0.05)
Negative Internal Learning	-0.172*** (0.06)	-0.170*** (0.07)	-0.165*** (0.06)
<u>External Learning-Relative</u> (Ref: No Learning)			
Positive Internal Learning	0.075* (0.04)	0.075* (0.04)	0.067* (0.04)
Neutral Internal Learning	-0.037 (0.06)	-0.041 (0.06)	-0.038 (0.06)

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Negative Internal Learning	-0.123* (0.06)	-0.126* (0.07)	-0.123** (0.06)
<u>External Learning-Friends</u> (Ref: No Learning)			
Positive Internal Learning	0.060 (0.04)	0.057 (0.04)	0.050 (0.04)
Neutral Internal Learning	-0.058 (0.07)	-0.066 (0.07)	-0.053 (0.06)
Negative Internal Learning	-0.105 (0.07)	-0.110 (0.07)	-0.104 (0.07)
Perception that loan enforcement is non-institutional	-0.060* (0.04)	-0.061* (0.04)	-0.061* (0.03)
N	687	687	687
LL	-370.396	-370.327	-388.422
<i>(Pseudo) R-squared</i>	.104	.104	.435

Standard errors are reported in parentheses. (** p<0.01, * p<0.05, * p<0.1)

We also controlled for other household and business variables which resulted in insignificant coefficients. These variables included Household percapita monthly income, Sex of the entrepreneur, education, monthly business profits, and their perceptions about whether MFIs take bribe for loan approvals and whether loan generally helps.

Table 4.8-4: NEO-FFI Reliability Test (Applicants vs. Non-Applicants)

Domain	No. of items in scale	Applicants(N=488)		Non-Applicants(N=199)	
		Average inter-item covariance	Scale reliability coefficients	Average inter-item covariance	Scale reliability coefficients
Neuroticism	12	0.330	0.78	0.403	0.80
Extroversion	12	0.326	0.78	0.308	0.75
Openness	12	0.510	0.85	0.479	0.83
Agreeableness	12	0.330	0.75	0.395	0.78
Conscientiousness	12	0.365	0.80	0.401	0.80

Table 4.8-5: NEO-FFI Reliability Test (Male vs. Female)

Domain	No. of items in scale	Male(N=531)		Female(N=156)	
		Average inter-item covariance	Scale reliability coefficients	Average inter-item covariance	Scale reliability coefficients
Neuroticism	12	0.347	0.78	0.376	0.79
Extroversion	12	0.299	0.76	0.393	0.80
Openness	12	0.493	0.84	0.523	0.85
Agreeableness	12	0.360	0.77	0.311	0.74
Conscientiousness	12	0.372	0.80	0.400	0.82

Table 4.8-6: NEO-FFI Reliability Test (Full Sample N=687)

Domain	No. of items in scale	Average inter-item covariance	Scale reliability coefficients	Reliability coefficients of original test*
Neuroticism	12	0.351	0.78	0.90
Extroversion	12	0.320	0.77	0.82
Openness	12	0.500	0.84	0.80
Agreeableness	12	0.348	0.76	0.81
Conscientiousness	12	0.379	0.80	0.91

* Source: Urdu version of NEO-FFI by National Institute of Psychology, QAU, Islamabad
Rest are author's own calculations

Table 4.8-7: Inter-Scale Correlation Matrix

	N	E	O	A	C
N	1				
E	-0.72	1			
O	-0.52	0.49	1		
A	-0.50	0.53	0.34	1	
C	-0.25	0.23	0.11	0.23	1

Table 4.8-8: Scoring Method of NEO-FFI

<p>Respondents reacted to each question on a five point scale. Some questions contribute positively and some negatively to each personality domain. For example, for measuring Conscientiousness, following questions were asked;</p> <p>Positive Question25: My objectives are very clear and I try to achieve them in an organized way.</p> <p>Negative Question15: I am not a very organized person.</p> <p>Each item was scored in the following manner. Cumulative score for each domain was calculated which is the average score for all 12 questions in the domain.</p>					
Scoring					
Item					
	Strongly Disagree	Agree	Neither Agree Nor Disagree	Agree	Strongly Agree
Positive	1	2	3	4	5
Negative	5	4	3	2	1

Table 4.8-9: Operationalization of Learning

<p>This learning episode is measured mainly through following two questions. It captures learning from one’s own past experiences.</p> <p>Q8: Did you ever take a business loan? Yes/No</p> <p>Q24: (If yes to Q8) what was the impact of the loan on your socio-economic conditions?</p> <p>(1). Condition improved (2). Condition did not change (3). Condition deteriorated</p>		
Learning		Description
No learning		The respondent did not take any business loan.
Positive learning	internal	The respondent took business loan and (s)he thinks that it has improved his/her socio-economic condition
Neutral learning	internal	The respondent took business loan and (s)he thinks that it has not changed his/her socio-economic condition
Negative learning	internal	The respondent took business loan and (s)he thinks that it has deteriorated his/her socio-economic condition

Table 4.8-10: Operationalization of Perception of Institutional Barriers

Perception of	Description
Employees' behavior	<p>Perception about behavior of MFIs' employee 1=friendly,2=unfriendly,3=do not know</p> <p>1: The respondent thinks that the employees of the MFIs are friendly.</p> <p>2: The respondent thinks that the employees of the MFIs are unfriendly.</p> <p>3: The respondent does not know about the behavior of MFI employees.</p>
Bribe	The respondent thinks that MFIs ask for bribe money for loan. (1=Yes, 0=No)
MFI lend to the poor	Respondent thinks that MFI can lend to the poor (1=Yes, 0=No)

Table 4.8-11: Description of Questionnaire

Section	Description
Enumeration Details	This section mainly contains information on personal data of the respondent and status of survey.
Section A: Household Roster	This section gathers personal information e.g age, marital status, schooling, employment and health history of the household.
Section B: General HH Information	This section gathers information on use of mobile phones, type of housing, access to information sources and other basic amenities.
Section C Shocks and risk mitigation strategies	This section gathers information on different idiosyncratic and systemic shocks that a household has gone through. It also gathers information on how these household, if faced with any shock, coped with those shocks.
Section D Credit History	In this section, we gather information on respondent's credit history. This section also operationalizes the concept of learning and perception about different institutional barriers.
Section E Socio-economic profile	This section mainly gathers information on HH income, HH expenditure and HH assets. It also contains questions related to women empowerment.
Section F: Business information	This section gathers information on nature of business, its assets and performance.
Section G: Akhuwat Satisfaction	This section gathers information on satisfaction of borrowers. This section was mainly included at the request of management of Akhuwat.
Section H: Personality	This section is related to personality. Copy rights of Urdu version of NEO-FFI were purchased from National Institute of Psychology, Pakistan. This test is fully adapted to local environment. It consists of 60 questions (12 questions for each domain) scored on scale of 1-5.

Figure 4.8-1: Flowchart of Sampling Strategy

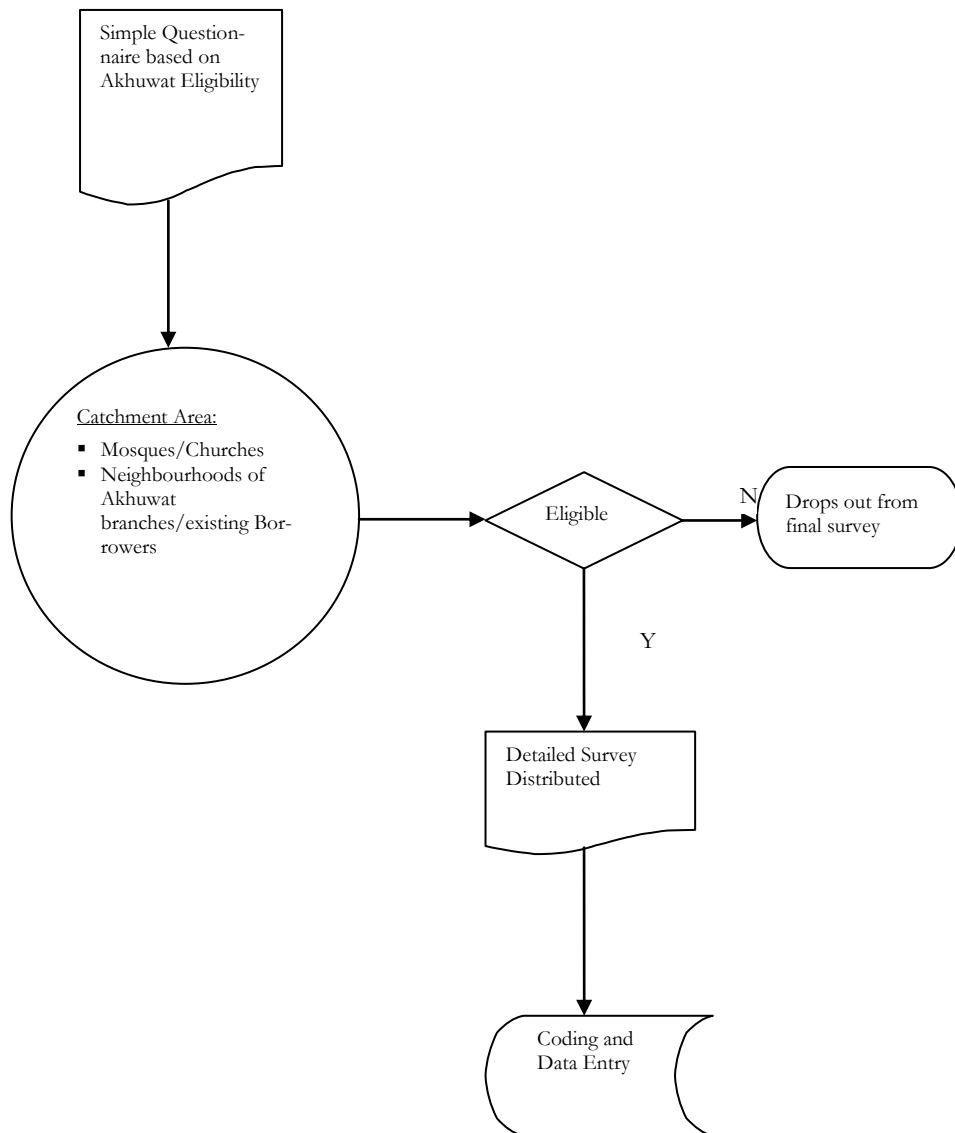


Figure 4.8-2: Comparison of Personality of Applicants and Non-Applicants

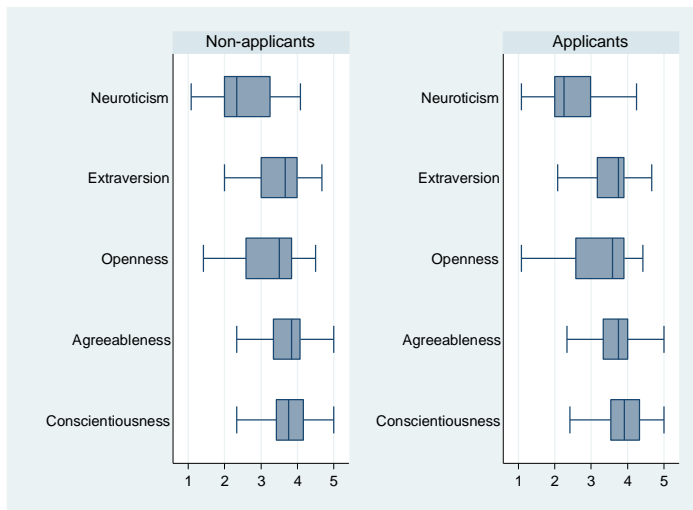


Figure 4.8-3: Comparison of Personality of Female and Male

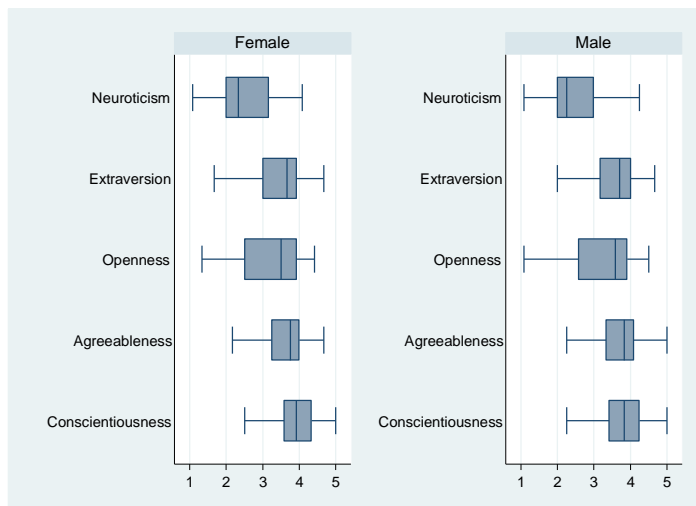


Figure 4.8-4: Simulated Marginal Effects of Positive and Negative Learning-Internal

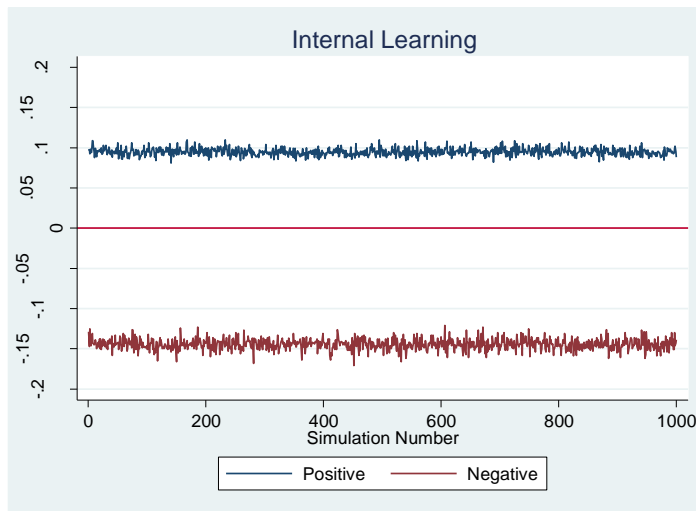


Figure 4.8-5: Simulated Marginal Effects of Positive and Negative Learning-External

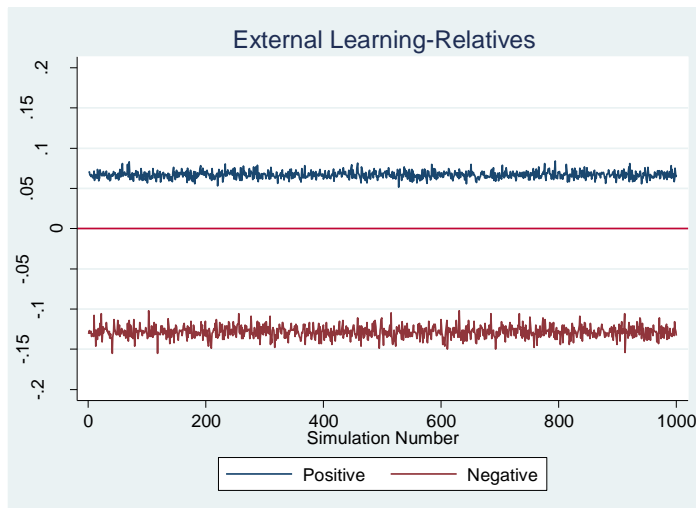
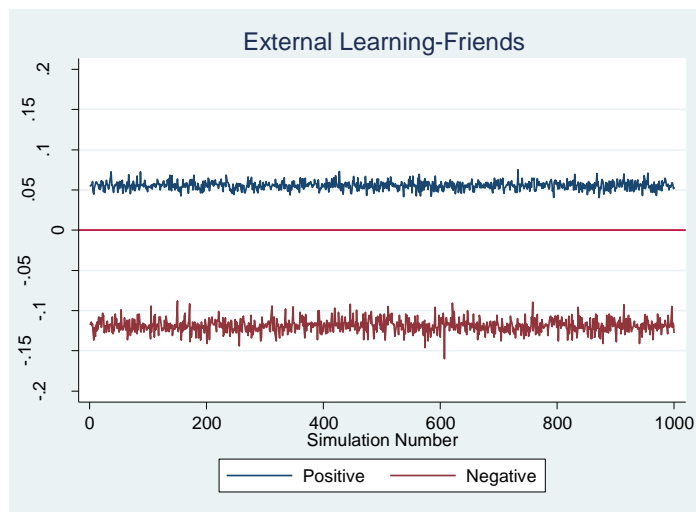


Figure 4.8-6: Simulated Marginal Effects of Positive and Negative Learning-External



5

Estimating Returns to Capital

5.1 Introduction

In developing countries, a large share of the labor force is employed by microenterprises operating in informal sector (De Mel et al. 2008). Microfinance has played an important role in providing much needed capital to these microenterprises. It is axiomatically believed that small firms have enough potential in terms of returns to capital to repay loans with high interest rates –a fundamental claim which is at the core of global microfinance movement. But is there any credible evidence on returns to capital to substantiate this claim?

Besides anecdotes and few rigorous empirical studies, the impact of microfinance on business returns has not been credibly and adequately established (Armendariz and Morduch 2010, Morduch 1999). At the start of the microfinance revolution, the emphasis of development policies was mainly on the timing and scale of intervention; however, as microfinance matured and became a well-funded innovation, the emphasis gradually shifted from interventions to the impact of interventions. This shift was mainly motivated by a desire for evidence-based policy making (Gertler et al. 2011). For long, many scholars and policy makers considered microfinance a ‘development success’ – a narrative which became part of a widely accepted discourse. Three recent randomized studies⁴⁴ have challenged the popular impact narrative and generated mixed reactions among scholars (Bauchet et al. 2011). These papers did not find significant impact of microfinance on different outcome indicators. Besides empirical evidence, news reports⁴⁵ of suicides committed by poor microfinance borrowers in the Indian state of Andhra Pradesh has further put a question mark on the effectiveness of microfinance⁴⁶. Similar stories have also been reported from other parts of developing world. These incidents have brought microcredit under intense scrutiny.

To address the aforementioned problem, the state of Andhra Pradesh introduced tough legislation seeking stringent regulation of microfinance activities. Political sloganeering further incited borrowers to stop repayment of their loans. In their reaction to this crisis, nine distinguished professors criticized the state legislature for enacting a law which in essence encouraged borrowers to ‘default en masse’⁴⁷. In this article, these scholars maintained that lending to the poor itself is not the main innovation of microfinance; rather its main innovation is lending to the poor at ‘*lower interest rates*’ than informal money lenders.

It is patently true that MFIs charge lower interest rates than money lenders; however, a more relevant concern is whether these interest rates are affordable. Or in other words, is the so called ‘lower interest rate’ low enough compared to borrower’s repayment capacity? The debate about repayment capacity essentially boils down to returns on marginal capital – an estimate which can be used as a benchmark for pricing of microfinance products. Returns to capital provides the upper bound of interest rates that microentrepreneurs might be able to pay without causing any harm to them.

The global narrative on microfinance revolves around one fundamental claim. The claim is that once poor entrepreneurs are given access to capital, they will be able to generate steep returns to capital (De Mel et al. 2008, Rodrik and Rosenzweig 2009). There are only few empirical studies in support of this claim. Results from field experiments in Mexico and Sri Lanka have shown large gains from access to capital on business returns; however, two recent studies in India and Morocco do not show any significant impact on business profitability.

Among the studies showing positive impact, two studies stand out. Mckenzie and Woodruff (2008) and De Mel et al. (2008) randomly allocated cash and in-kind grants to firms in Mexico and Sri Lanka respectively. The estimated annual return to capital was 240-396 percent in Mexico and 55-63 percent in Sri Lanka. Apart from these two studies, in a non-experimental study in Mexico, Mckenzie and Woodruff (2006) found annual return of 180% for firms with capital stock of less than \$200 and 40-60% for firms with more than \$500 in capital stock. In Ghana, Udry and Anagol (2006) found annual return of 50% on traditional crops and 250% on non-traditional crops grown on medium sized plots.

In contrast, two recent randomized studies did not find any impact of microcredit on business profits. In these studies, researchers partnered with microfinance organizations, which were planning to open new village branches in India and Morocco. Both studies randomly selected villages for opening of new branches and estimated intention to treat effects (ITT) on different outcomes. In India, Banerjee et al. (2009) finds that households in the treated areas are 1.7 percentage points more likely to start new businesses compared to households in control villages; however, the businesses in treated areas did not report any significant increases in profits. Similarly in Morocco, Crépon et al. (2011) find that the household income from livestock and other non-agricultural businesses in the treated areas did not increase. In another study in Philippines, Karlan and Zinman (2011) randomly assigned marginally rejected loan applications of First Macro Bank to treatment and control groups. The treatment group was eligible to borrow 10,000 pesos which was equivalent to 37% of their average monthly income. After 11 to 22 months, the paper estimated ITT effects and found that the net borrowings of the treatment group increased; however, surprisingly their subjective wellbeing declined.

Available evidence on returns to capital in small enterprises is both scant and mixed. The purpose of this paper is to provide further evidence on returns to capital from a randomized experiment in Pakistan. We conducted this experiment in collaboration with Akhuwat Microfinance. At the beginning of the experiment, we collected baseline data from 488 microenterprises that applied for Akhuwat's interest free loans and were eligible based on Akhuwat's lending criteria. Prior to randomization, we conducted baseline survey. Thereafter, we randomly assigned 243 applicants to treatment group and the remaining 245 applicants to control group. Treatment was given in the form of interest free loans of Rs. 10,000. Borrowers were contractually restricted to spend the loan amount on business activities only and they were required to repay the loan in 10 equal monthly instalments. We followed the treatment and control group for two periods. In the first follow-up survey, which was conducted 5 months after the baseline, we only collected self-reported data on business profits, capital stock and the number of hours worked. Ten months after the baseline, we conducted a second follow-up survey in which we collected detailed household and business level data.

We estimated treatment effects using both, a single and double difference approach. Depending on the method, the capital stock of treated microenterprises increased by Rs. 2,305 to Rs. 2,448. Profits also registered a significant increase ranging from Rs. 241 to 275 a month. The number of hours worked by the microentrepreneurs remained unaffected. Using randomized treatment as an instrument for capital, we find an average monthly return to capital of 8.6 to 11.9%.

This paper makes several contributions. *Firstly*, we use interest free loans as a treatment instead of grants or interest-bearing loans. Some studies (e.g. De Mel et al. 2008, McKenzie and Woodruff 2008) used grants and others (e.g. Banerjee et al. 2009, Crépon et al. 2011, Karlan and Zinman 2011) used interest-bearing loans/microfinance programs as treatment in their experiments. We are not aware of any study which uses interest free loans as treatment in a randomized experiment as done here. *Secondly*, instead of *unrestricted* cash grants, we use *restricted* cash loans. *Finally*, to our knowledge, it is the first study which estimates returns to capital through a randomized experiment in Pakistan –a country where microfinance has made significant progress over the years. Our findings suggest that, if given access to capital, microenterprises in Pakistan can earn steep returns to capital which are considerably higher than market interest rates. With large returns to capital and a huge untapped market, microfinance in Pakistan has immense potential⁴⁸. We expect that this paper will provide useful feedback to policy debates around pricing of microcredit products in Pakistan⁴⁹.

The rest of the paper is organized as follows. Section 5.2 provides a brief literature review on returns to capital in microenterprises. Section 5.3 describes the context of the experiment. Section 5.4 relates to data collection. Section 5.5 investigates sample attrition for systematic patterns. Section 5.6 outlines the empirical strategy. Section 5.7 reports results and section 5.8 provides concluding remarks.

5.2 Literature Review

There is a growing body of empirical and theoretical literature which establishes the importance of access to capital in business creation and survival (Giné and Mansuri 2011). Entrepreneurs normally require minimum initial investment to meet startup costs. In imperfect credit

markets, these costs serve as an entry barrier and as a result different theoretical models predict a long term low-growth poverty trap (Banerjee and Newman 1993)⁵⁰. Market imperfections have severe implications for the poor in particular because it systematically rations out the poor from credit markets. Due to lack of access to credit, poor households may not be able to put their skills into practice and as a result they remain in perpetual poverty (Yunus and Weber 2007). To address the problem of systematic exclusion, microfinance institutions have played an important role in providing access to capital for the unbanked poor. But does microfinance make any difference?

It is generally believed that once poor entrepreneurs, who are more likely to face binding credit constraints than relatively wealthy entrepreneurs, are given access to capital, they are able to generate high returns to capital (De Mel et al. 2008, Rodrik and Rosenzweig 2009). We, however, have little empirical evidence to support this claim.

Few non-experimental studies so far have established large impact of access to capital on business returns. In Mexico, McKenzie and Woodruff (2006) found an annual return of 180% for smaller firms and 40-60% for larger firms. In Ghana, returns to capital were 50% on traditional crops and 250% on non-traditional crops (Udry and Anagol 2006). Although non-experimental studies show large impact of access to capital on business returns, nonetheless they are contaminated with potential biases which raise a question mark on the credibility of these estimates. McKenzie and Woodruff (2006) identify two sources of potential bias in non-randomized studies which try to estimate returns to marginal capital. First, the investment decision of entrepreneurs is influenced by market specific profitability. As a result, returns to capital are not only driven by marginal investment but also by market gains. Firms tend to invest more in profitable markets, and therefore, it is difficult to separate the effect of marginal investment from the initial market conditions. The second source of bias arises from self-selection when relatively able entrepreneurs are more likely to participate in microcredit programs. Besides determining participation, entrepreneurial ability is also a key determinant of business performance and hence it is difficult to isolate returns to capital from returns to entrepreneurial ability.

In order to remove the aforementioned biases, few studies have used randomized designs to examine the impact of microcredit on business returns. Theoretically randomization generates exogenous variation in

capital stock and as a result the selection bias is removed. In other words, variation in capital is purely by chance and is not correlated with unobserved characteristics of the entrepreneur.

McKenzie and Woodruff (2008) conducted a randomized experiment in Mexico. 198 small firms, having less than 10,000 pesos in capital stock were sampled for this experiment. Firms were assigned to treatment and control groups through a random draw at different rounds of study. Besides deciding about beneficiaries, the draw also determined the timing of treatment, however, this was not revealed to the firms. One of the strengths of the paper is that it investigated spillover effects and sample attrition in order to overcome possible estimation biases. Firms in the treatment group received 1,500 pesos in grants in the form of either cash or in-kind (i.e. capital in the form of equipment or inventories). Considering the size of the firms, 1,500 pesos was a substantial shock. It was approximately equivalent to 25% of average capital stock and 50% of median monthly profits. These grants were given as a compensation for participation in the survey. The monthly profits of the treated firms increased by 608-685 pesos which was equivalent to 46% monthly returns on capital. The paper found that in-kind produced larger effects than cash treatment i.e. 600 pesos compared to 436 pesos. The paper finds higher returns for more credit constrained entrepreneurs. Although the study does not make any generalizations, nevertheless, it has some limitations. It focuses only on male entrepreneurs aging 22-55 years and firms operating in the retail sector; therefore, conclusions for female entrepreneurs and firms operating in other sectors cannot be drawn from this study.

In another study, De Mel et al.(2008) conducted an identical field experiment in Sri Lanka in which 408 firms participated. At the end of first round of the survey, firms were selected for prize money through a random draw. The selected entrepreneurs received one of the four treatment types: 10,000 LKR worth of equipment/ inventories, 10,000 LKR in cash, 20,000 LKR worth of equipment/ inventories, or 20,000 LKR in cash. The treatment of 10,000 LKR was equivalent to approximately three months of median profits reported by the firms participating in the experiment. The cash treatments were unrestricted. Although cash recipients were free to spend the treatment money for any purpose; on average, 58% of the amount was invested in business. The paper finds that 10,000 LKR in-kind increases capital stock by 40% and the same amount

in cash increases capital stock only by 23%. Similarly, capital stock increases by 71% with 20,000 LKR in-kind and 53% with same amount in cash. In-kind vs. cash treatment created differential effects on business profits. 10,000 LKR in-kind did not significantly increase monthly profits; however, the same amount in cash increased monthly profits by 15%. These results are opposite to what the researchers found in Mexico where in-kind treatment created larger effects than cash treatment. Both 20,000 LKR in-kind and cash increased monthly profits by 21%. Using randomized treatment as an instrument for capital stock, the paper finds an average annual real return to capital of 55%-63%. In Mexico, the annual returns were around 240%-396% which were extremely high compared to estimates in Sri Lanka.

In a rather recent experiment in Sri Lanka, De Mel et al. (2014) randomized two types of treatment among two groups of 628 randomly sampled women in each group. The first group consisted of existing business owners. The second group was made of those potential owners who were out of labor market but interested in starting a business. 400 women from each group were randomly treated with business training alone (N=200) and combination of business training and a cash grant of LKR 15,000 (N=200). The treatment and control groups were tracked for two years in four follow-up surveys. For existing business owners, the paper finds no impact of training alone on business profits, sales and capital stock. The combination of training and cash grant, on the other hand, significantly improved business profitability in the first eight months. The impact was, however, short lived as it disappeared in the second year. For potential owners, the training only treatment had a significant impact on business profits, however, surprisingly; training plus cash grant had no impact on business profits.

Banerjee et al. (2009) conducted a randomized experiment for estimating the impact of Spandana microfinance program on different outcome indicators. Spandana was a fast growing group-based microcredit program in India with more than 1.2 million active borrowers in March 2008. Spandana gives unrestricted loans, that is, borrowers are free to spend the loan amount and are not restricted to expenditure on business. Spandana planned to expand its business into 120 new unbanked villages. After conducting a baseline survey, half of the 104 selected villages were randomly selected for opening Spandana branches. A follow-up survey was conducted 15-18 months after the baseline. After estimating

the intent to treat (ITT) effects, (Banerjee et al. 2009) find that households in the treated areas are 1.7 percentage points more likely to report opening of new business than non-treated areas. The paper, however, finds no evidence of significant increase in business profits in the treated areas⁵¹.

A similar study was conducted in rural areas of Morocco (Crépon et al. 2011). For this study, researchers partnered with Al Amana microfinance which was planning to expand their business to other villages in Morocco. Within one year starting from 2006, Al Amana, which mainly offers joint-liability loans, opened new branches in 60 villages randomly selected from 81 matched pairs – each pair composing of two or more villages. The paper estimates ITT effects and finds that treatment has significantly reduced credit constraints. Borrowers were able to upscale their activities involving non-livestock agriculture and livestock. Income earned from agriculture by a household in the treatment areas significantly increased by 976 Moroccan Dirhams (MAD), however, income from livestock and other businesses did not show any significant increase.

Although experimental designs are considered as a gold standard in impact evaluations, in essence they establish causality for a particular context only. For example, findings in India may not be generalized to Sri Lanka. For this very reason, returns to capital in Sri Lanka, Mexico, India and Morocco show large variations. Similarly, study done on firms engaged in retail business may not be generalized to the manufacturing sector. Although very promising, these results show large differences in returns to capital and, therefore, further investigation is needed. In this research, we report results from a randomized study in Pakistan. This study is first of its kind which uses interest-free loans as a treatment.

5.3 Theoretical Framework

In the first part of this section, we briefly discuss the channels through which the effects of microfinance loans are translated into desirable outcomes. In the second part, we provide the theoretical motivation for using a randomized design and its ability to remove selection bias.

5.3.1 Theory of Impact

The impact of microcredit has intuitive theoretical underpinnings. In the presence of indivisible start-up or expansion costs, poor entrepreneurs, despite having skills, are unable to exploit their full entrepreneurial potential. The critical problem is that credit markets ration out poor entrepreneurs. Microcredit eases credit constraints of the poor and thus adds to market efficiency. According to Banerjee et al. (2009)⁵², in efficient markets the level of investment and its timing is determined by rates of return which is a direct consequence of the ‘separation theorem’ –that is, saving does not affect investment decisions and vice versa. In other words, households will not be forced to first save and then invest in different avenues like business, education, health and the like. If poor households have access to microcredit, they may efficiently allocate and time their investments consistent with the rate of return. This basically means that investment and saving decisions are taken separately. The other indirect effect of microcredit comes from resisting temptation expenditures (tea, cigarettes, alcohol, leisure etc). Banerjee et al. (2009) exemplify microcredit as ‘saving in reverse’. That is, households avail microcredit and then start saving to repay obligatory periodical instalments. This creates a commitment mechanism which makes their investment decisions more efficient. Theoretically, microfinance loans increase efficiency in the investment decision and it is expected that these loans will increase the capital stock of microenterprises and as a result profitability is also likely to increase.

5.3.2 Theory of Randomization

How would a treated microenterprise fare in the absence of treatment? This is a central question in all impact evaluation studies. Estimating the causal effect of an intervention requires identification of an appropriate counterfactual. In reality, counterfactuals are unobserved and we are faced with a typical problem of *missing data*. A major source of bias in evaluation studies comes from program selection. In demand driven programs like Akhuwat, microenterprises who apply for Akhuwat loans may have inherently different unobserved characteristics than those who do not apply. These characteristics, among others, may include entrepreneurial ability, motivation and risk aversion. Besides driving participation, these latent characteristics are perhaps key determinants of business performance. In other words, any improvement in the outcomes of treat-

ment groups may not be caused by treatment alone. Therefore, if we compare those who applied for a loan with those who did not will result in biased estimates.

Suppose Y_i^T is the outcome of treated microenterprise i and Y_i^C is the outcome of true counterfactual. That is, Y_i^C is the outcome of the same microenterprise i if it was not treated. The average treatment effect is $E(Y_i^T - Y_i^C)$. One approach to estimate the treatment effect is to calculate the difference between average outcomes of treatment and control groups. Our difference estimator will be;

$$D = E(Y_i^T|T) - E(Y_i^C|C)$$

This counterfactual is unobserved. In reality, once treated, we cannot observe the untreated scenario of the treated. Assume that $E(Y_i^C|T)$ is the correct counterfactual for $E(Y_i^T|T)$. The above equation can be rewritten as follows;

$$\begin{aligned} D &= E(Y_i^T|T) - E(Y_i^C|T) + E(Y_i^C|T) - E(Y_i^C|C) \\ D &= E(Y_i^T - Y_i^C|T) + E(Y_i^C|T) - E(Y_i^C|C) \end{aligned}$$

$E(Y_i^T - Y_i^C|T)$ is the treatment effect that we are interested in. The last term $E(Y_i^C|T) - E(Y_i^C|C)$ represent selection bias which may arise if treatment and control group are inherently different. If we ignore the selection bias, the program impact may be under or overestimated. Since, $E(Y_i^C|T)$ is unobserved, therefore, in general it is not possible to measure selection bias. One way to correct for selection bias is to assign microenterprises to treatment and control groups randomly i.e. $Y_i^T, Y_i^C \perp T$. Both groups have equal chance of receiving treatment, that is;

$$E(Y_i^C|T) = E(Y_i^C|C)$$

This implies that randomization successfully removes selection bias.

$$E(Y_i^C|T) - E(Y_i^C|C) = 0$$

$$\textit{Selection bias} = 0$$

5.4 Context and Description of The Experiment

5.4.1 The Product

For this experiment, we partnered with Akhuwat Microfinance which, besides other products, provides interest free loans to credit constrained microentrepreneurs in Pakistan. For treatment, we chose Family Enterprise Loan which is the flagship microcredit program of Akhuwat. It accounts for approximately 91% of Akhuwat loan portfolio. Depending on the loan cycle, the normal loan amount ranges from Rs. 10,000 to 30,000. The loan has to be repaid in 10 equal monthly instalments. This specific loan product is designed for starting or expanding businesses. These businesses are typically very small ranging from fruit and vegetable vending on the carts, grocery stores, food stalls, carpeting, welding, masonry, tailoring, embroidery and selling cloths etc.

The product derives its name –Family enterprise loan –from its peculiar design. Although the business is run by only one person, Akhuwat involves borrower’s family in the loan application process. Akhuwat is of the view that the design of the product aims to strengthen family cohesion because the business as result of this loan becomes a family enterprise instead of being perceived as individual initiative.

5.4.2 Sample

Potential borrowers apply for Akhuwat’s Family enterprise loan after paying a non-refundable application fee of Rs. 100. The loan application is co-signed by a spouse or any other family member. Since Akhuwat aims to target the poor, it follows a poverty based screening criteria. To do so, Akhuwat has instituted a two stage evaluation process. In the first stage, when individuals apply for an Akhuwat loan, their eligibility is decided mainly on income criteria. In order to be eligible, applicants should have a monthly percapita household income of less than Rs. 1,000⁵⁵. Af-

ter meeting this criterion, the application enters into a second stage in which detailed economic and social appraisal is carried out. In this stage, personal and family information, income and expenditure of the household, business and its viability, credit needs of the business and planned utilization of the loan are ascertained.

For this experiment, we selected four branches of Akhuwat. Applicants submitted applications as usual to these branches. Akhuwat staff evaluated all applications on the prevailing eligibility criteria. At the end of evaluation process, we selected 488 eligible applicants for randomization. The justification of our sample is given in Appendix 5.9.1

5.4.3 Randomization

The main purpose of this experiment is to give an exogenous shock to the capital stock of randomly selected microenterprises. As a policy, Akhuwat serves its customers on a first-come-first-served basis. To support our experimental design, Akhuwat agreed to make a one-time exception to this rule. This was decided in a meeting with the CEO of Akhuwat held on July 3, 2009 in Lahore, Pakistan. In this meeting, moral issues (i.e. refusing treatment to eligible applicants falling in control group) arising from the experiment were also discussed in detail. After careful deliberation, it was decided that, as compensation, the control group will be offered a larger loan at the end of the experiment i.e. after 10 months which is the usual repayment period of the loan. This arrangement, however, was kept confidential so that the firms in the control group did not act or change their behaviour in anticipation of getting larger loans in the future. At the time of application submission, all applicants were informed about the random draw among the eligible applicants and the consequences of this random draw were explained to them. The process of randomization and data collection is shown in the flowchart in Figure 5.10-1 in the appendix.

Our sample for this experiment consists of 488 eligible applicants. Before randomization, we conducted a full-scale baseline survey. At the conclusion of the survey we made a draw through a random number generator in Microsoft Excel. As a result of this draw, 243 firms were randomly assigned to treatment group and remaining 245 were assigned to control. Each applicant in the treatment group was given an interest-free loan of Rs. 10,000 for 10 months duration. The loan was repayable in 10 equal monthly instalments. Two follow-up surveys were conducted.

The first mini follow-up survey was conducted 5 months after the loan disbursement and the second full-scale follow-up survey was conducted 10 months after the loan disbursement. In the first mini follow-up, we collected data only on business profits, capital stock and number of hours worked by microentrepreneurs.

The treatment of Rs. 10,000 is equivalent to 123% of microenterprises' median income and 41% of median capital stock in the baseline. As per the loan agreement, borrowers could only spend the loan amount on business activities and hence the utilization of the loan amount was restricted. Since the loan amount is disbursed in cash, ensuring compliance of spending restrictions is technically difficult because of fungibility issues. Nonetheless Akhuwat staff tries to ensure compliance by regularly visiting business sites of the borrowers.

5.5 Data

This study relies on a three-period panel dataset. The data were collected through a survey questionnaire. The timeline of experiment and data collection is provided in Figure 5.10-2 in the appendix. Since the gestation period of microenterprises is generally short, it is expected that the loans will show its impact, if any, at the end of 10 months⁵⁴. Microentrepreneurs were visited on their home/business addresses for data collection. Of 488 applicants in the baseline, 453 completed three rounds of surveys representing an attrition rate of 6.97%. The response rate is comparable to other similar randomized studies. In our final analysis, we use a panel dataset comprising of 453 microenterprises i.e. 1359 firm-period observations.

In the first wave, a baseline survey was conducted in June 2010 prior to randomization of treatment. For collection of the baseline data, the survey instrument contained detailed sections on key variables pertaining to microentrepreneur's households and their businesses. Our baseline data reveals that an average household in our sample has 5.64 members of which 1.57 are school going children. An average household is approximately 26 years old and has little less than 5 years of education. 85% of the households are male-headed. Adult female members of the household are mostly out of the labor market as 1.41 females compared to 0.51 males did not report any paid work. Average income of the

households is Rs. 12,640 of which approximately 66% is spent on food related expenditures.

In this survey, we are mainly interested in two key variables i.e. profitability and capital stock of the microenterprise. 45% of the respondents reported that they do not maintain any record of their business activities – be it formal or informal. We obtained data on business profits by asking a direct question –an approach which is also used by De Mel et al. (2008). De Mel et al.(2009) established that data on profits obtained in this manner provide a more reliable measure than using revenue minus expenses approach. We also, however, gathered detailed information on monthly revenues and expenses of the microenterprise. In our baseline survey, income data as a result of both methods – direct vs. indirect – were significantly correlated with a coefficient of 0.87 which is comparable to 0.70 reported in De Mel et al. (2008). Studies conducted in other countries found lower or even no correlation. Correlation between profits derived from direct and revenue minus expenses approach was 0.26 in Côte d'Ivoire, negative and close to zero in Ghana (Vijverberg and Mead 2000) and 0.24 in Zimbabwe (Daniels 2001).

In our analysis we use monthly profits. For inflation adjustment we use monthly consumer prices indices⁵⁵. Microenterprises in our baseline have approximately Rs. 30,026 worth of business assets. After excluding the cost of land and building, operational or productive capital stock was around Rs. 24,048. 35% of the microenterprises in our sample work in retail and 35% in services sector. The startup capital in 60% of the cases was raised from internal resources i.e. either from household savings or internal borrowings from family members. All of the microenterprises in our sample were informal. The informality of these businesses is characterized by their low levels of capital and their exclusion from formal banking services. None of the businesses had national tax numbers and only 2% had bank accounts in the name of their businesses. On average, microentrepreneurs worked for 9.86 hours in a day.

In the third round we asked the treatment group about the utilization of the loan. Since the question was asked 10 months after treatment, the responses were based on recall. Since borrowers were contractually obliged to spend the whole amount on business transactions only, therefore all of them responded in a way which showed conformity. On average, 31.98% of the loan amount was spent on buying inventory, 54.16%

on tool, and 8.54% on furniture/carts/display cases and the remaining on renting locations and other activities.

After collecting baseline data, we investigated if the process of randomization has created a valid control group. As shown in Table 5.5-1, we did not find any significant differences between the two groups in the baseline.

Table 5.5-1: Descriptive Statistics and Verification of Randomization

H_0 : Both Groups have Equal Means	Treatment		Control		t-test t- statistic
	Mean	SD	Mean	SD	
Total number of the HH members	5.59	2	5.69	2.1	0.546
Household monthly income	12,855	5,148	12,427	4,485	0.978
Household assets	765,696	777,594	732,726	873,910	0.440
Household monthly expenditure	12,793	5,072	12,707	4,486	0.199
Number of school going children	1.49	1.58	1.64	1.75	0.976
Presence of Chronic ill in the Household	0.239	0.583	0.188	0.441	1.090
Years of education of borrower	5.06	3.87	4.72	4.35	0.910
Age	38.4	10.1	38.9	10.4	0.511
Monthly Profits	8,153	1,407	8,186	1,324	0.260
Revenues	9,834	3,149	9,861	2,581	0.105
Monthly sales	24,939	32,641	27,098	32,481	0.733
Business assets	30,121	49,589	29,932	43,030	0.045
Hours of work in a day	9.87	2.18	9.84	1.98	0.146
Capital Stock	24,125	3,999	23,973	4,330	0.404
Credit requirement	23,798	17,892	23,318	16,503	0.308

Neuroticism	2.49	0.654	2.48	0.65	0.212
Extraversion	3.49	0.655	3.52	0.642	0.528
Openness	3.31	0.75	3.23	0.802	1.110
Agreeableness	3.63	0.628	3.59	0.696	0.635
Conscientiousness	3.86	0.678	3.86	0.673	0.042

Notes: Significance levels (*=10%, **=5%, ***=1%). The baseline data was collected in June 2010. Variable Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Capital stock excludes value of land and buildings.

5.6 Sample Attrition

We investigated for any systematic patterns in attrition. Systematic attrition may create substantial estimation biases. For example, if less profitable microenterprises from the control group systematically drop out of the survey, then our estimates would be downward biased. Based on bivariate comparisons of our key variables of attrited and unattrited microenterprises, we did not find any significant differences as shown Table 5.6-1.

Table 5.6-1: Comparison of Means of Attrited and Unattrited Microenterprises

H_0 : Both Groups have Equal Means	Attrited		Unattrited		t-test t-statistic
	Mean	S.D	Mean	S.D	
Monthly Profits	8,131	1,388	8,172	1,364	0.172
Capital Stock	23,991	3,941	24,053	4,185	0.084
Number of Hours Worked	9.38	1.95	9.89	2.09	1.390

Significance levels (*=10%, **=5%, ***=1%)

In multivariate analysis, we also run probit models on our key variables of interest to see if coefficients are jointly and simultaneously equal to zero. Table 5.6-2 shows that none of the coefficients were significant. Overall the model is insignificant which implies that there is no systematic pattern in attrition.

Table 5.6-2: Determinants of Attrition

Attrition	Coefficients (S.E)
Direct Monthly Profits	-0.000 (0.00)
Capital Stock	0.000 (0.00)
Number of Hours Worked	-0.060 (0.04)
<i>Number of Attrited Microenterprises</i>	34
<i>Number of Unattrited Microenterprises</i>	454
<i>LR Chi2(3)</i>	2.00
<i>Prob>Chi2</i>	0.5728

(Standard errors are reported in parenthesis)

5.7 Estimation of Treatment Effects

In this section, we outline our estimation strategy for examining treatment effects on different outcome variables. Our estimation strategy is guided by standard production technology in which capital, labor and latent entrepreneurial ability enters as major factors of production. Intuitively treatment has both direct and indirect effects. We expect that randomization of treatment will directly increase capital stock of treated microenterprises. Technically the variation in capital will be exogenous due to randomization. In response to infusion of additional capital, business profits are likely to increase. As an indirect effect, treatment may also

incentivize entrepreneurs to put more effort into their businesses. For estimating treatment effects on different business outcomes, we proceed as follows. In the first step, we examine the impact of treatment on capital stock, profits and number of hours worked; and in the second step, we estimate returns to capital which is our main target.

5.7.1 Impact of Treatment on Capital stock, Business Profits and Hours of Work

In this experiment, microenterprises were randomly allocated or not allocated interest free loans. It was mandatory for borrowers to spend the loan amount for business purposes. We expect that treatment will positively affect capital stock and business profitability of credit constrained entrepreneurs. We also expect that treatment may extract more effort from entrepreneurs; however, it is less obvious. We estimate the impact of treatment on different outcomes in the following regression.

$$Y_{it} = \alpha + \beta_T Treatment_{it} + \sum_{t=2}^3 \omega_t + \lambda_i + \varepsilon_{it} \quad 5.7-1$$

Where Y_{it} is the outcome of interest, $Treatment_{it}$ is a dummy which takes values of 1 for treatment and 0 for control; ω_t captures fixed wave effects; β_T represents overall effect on the treated; and λ_i are time invariant fixed effects of microenterprises. The error term ε_{it} in this model represents other unobserved factors affecting our outcome variables. The randomization of treatment implies that ε_{it} is random and uncorrelated with other covariates in our model. Since the treatment was randomized at the microenterprise level, we cluster the standard errors at microenterprise level as well.

5.7.2 Returns to Capital

In this section, we estimate returns to capital which has important policy implications. It provides an indication of repayment capacity of the borrowers. We use following equation to estimate returns to capital.

$$profits_{it} = \alpha + \beta_c Capital_{it} + \sum_{t=2}^3 \omega_t + \lambda_i + \varepsilon_{it}, t=1,2,3 \quad 5.7-2$$

In the above equation $profits_{it}$ represents the monthly profits of microenterprise i at time t . $Capital_{it}$ represents the capital stock of the microenterprise i at time t . Capital does not include the value of land and building. λ_i captures the microenterprise fixed effects. We estimate our model in equation 5.7-2 both in levels and logs.

5.8 Results

5.8.1 Impact of Treatment on Capital stock, Business Profits and Hours of Work

We use single difference and difference-in-difference (DID) approach to estimate the treatment effects. Since randomization has created a valid control group as shown in Table 5.5-1, we estimate post-treatment effects through a single-difference estimator in which the treatment effect is simply the difference between the mean outcomes for treatment and control groups at $t=3$. For the DID estimator, we take advantage of the panel data and estimate equation 5.7-1 using fixed effects and random effects model. The fixed effects estimation will remove the effects of time invariant unobserved factors. To see if the unobserved effects are correlated with our outcome variables, we estimate both fixed and random effects model and conduct a Hausman test in which random effects is the preferred model under the null hypothesis. Based on the test statistic, we cannot reject the null hypothesis (*see* Appendix 5.10-1). In our analyses, we, however, report both random and fixed effects estimates for comparison purposes.

The first two columns (1-2) of Table 5.8-1, report single difference estimators. Column (1) shows that the monthly profits of the treated microenterprises significantly increased by Rs. 241. Monthly profits, measured through the revenue minus expenses approach, also increased by Rs. 220. As expected, the capital stock of treated microenterprises also increased by Rs. 2,448. This is the increase in capital stock after the repayment of the interest free loans which were to be repaid in 10 equal monthly instalments. We find no evidence of treatment effects on number of hours worked. Column (2) shows the treatment effects on variables of interest after log transformation. The coefficients as result of this transformation can be interpreted as percentage changes. As reported in column (2), for the treated microenterprises, the monthly profits increased by 2.73%; indirect profits increased by 2.58%; capital stock increased by 10% and the number of hours worked did not change. The coefficients reported in column (2) show differential increases. For example, if the average direct profits of the control group increases by 4.6% between the first and the third wave then in the same period, the profits of treatment group increased by 7.7% i.e. $4.6\% + 3.1\%$. In other words, the differential increase of 3.1 percentage points may be attributed to treatment.

The last four columns (3-6) in Table 5.8-1, report the difference in difference estimators both for levels and logs. Column (3) shows fixed effects estimates. The direct monthly profit of treatment group increased by Rs. 275 which is equivalent to 2.75% of the treatment amount and the indirect profits increased by Rs. 193. Working capital increased by Rs. 2,305. As can be seen in column (3) and column (5), coefficients and standard errors estimated through fixed and random effects model are quite similar. The random effects model shows that the monthly direct and indirect profits significantly increased by Rs. 274 and Rs. 201, respectively. Working capital of treated microenterprises increased by Rs. 2,319. Under both fixed and random effects model, treatment did not show any impact on the number of hours worked.

Table 5.8-1: Impact of Treatment on Business Outcomes

Impact of Treatment on:	Single Difference (one tail t-test at t=3)		Double Difference			
			Fixed Effects		Random Effects	
	Levels (1)	Logs (2)	Levels (3)	Logs (4)	Levels (5)	Logs (6)
Direct Monthly Profits	241* (124)	0.0273* (0.0148)	275*** (39)	0.033*** (0.005)	274*** (38)	0.033*** (0.005)
Indirect Monthly Profits †	220* (139)	0.0258* (0.0171)	193* (108)	0.025* (0.014)	201** (98)	0.026** (0.012)
Working Capital	2,448*** (394)	0.10*** (0.0159)	2,305*** (163)	0.091*** (0.007)	2,319*** (160)	0.092*** (0.006)
Number of Hours worked in a Day	0.027 (0.216)	-0.0002 (0.0231)	0.027 (0.122)	0.005 (0.014)	0.032 (0.128)	0.004 (0.015)
Number of microenterprises	454	454	454	454	454	454
Number of observations	454	454	1361	1361	1361	1361

Notes: Significance level (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$. Robust standard errors are clustered at the microenterprise level and reported in parentheses. The data was collected in three waves (t=1,2,3). The baseline data (t=1) was gathered in June 2010 and a detailed follow up survey was conducted after 10 months (t=3). In between the two rounds, at t=2, we also collected a self-reported data on three core variables of interest i.e. business profits, working capital and hours of daily work. Variable Direct Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Working Capital excludes value of land and buildings.

† Variable Indirect Monthly Profits was measured through revenues minus expenses approach. We have data for this variable for only two periods i.e. t=1 and t=3. For analysis involving this variable, we use 908 microenterprise-period observations instead of 1361 observations.

5.8.2 Returns to Capital

Capital, in a more realistic setting, complements entrepreneurial ability. As a result, able entrepreneurs are likely to invest higher percentages of the loan amount in their businesses than less able entrepreneurs. Besides driving capital, entrepreneurial ability is also a key determinant of profitability. When both investment and profitability are correlated with latent abilities, it is difficult to separate *returns to ability* from *returns to capital*. Conflation between returns to capital and returns to ability renders $Capital_{it}$ in equation 5.7-2 endogenous. Although, as a result of randomization, theoretically both treatment and control groups would have same unobserved entrepreneurial abilities; however, once loans are given to the treatment group, we expect idiosyncratic responses of the entrepreneurs due to differences in their latent abilities within the group. Standard panel data analysis techniques do not fix this particular endogeneity problem because changes in capital stock between rounds of a panel are endogenously determined by unmeasured shocks (De Mel et al. 2008).

We estimated equation 5.7-2 using both fixed effects and random effects models⁵⁶. To obtain an unbiased estimate of returns to capital, we follow De Mel et al. (2008) and use random treatment as an instrument for $Capital_{it}$ in our two-stage regression model. De Mel et al. argue that an instrument is only valid if it only affects capital and no other factors of production, for example, entrepreneurial effort. As shown in the previous section, treatment significantly increased capital stock, however, number of hours worked did not change. Table 5.8-2 shows that in the first-stage regressions, treatment significantly increases levels of capital stock. Using fixed effects model, we find 11.9% return to capital on monthly basis which is very high. Random effects model yielded similar results i.e. 11.8%. The indirect monthly profits, however, show smaller and less significant returns to capital. Based on indirect profits, monthly returns to capital is 8.6% under fixed effects model and 8.8% under random effects model.

The coefficients of log profits on log capital stock can be interpreted as elasticities (De Mel et al. 2008). In our baseline, with an average capital of Rs. 24,053, a microenterprise earns an average monthly profit of Rs. 8,172. With elasticity of 0.361, the implied average monthly return is

12.27% $\left(i.e. \frac{8,172}{24,053} \times 0.361 \right)$ which is close to linear estimate of 11%. If

we take median values of capital and profitability, then returns to capital increases to 12.5%.

Table 5.8-1 and Table 5.8-2 provide a basis for an ancillary yet important conclusion. Our analyses show that profits measured directly provides more precise estimates because it has smaller standard errors compared to that of indirect profits. De Mel et al.(2008) also prefer using a direct measure of profits over profits calculated through the revenue minus expenses approach.

Table 5.8-2: Returns to Capital

	Two Stage Instrumental Variable Regression							
	Direct Monthly Profits				Indirect Monthly Profits †			
	Level	Log	Level	Log	Level	Log	Level	Log
	FE	FE	RE	RE	FE	FE	RE	RE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Working Capital/Log of Working Capital	0.119*** (0.014)	0.361*** (0.044)	0.118*** (0.013)	0.355*** (0.041)	0.086* (0.049)	0.284* (0.156)	0.088** (0.042)	0.273** (0.132)
First-Stage Regression								
Coefficient on Treatment Dummy	2,305*** (131)	0.091*** (0.005)	2,318*** (127)	0.092*** (0.005)	2,249*** (151)	0.090*** (0.006)	2,333*** (268)	0.094*** (0.011)
F statistic	39.46	41.87	-	-	25.96	27.33	-	-
Number of microenterprises	454	454	454	454	454	454	454	454
Number of observations	1361	1361	1361	1361	908	908	908	908

Notes: Significance level (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$. Robust standard errors are clustered at the microenterprise level and reported in parentheses. The data was collected in three waves (t=1,2,3). The baseline data (t=1) was gathered in June 2010 and a detailed follow up survey was conducted after 10 months (t=3). In between the two rounds, at t=2, we also collected a self-reported data on three core variables of interest i.e. business profits, working capital and hours of daily work. Variable Direct Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Working Capital excludes value of land and buildings.

† Variable Indirect Monthly Profits was measured through revenues minus expenses approach. We have data for this variable for only two periods i.e. t=1 and t=3. For analysis involving this variable, we use 908 microenterprise-period observations instead of 1361 observations.

5.9 Conclusions

Because of high risk lending and transaction costs, microfinance institutions normally charge high interest rates from the poor with a belief that the poor's return on marginal capital is very high. This is, however, not always true. A large number of reported suicides of poor microfinance borrowers have generated intense debate about the pricing of microfinance loans vis-à-vis repayment capacity of the poor. The repayment capacity of microenterprises depends on their returns on marginal capital. A credible estimate of returns to capital in microenterprises is, therefore, of great interest to policy makers for developing a sustainable microfinance sector.

We conducted a randomized experiment in collaboration with Akhuwat microfinance to generate evidence on returns to capital in microenterprises. For this experiment, we collected detailed baseline data from 488 microenterprises who applied for Akhuwat's interest free loans. After the baseline, we randomized treatment among the 488 microenterprises. Randomization created a valid control group based on baseline characteristics. Each microenterprise in the treatment group was given an interest loan of Rs. 10,000. We followed these enterprises for 10 months. For estimating various treatment effects we used both fixed and random effects model. The standard errors were clustered at the enterprise level. Using single difference and difference in difference estimators we found that treatment significantly increased the capital stock of treated microenterprises - estimates ranged between Rs. 2,305 to Rs. 2,448. Compared to the control group, the monthly profits of treatment group also increased. The effects were between Rs. 241 to Rs. 275. The number of hours worked by microentrepreneurs did not respond to treatment. For estimating returns to capital, we used randomized treatment as an instrument. The estimated monthly returns to capital were 8.6% – 11.9% (annual interest rate of 103.2% – 142.8%) for microenterprises in our sample which are very high compared to both market interest rates⁵⁷ of 12.5% and microfinance annual lending rate of 33.5% in Pakistan.

Our results suggest large gains from access to capital; however, these results are only valid for those microenterprises who apply for Akhuwat's microcredit. Due to lack of data, we did not control for possible spillover effects. McKenzie and Woodruff (2008) found insignificant but

positive spillovers in their study in Mexico. In case of positive spillovers, our estimates may be viewed as a lower bound.

Notes

⁴⁴ Banerjee et al. (2009); Karlan and Zinman (2011); and Crépon et al. (2011)

⁴⁵ On 16 December 2010, BBC reported that microcredit had turned out to be a ‘big curse’ for many poor borrowers in the State of Andhra Pradesh. According to the State government, more than 80 people committed suicide after defaulting on their mounting debt. The media reports blamed multiple lending, over-indebtedness, coercive recovery methods, exorbitant interest rates and MFI’s grow-at-any-cost strategy as reasons for this crisis. In Andhra Pradesh, households spend more than 60% of their annual income on debt repayments. More than one third of total microcredit borrowers live in Andhra Pradesh with an exposure of more than \$4 billion. The problem was dubbed to be of comparable magnitude to the subprime debacle.

Sources: <http://www.bbc.co.uk/news/world-south-asia-11997571> [Last accessed: June 22, 2016]

http://www.nytimes.com/2010/11/18/world/asia/18micro.html?_r=1&pagewanted=all [Last accessed: June 22, 2016].

⁴⁶ Source: <http://www.bbc.co.uk/news/world-south-asia-11997571> [Last accessed: June 22, 2016]

⁴⁷ Source: Microcredit is not the enemy –published on December 13, 2010 in Financial Times <http://www.ft.com/intl/cms/s/0/53e4724c-06f3-11e0-8c29-00144feabdc0.html#axzz20z2pMDKl> [Last accessed: April 22, 2012]

⁴⁸ Despite this growth, microfinance sector in Pakistan has reached only 7% of the potential market Source: State Bank of Pakistan second quarterly report for year 2006

<http://www.sbp.org.pk/reports/quarterly/FY06/second/microfinance.pdf> [Last accessed on January 8, 2010].

⁴⁹ Pricing of microcredit is a contentious issue. One school of thought –the institutionists– favors charging high interest rates with a view to make micro-finance institutions self-sustainable. The other school of the thought –welfarists– considers charging high interest rates tantamount to ‘mission drift’. In support of high interest rates, the usual argument is that the poor primarily look for access to credit and not necessarily ‘cheap credit’. The hidden assumption in this argument is that small firms have enough potential in terms of returns on capital to repay loans with high interest rates.

⁵⁰ Banerjee (2003) provides a good survey of these models

⁵¹ For impact of Spandana microcredit on other outcome indicators please refer to Banerjee et al. (2009)

⁵² The effect of microcredit also comes from its ability to enhance bargaining power of the women in a household. Most microcredit programs target women. After productively investing the loan amount, women are able to contribute to the household income which increases their self-esteem. It gives gradual financial emancipation to the women. Research shows that compared to men money under women control are more likely to be spent on children welfare.

⁵³ Our sample shows that this criterion is not strictly followed. The percapita monthly household income in our sample is Rs. 2,341.

⁵⁴ In Sri Lanka, out of 385 firms, 124 were treated after the first wave and 104 were treated after the third wave (De Mel et al. 2008). Quarterly data were collected for 9 waves in total. In Mexico, out of 198 firms, different firms were randomly treated at the end of each wave (5 waves in total). 71 firms were treated in the 5th round which means that their reported profit in the last wave showed the treatment effect of only three months (D. McKenzie and Woodruff 2008). In both these experiments, grants were given in cash and in kind (e.g. inventory and equipment).

⁵⁵ Source: Monthly Bulletin of Statistics published by Pakistan Federal Bureau of Statistics

http://www.pbs.gov.pk/sites/default/files/other/monthly_bulletin/report.pdf
[Last accessed: June 22, 2016]

⁵⁶ Before proceeding to model estimation, we conducted some diagnostic tests. We conducted a post estimation joint test to see if time fixed effects are jointly equal to zero. We strongly reject the null hypothesis of no time fixed effects ($F=99.08$). We, therefore, introduce time dummies to capture wave effects in our estimation strategy. We estimated equation 5.7-2 using both random effects and fixed effects model. A Hausman test supports the use of random effects.

⁵⁷ Source:

<http://www.sbp.org.pk/reports/annual/arFY11/Urdu/Stats/eng/Chapter-1.pdf>
[Last accessed: June 22, 2016]

5.10 Appendices

Appendix 5.9.1

The choice of appropriate sample size is critical to any evaluation study. The sample size should be large enough to detect treatment effects if they truly exist. Large sample sizes are preferred but gathering quality data is often expensive and time consuming. If treatment effect is not detected, then there can be two possible explanations of it. First, there is no effect at all. Second, the sample size was not large enough to detect this effect. In practice, researchers choose power of 0.8 and significance level of 0.05. Sample power is the probability of rejecting null hypothesis of no treatment effects and alternatively accepting treatment effects. Lenth (2001) sheds light on the importance of optimal sample size and argues that undersized studies are not capable of producing useful results while oversized studies use more resources than are necessary.

First of all we have to determine if a sample size of 454 (after attrition) is adequate. Suppose δ_T and δ_C denote the mean outcome for treated and control group respectively. Our task is to choose a sample size which maintains a power of π say 0.8. $\theta = \delta_T - \delta_C$ is the treatment effect that we are interested in detecting. We test $H_0 : \theta = 0$, and alternatively $H_1 : \theta > 0$. We use a one-sided test because we expect positive treatment effects. However, the tricky part is determining effect size before the experiment?

Statisticians have developed various techniques to tackle this problem. For sample size calculation, the key inputs are standardized effect, desired power and significance level. Intuitively larger effects with small variations are easy to observe and therefore these effects can be detected with smaller sample sizes. On the contrary, smaller effect sizes with larger variations need larger samples for detection. Effect sizes are obtained from secondary sources/previous similar studies. In the context of this research design, we face three challenges.

First, the impact of microcredit on business returns is not adequately studied and therefore, secondary sources are limited. Second, some of the estimates from secondary sources are based on non-experimental designs. The literature on impact evaluation suggests that non-experimental designs may under/overestimate the impact. The direction

of the bias is not clear which further aggravates the problem. We know of only two experimental studies i.e. McKenzie and Woodruff (2008) in Mexico and De Mel et al. (2008) in Sri Lanka, which have evaluated the impact of exogenous capital shock on business returns. Both studies established very large treatment effects on business returns ranging from 240-396 percent in Mexico and from 55-63 percent in Sri Lanka. Banerjee et al. (2009) and Crépon et al. (2011) studies did not find any impact of microcredit on business returns. Our sample size of 454 is large compared to some experimental studies. For example, papers which calculated returns to capital in Mexico and Sri Lanka used a sample size of 198 and 385 firms respectively. Other studies, such as van Kempen et al. (2009) conducted an experiment with 218 individuals to investigate household revealed preferences for (legal) firewood in rural Guatemala. In another experiment van Kempen (2009) use a sample size of 156 individuals to test the role of expectations in women's empowerment in India.

Apart from anecdotal support, we rely on Cohen (1988) to determine adequacy of our sample size of 454. Cohen considers a standardized effect of 0.2 "small", 0.5 "medium" and 0.8 "large". The treatment effects found in Sri Lanka and Mexico were very large, however, we are cognizant of the fact that it might be quite different in Pakistan. With this sample size and 0.8 power, we should be able to detect standardized effect of 0.22 which is close to small. Standardized treatment effects are likely to be larger than 0.22 and hence can be detected with sample size of 454. Table 5.10-1 provides sensitivity analysis of sample size to different levels of standardized effect sizes and power.

Table 5.10-1: Sample Size for Different Level of Standardized Effects and Power

Significance Level=0.05			
Sample Size for Treatment, Control			
	Standardized Effect Size	Power=0.8	Power=0.9
Small	0.2	310, 310	429, 429
Medium	0.5	50, 50	69, 69
Large	0.8	20, 20	27, 27

Figure 5.10-1: Randomization and Data Collection Flowchart

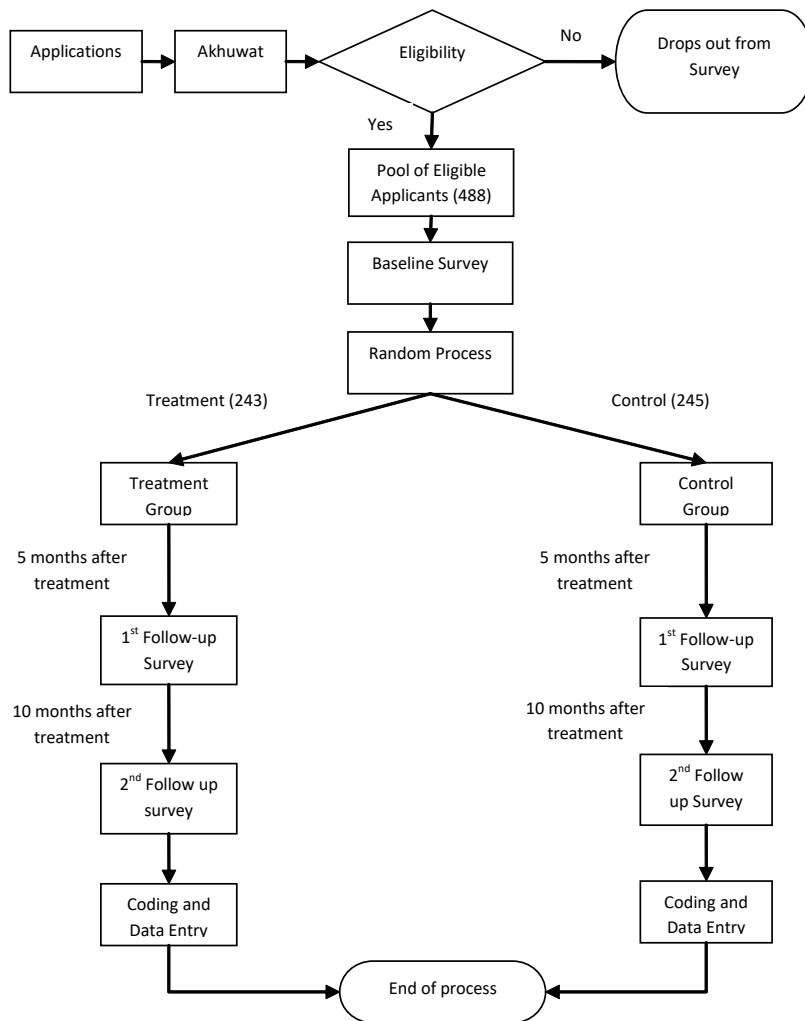
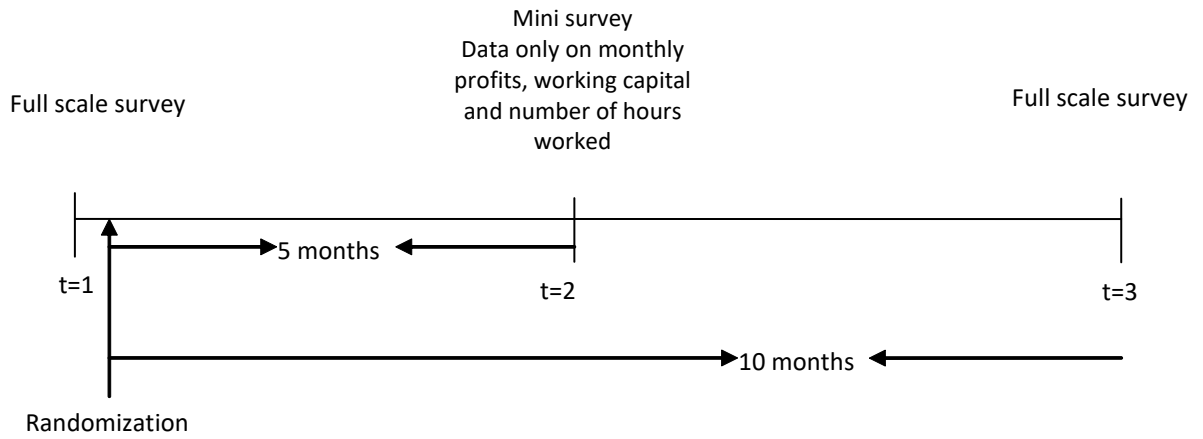


Figure 5.10-2: Timeline of Experiment and Data Collection



Appendix 5.10-1: Hausman Test

Hausman Test: Monthly Profits

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fel	rel	Difference	S.E.
2bn.time	397.8265	398.2733	-.4468205	2.796461
3.time	382.68	383.1641	-.4841048	2.794772
treatment	275.1932	274.212	.9811768	5.51431

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
 = 0.04
 Prob>chi2 = 0.9982

Hausman Test: Log(Monthly Profits)

	---- Coefficients ----		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)		
	fe2	re2	Difference	S.E.
2bn.time	.0492098	.0493064	-.0000966	.0003563
3.time	.0479316	.0480333	-.0001017	.0003561
treatment	.0329727	.0327666	.000206	.0007045

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.09
 Prob>chi2 = 0.9929

Hausman Test: Indirect Monthly Profits

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe9	re9	Difference	S.E.
3.time	402.4783	398.6416	3.836705	20.39839
treatment	193.236	201.0122	-7.77618	41.18941

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.04
 Prob>chi2 = 0.9823

Hausman Test: Log(Indirect Monthly Profits)

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe10	re10	Difference	S.E.
3.time	.0535549	.0534957	.0000593	.0025555
treatment	.0254199	.02554	-.0001201	.0051588

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.00
 Prob>chi2 = 0.9997

Hausman Test: Working Capital

	---- Coefficients ----		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	Difference	S.E.
	fe3	re3		
2bn.time	215.4505	208.3623	7.088289	14.59985
3.time	-75.39339	-82.46907	7.07568	14.59108
treatment	2304.637	2318.977	-14.34089	29.06083

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(3) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\ &= 0.24 \\ \text{Prob}>\text{chi2} &= 0.9703 \end{aligned}$$

Hausman Test: Log(Working Capital)

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe4	re4	Difference	S.E.
2bn.time	.0092801	.0089189	.0003612	.000562
3.time	-.0016457	-.0020051	.0003594	.0005617
treatment	.0912332	.0919617	-.0007285	.0011198

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.42
 Prob>chi2 = 0.9353

Hausman Test: Number of hours worked in a day

	---- Coefficients ----		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	(b-B)	
	fe5	re5	Difference	S.E.
2bn.time	-.0972041	-.1000541	.00285	.0233507
3.time	-.0596107	-.0621681	.0025574	.023336
treatment	.0270681	.0322514	-.0051833	.047009

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.03
 Prob>chi2 = 0.9988

Hausman Test: Log(Number of hours worked in a day)

	---- Coefficients ----		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	Difference	S.E.
	fe6	re6		
2bn.time	-.0340088	-.0338384	-.0001704	.0027918
3.time	-.0131472	-.0129437	-.0002035	.00279
treatment	.0046485	.004236	.0004125	.0056228

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.02
 Prob>chi2 = 0.9992

Hausman Test: Returns on Capital(direct income)-in levels

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe7	re7	Difference	S.E.
wc	.1194085	.1180304	.0013781	.0043031
2bn.time	372.0998	373.9047	-1.804845	6.946309
3.time	391.6826	393.1458	-1.463142	5.930876

b = consistent under Ho and Ha; obtained from xtivreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtivreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
 = 0.10
 Prob>chi2 = 0.9915

Hausman Test: Returns on Capital(direct income)-in Logs

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe8	re8	Difference	S.E.
logwc	.3614108	.3551688	.006242	.0150133
2bn.time	.0458559	.0461877	-.0003317	.0009966
3.time	.0485264	.0487971	-.0002707	.0008665

b = consistent under Ho and Ha; obtained from xtivreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtivreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
 = 0.17
 Prob>chi2 = 0.9818

Hausman Test: Returns on Capital(indirect income)-in Levels

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fell	rell	Difference	S.E.
wc	.0859265	.0876799	-.0017534	.0248137
3.time	406.5915	404.73	1.861531	25.66966

b = consistent under Ho and Ha; obtained from xtivreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtivreg

Test: Ho: difference in coefficients not systematic

chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.00
 Prob>chi2 = 0.9975
 (V_b-V_B is not positive definite)

Hausman Test: Returns on Capital(indirect income)-in Logs

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe12	re12	Difference	S.E.
logwc	.2841655	.2733628	.0108026	.0829151
3.time	.0537732	.0542417	-.0004685	.0037785

b = consistent under Ho and Ha; obtained from xtivreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtivreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(2) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\ &= 0.02 \\ \text{Prob}>\text{chi2} &= 0.9915 \end{aligned}$$

6

Gender-based Differences in Business Returns

6.1 Introduction

In his book, David Roodman tells us two contrasting stories about Grameen Bank and asks an intriguing question whether microcredit is a ‘savior or a snare’ (Roodman 2012)⁵⁸. The first story is about Murshida, a poor Bangladeshi woman, who faced repeated physical violence from her husband. One day her husband sold the roof top of their hut to pay for his gambling debt. That night, Murshida and her three children spent the night in a thunderstorm without any shelter. The next day, she confronted her husband and during this altercation, the husband divorced Murshida on the spot and threw her and her three children out of house. She took shelter in her brother’s house and bought a goat with \$30 microloan from Grameen Bank. With larger loans she started a sewing business and eventually employed 25 women. The second story is about Razia who, unlike Murshida, paid a heavy price for her microloan. She borrowed from Grameen Bank hoping to give her daughter education. Instead, she sold her cows, jewellery and house to pay off her debt.

None of these stories necessarily represent an average female borrower; however, some of the negative stories do raise an important question about the effectiveness of microfinance as a development intervention (Roodman 2012). Females all over the world and especially in developing countries are generally believed to be more credit constrained than their male counterparts (e.g. Khandker 1998). For this reason, when Grameen bank pioneered the idea of group lending, their main target was poor women. If the theory of ‘women being more credit constrained’ is valid then access to credit maybe expected to have a greater impact on female microentrepreneurs as opposed to male (De Mel et al. 2008). Contrary to this expectation, recent impact studies do not tend to support this idea.

In a randomized experiment, De Mel et al. (2008) gave a positive shock to the capital stock of randomly selective microenterprises in Sri Lanka. The shock was given in the form of cash and in-kind grants. The study found 5-6% monthly returns to capital which were very high compared to market interest rates. The paper finds significant gender-based heterogeneity in treatment effects. For men, treatment in the form of additional capital led to a significant increase in business profits. Female microentrepreneurs, on the contrary, did not report any impact of additional capital on their business returns. Karlan & Zinman (2010) also do not find any treatment effects for female owned microenterprises in Philippines. Based on these findings, De Mel et al. (2009) raise the question as to whether capital alone is enough for growth of female owned microenterprises.

This paper adds further evidence to the debate by exploring gender-based heterogeneity in business returns. For this study we partnered with Akhuwat Microfinance which provides interest free loans to credit constrained microentrepreneurs in Pakistan. Borrowers apply for Akhuwat loan through a self-selection process. From a pool of eligible applicants, we randomly assigned 243 microentrepreneurs to treatment and 245 to control group. The treatment was given in the form of Rs. 10,000 interest free loans. We followed these microentrepreneurs for the next 10 months and created a panel dataset comprising of three waves. At the first level of our analyses, we investigate gender-based heterogeneity in the baseline characteristics. We found that in the baseline, female microentrepreneurs earn 20% less than their male counterparts. They also operate at lower levels of capital. The gender-based differences in monthly returns significantly decreased once we controlled for differences in capital stock and *purdah (vei)*. Our second level of analyses uses panel dataset and explores gender-based heterogeneity in treatment effects. Consistent with De Mel et al.(2008), we found significant heterogeneity of treatment effects on business returns. In response to treatment, male owned microenterprises showed large and statistically significant increases in business returns. Female owned enterprises, however, showed smaller albeit still statistically significant increases in business returns.

Rest of the chapter is organized as follows. Section 6.2 provides brief literature review on gender-based differences in returns; Section 6.3 describes the experiment; Section 6.4 relates to data collection; Section 6.5 investigates sample attrition; Section 6.6 outlines our empirical strategy

for estimation of treatment effects and heterogeneity; Section 6.7 discusses results and at the end, section 6.8 provides concluding remarks.

6.2 Literature Review

Research on gender-based differences in entrepreneurship has generally focused on two important aspects i.e. participation and performance. The first strand of literature shows that compared to men, women's rates of participation in entrepreneurship is significantly low⁵⁹ (Estrin and Mickiewicz 2009; Bosma and Harding 2007). The second strand of literature, which is of interest to us in this paper, documents gender-based differences in firm performance. Bardasi et al. (2011) review literature which provides evidence that women entrepreneurs underperform compared to men⁶⁰. An intriguing question is what factors explain gender-based heterogeneity in business returns?

Neoclassical economists attribute heterogeneity in business returns to differences in productivity. They believe that markets pay similar reward to equally capable male and female entrepreneurs regardless of their gender. In other words, there is no gender discrimination in the market and that gender-based performance differences are mainly explained by productivity gaps rather than by the gender itself. In line with this argument, social feminists posit that nature endowed both genders with different bundles of productivities. They argue that these intrinsic productivity differences mainly drive the performance gaps (Fischer et al. 1993). Besides productivity, male and female entrepreneurs exhibit different risk appetite. Female entrepreneurs are known to have higher risk aversion compared to male entrepreneurs (Borghans et al. 2009, Hartog et al. 2002). As a result, female entrepreneurs chose less risky professions which imply relatively less returns. Liberal feminists, on the other hand, are of the view that differences in productivity alone do not explain gender-based performance gaps adequately and that female's apparent underperformance is due to discrimination. They argue that these discriminations are 'overt' and structural (Robb and Watson 2012). Whether caused by fair market dynamics or discrimination, both schools agree that gender-based heterogeneity does exist. The key drivers of gender-based performance gaps can be mapped into the following categories.

6.2.1 Gender-based Differences in Access to Markets

Gender-based differences may be caused by structural constraints enforced through formal and informal institutions. Market imperfections, as a formal institution, have various implications for female entrepreneurs in terms of their participation and performance in the market place. Some studies suggest that credit markets perceive women to be high risk clients. The perception of ‘women being high risk clients’ affects women entrepreneurs in two ways. First, it limits women’s access to credit markets (Brush 1992, Heidrick and Nicol 2002) and, second, it dictates credit markets to charge higher interest rates. Muravyev et al. (2009) found that in Europe, female entrepreneurs are 5.4% less likely to obtain bank loans. Furthermore women, on average, pay 0.6% higher interest rate than their male counterparts (Muravyev et al. 2009). The gender imbalance in access to finance in developing countries, where the financial markets are not sufficiently developed, is even more (Bardasi et al. 2011). With limited access to capital, female entrepreneurs end up operating with suboptimal levels of capital. This suboptimality may be a key driver of gender-based differences especially in those labor markets which have discontinuous returns to capital (Banerjee and Newman 1993). In the presence of indivisible minimum scale investment and credit market imperfections, the production process becomes inefficient which results in heterogeneous returns depending on whether an entrepreneur is above or below the minimum investment threshold.

Gender-based differences may also be caused by structural constraints in labor markets. Labor markets for women, in developing countries especially in countries like Pakistan, are largely missing due to social and cultural norms (Emran et al. 2011). These norms act as barriers and render part of the women’s labor endowment ‘non-tradable’. As a result, female entrepreneurs grow their business to the extent which makes their non-traded labor productive. In Pakistan, one of the cultural barriers for women is the institution of *purdah* (veil) (Roomi 2013)⁶¹. *Purdah* does not necessarily mean covering of face; it rather defines spatial boundaries for women which results in their systematic segregation and seclusion (Papanek 1971). *Purdah* discourages mixing with the opposite gender and also restricts women’s spatial mobility. Consequently, *purdah*, as a structural constraint, limits women’s potential for profitable network formation and restricts their access to various opportunities. Lack of networking hampers their business growth and deprives them of useful

resources (Powell et al. 1999). These resources can be in the form of money, suppliers' credits or guarantees in case of any need for formal and informal credit. These factors combined may cause substantial gender-based differences in business returns.

6.2.2 Differences in Human Capital and Personality Traits

Human capital is one of the most important inputs in any production function. The theory of human capital formation, which was first formalized by Schultz (1902-1998) and Becker (1930-2014) in early 1960s, states that human capital can be built through education, life experiences and both on-the-job and off-the-job trainings. Numerous studies have established the importance of human capital in explaining various positive outcomes both at individual and firm levels. For example, in the US, formal training increased firm productivity by 6 percent (Bartel 1992). A 10% increase in education is associated with 8.5-12.7% increase in productivity (Lynch and Black 1995).

Another explanation for variation in returns comes from the field of psychology. According to the literature in psychology, besides cognitive skills, non-cognitive abilities e.g personality traits, motivation, beauty, social networking etc. have the power to predict different socioeconomic outcomes. Heckman et al. (2006) provide evidence that non-cognitive skills are at least as important as cognitive skills. These findings thus challenges the *g-theory* of human behavior advocated by Herrnstein and Murray (1994) which considers cognitive skills as a dominant factor in explaining different socioeconomic outcomes. Mueller and Plug (2006) term personality as a bundle of productive traits. Individuals trade these traits against equilibrium price which is determined by market return on each component of the trait vector. Individuals choose professions which pay the highest reward to their traits and as a result, in equilibrium, labor market observes occupational sorting based on personality traits (Tett et al. 1991).

Using five factor model, Mueller and Plug (2006) analyzed the effects of personality on earnings. They find that extroversion, agreeableness, conscientiousness, neuroticism and openness to experience are rewarded/ penalized significantly and differently across genders. Among these factors, agreeableness is the most important factor in explaining

earning differentials between male and female. The paper also finds evidence of significant gender differences in personality traits. Mueller and Plug (2006) acknowledge that the main limitation of their empirical work is endogeneity of personality measures. The data on personality measures and earnings were gathered simultaneously and therefore, the causal relationship is not very clear. That is, we do not know for sure whether personality is driving earnings or vice versa. One possible solution to correct this problem is to gather data on personality before the outcomes.

Since personality is related with various outcomes e.g. educational attainment, job performance etc., therefore, intuitively, any systematic gender-based differences in personality traits has the ability to explain gender-based performance gaps.

6.3 Data

For this study, we conducted an experiment and collected a three-period panel dataset from 488 applicants who were eligible for Akhuwat's enterprise loans. Section 5.4 in Chapter 5 provides a detailed description of this experiment. 24% of our sample consists of female borrowers (N=115). After conducting baseline survey 243 firms were randomly assigned to treatment group and remaining 245 were assigned to control. The gender-based distribution of treatment and control groups is presented in Table 6.3-1.

Table 6.3-1: Gender-based Distribution of Treatment and Control Groups

	Treatment	Control	Total
Male	178	195	373
Female	65	50	115
Total	243	245	488

Table 5.5-1 in chapter 5 shows that overall randomization created a valid control group. We also investigated the validity of randomization for both male and female subsamples. Table 6.8-1 shows that for male microentrepreneurs, the treatment group has significantly higher educa-

tion than that of control group. Similarly, the treatment group reported significantly higher scores on agreeableness domain. For Female micro-entrepreneurs, the treatment group has a significantly lower score on agreeableness domain (see Table 6.8-2). These small differences are not likely to bias our estimates. McKenzie and Woodruff(2008) argue that because of randomization, any possible differences in both treatment and control groups are due to 'pure chance' and thus are not expected to create any bias. Further, the use of fixed effects model will remove the effects of time invariant characteristics.

In the baseline, both male and female microentrepreneurs reported significant differences in key business characteristics. Table 6.6-1 shows that female microentrepreneurs operate a relatively smaller business with significantly lower levels of capital stock and monthly income. They also generate significantly lower revenues and commit fewer hours to the business. In our sample, microentrepreneurs generally operate very small businesses. Considering the size of businesses, the treatment of Rs. 10,000 is substantial. For female microentrepreneurs, this treatment is equivalent to 143% of their median monthly income. For men, it is 116% of their median income. Similarly, the treatment of Rs. 10,000 represents 45% and 41% of the median capital stock for female and male owned microenterprises respectively. 52.63% of female and 26.95% of males in our sample run their businesses from homes. Table 6.3-2 reveals that the joint distribution of the microentrepreneurs across different sectors do not show any significant differences across genders ($p=0.33$).

Table 6.3-2: Gender-based Distribution by Sectors

	Female	Male	Total
Retail	34	127	161
Manufacturing	18	53	71
Services	37	137	174
Agriculture	1	1	2
Others	25	55	80
Total	115	373	488
Pearson Chi-square(4)=4.5714 P=0.33			

To better understand the businesses operated by men and women, in the following paragraphs, we talk about two cases. For the sake of confidentiality, we conceal the identities of microentrepreneurs by using fictitious names.

Rabia is one of Akhuwat's current borrowers. Her life is full of hardships and struggles. Almost two years after marriage, her husband abandoned Rabia and her four months old son. Rabia went back to her parent's house where she lived with her mother and three brothers. When her son turned 18, he was shot dead. By the time, she also lost her mother. After her mother's demise, Rabia decided not to be financially dependent on her brothers. She heard about Akhuwat's interest free loans and one day borrowed Rs.10,000 with an intention to start her own business. With that money, she bought wheat from local farmers and had it ground from a nearby flour mill. She stocked the flour in her house and people especially women from the neighbourhood became her customers. In an interview with the author, she said that people like her stone-ground flour because of its freshness and superior quality. On average, she buys 15 bags (40 kilograms in each bag) of wheat in a week. For each bag, she pays Rs.50 for transportation, Rs.20 for sift cleaning and Rs.80 for grounding. After paying all these expenses, she makes Rs.150-200 in each bag. Other typical businesses operated by women are tailoring, door-to-door selling of clothes and other items, embroidery, beauty parlour, making car seat covers and grocery stores etc.

Hassan is another borrower of Akhuwat who unlike Rabia is a skilled worker. He used to work for a furniture manufacturer on daily wages as a carpenter. He was not happy with his earnings and therefore decided to start his own business. He took Rs. 10,000 interest-free loan from Akhuwat and bought tools with that money. He rented a shop and developed it into a workshop. Hassan started getting contracts from furniture manufacturers which normally included work related to wood moulding, grinding and polishing. Two of his main expenditures are utility bills and location rent. After paying these expenses, Hassan earns Rs.10,000-12,000 in a month.

Besides business level, our sample shows significant gender-based differences in some household characteristics (see Table 6.3-3). The average male and female education in Pakistan is 6.1 and 3.3 years respectively⁶². Both male and female entrepreneurs in our sample have less than aver-

age education. Female microentrepreneurs are significantly older and less educated compared to male microentrepreneurs. Similarly, their household's monthly income and food and non-food expenditure are also significantly different.

Table 6.3-3: Gender-based Differences in Household and Business Characteristics

H_0 : Both Groups have Equal Means	Male		Female		t-test <i>t</i> - statistics
	Mean	S.D	Mean	S.D	
Education	5.51	3.97	2.88	3.95	6.21***
Age of the borrower	37.4	10.2	42.8	9.39	5.06***
Number of Children in the HH	1.25	1.34	0.948	1.18	2.21**
HH Assets	761,735	862,268	708,303	700,693	0.606
HH monthly income	12,999	4,577	11,476	5,419	2.98***
HH expenditure	13,113	4,554	11,571	5,307	3.05***
HH food expenditure	8,668	4,238	7,531	4,899	2.42***
Monthly Profits	8,563	1,155	6,892	1,205	13.4***
Capital Stock	24,642	4,029	22,125	4,031	5.86***
Hours of work in a day	10.1	2.08	9.06	1.86	4.81***

Significance levels (*=10%,**=5%, ***=1%)

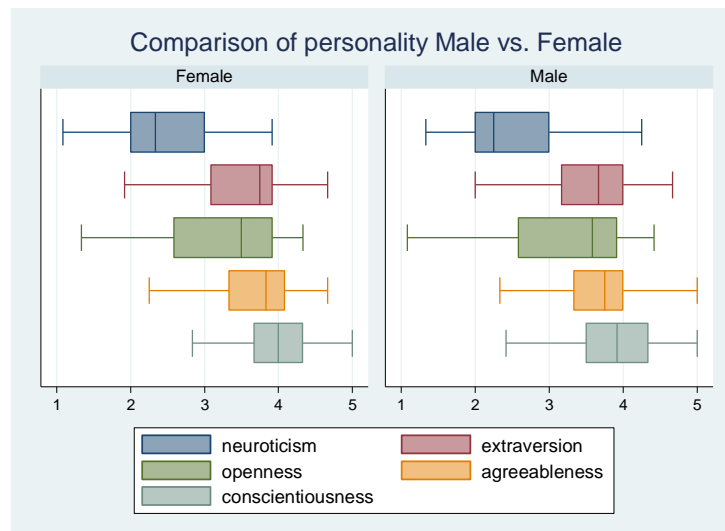
Table 6.3-4 compares personality traits of both male and female entrepreneurs (*see* also Figure 6.3-1). Our data do not show any significant gender-based differences in Neuroticism, Extraversion, Openness and Agreeableness domains. On the Conscientiousness domain though, female microentrepreneurs score significantly higher than male microentrepreneurs.

Table 6.3-4: Baseline Differences in Personality

H_0 : Both Groups have Equal Means	Male		Female		t -test t - statistics
	Mean	S.D	Mean	S.D	
Neuroticism	2.48	0.655	2.48	0.643	0.012
Extraversion	3.51	0.632	3.49	0.701	0.302
Openness	3.28	0.781	3.25	0.764	0.299
Agreeableness	3.6	0.676	3.64	0.621	0.626
Conscientiousness	3.83	0.676	3.94	0.665	1.596*

Significance levels (*=10%, **=5%, ***=1%)

Figure 6.3-1: Comparison of Personality: Male vs. Female



6.4 Sample Attrition

Of 488 applicants in the baseline, 454 completed the follow-up survey in the third wave representing an attrition rate of 6.97%. The response rate is comparable to other similar randomized studies. The attrition is non-

systematic as we did not see any significant differences in the baseline characteristics of attrited and unattrited microentrepreneurs (see Table 5.6-1 and Table 5.6-2). Our analysis also reveals that the attrition was non-systematic both for male and female microentrepreneurs (see Table 6.4-1 and Table 6.4-2).

Table 6.4-1: Comparison of Means of Attrited and Unattrited Microenterprises-Female

H_0 : Both Groups have Equal Means	Attrited		Unattrited		t-test <i>t</i> - statistics
	Mean	S.D	Mean	S.D	
Monthly Profits	6,496	1,051	6,922	1,215	0.963
Capital Stock	21,223	2,484	22,192	4,123	0.655
Number of Hours Worked	8.38	0.916	9.11	1.9	1.08

Significance levels (*=10%, **=5%, ***=1%)

Table 6.4-2: Comparison of Means of Attrited and Unattrited Microenterprises - Male

H_0 : Both Groups have Equal Means	Attrited		Unattrited		t-test <i>t</i> - statistics
	Mean	S.D	Mean	S.D	
Monthly Profits	8,633	1,055	8,558	1,163	0.321
Capital stock	24,843	3,946	24,627	4,040	0.263
Number of Hours Worked	9.69	2.09	10.1	2.08	1.05

Significance levels (*=10%, **=5%, ***=1%)

6.5 Estimation Strategy

In this paper, we investigate gender-based differences in two stages. In the first stage, we use baseline data and investigate gender-based differ-

ences in monthly profits. In the second stage, we investigate gender-based heterogeneity in treatment effects.

6.5.1 Gender-based Heterogeneity in Monthly Profits-Baseline

To examine gender-based differences, we start by simply comparing average monthly profits earned by male and female microentrepreneurs. Later on we add covariates for demographic differences, business characteristics, personality traits and purdah. We estimate the following model using ordinary least squares.

$$\begin{aligned} \text{Profits}_i = & \alpha + \beta_{\text{Male}} \text{Sexbrwr}_i + \beta_H \text{HH}_i + \beta_B \text{B}_i + \beta_P \text{P}_i \\ & + \beta_{\text{purdah}} \text{Purdah}_i + \varepsilon_i \end{aligned} \quad 6.5-1$$

Variable Profits_i represents monthly profits of microenterprise i . Sexbrwr_i is a dummy variable which takes value of 1 for male entrepreneurs and 0 for female entrepreneurs. HH_i and B_i represent household and business characteristics respectively. P_i relates to five personality domains and Purdah_i is a dummy variable showing if a microentrepreneur is doing purdah⁶³. We use purdah as a proxy for limited access to labor markets through restricted spatial mobility which may help explain variation in business returns. ε_i is a zero mean stochastic error term which captures other unobserved factors.

After establishing gender-based differences in monthly profits, we then proceed to examine the factors which contribute to these differences. For this purpose we follow Oaxaca and Ransom (1994) and decompose the gender-based differences into Explained and Unexplained components based on common coefficients estimated from pooled regression.

Suppose Profits_M and Profits_F are the monthly profits for male and female microentrepreneurs in our sample. The average gender-based earning differential $\Delta \text{Profits}$ can be shown as;

$$\Delta \text{Profits} = E(\text{Profits}_M) - E(\text{Profits}_F)$$

Assuming linear relationship, $\Delta \text{Profits}$ can be expressed as;

$$\Delta \text{Profits} = E(\beta_M X_M + \varepsilon_M) - E(\beta_F X_F + \varepsilon_F)$$

Where X is set of covariates in our regression model which explain variation in monthly profits.

Since $E(\beta_M) = \beta_M$, $E(\beta_F) = \beta_F$, $E(\varepsilon_M) = 0$ and $E(\varepsilon_F) = 0$

$$\Delta \text{Profits} = \beta_M \bar{X}_M - \beta_F \bar{X}_F \quad \mathbf{6.5-2}$$

Various studies have decomposed equation 6.5-2 into various components. Since we will be using estimates from pooled regression, we decompose 6.5-2 into the following two components.

$$\Delta \text{Profits} = \beta_P (\bar{X}_M - \bar{X}_F) + [(\beta_M - \beta_P) \bar{X}_M - (\beta_F - \beta_P) \bar{X}_F] \quad \mathbf{6.5-3}$$

The term $\beta_P (\bar{X}_M - \bar{X}_F)$ explains the gender-based gap in profits due to differences in average characteristics of male and female entrepreneurs. The second term $[(\beta_M - \beta_P) \bar{X}_M - (\beta_F - \beta_P) \bar{X}_F]$ captures differential returns on male-female characteristics in the market. In literature, this term is referred to as market discrimination (e.g. Oaxaca and Ransom 1994, Caliendo et al. 2014, Jann 2008). Mueller and Plug (2006) though refrain to interpret this gap as discrimination because they are of the view that, instead of market discrimination, this gap may potentially be caused by gender-based differences in preferences.

6.5.2 Gender-based Heterogeneity in Treatment Effects-Panel Dataset

In the second stage, we investigate gender-based heterogeneity in treatment effects on different outcomes of interest. We use panel dataset and estimate the following model;

$$Y_{it} = \alpha + \beta_T Treatment_{it} + \sum_{t=2}^3 \beta_{\omega t} \omega_t + \beta_{TM} Treatment_{it} * Sexbrwr_i + \sum_{t=2}^3 \beta_{\omega M t} \omega_t * Sexbrwr_i + \lambda_i + \varepsilon_{it} \quad 6.5-4$$

It is expected that randomization will purge individual specific effects, however, we will also control for time-invariant characteristics by estimating a fixed effects model. Y_{it} is the outcome of interest of firm i in period t , $Treatment_{it}$ is a dummy which takes values of 1 for treatment and 0 for control; ω_t captures fixed wave effects; β_T represents overall effect on the treated; and λ_i are time invariant fixed effects of microenterprises. $Sexbrwr_i$ is a gender dummy which takes value of 1 for male entrepreneurs and 0 for female. β_{TM} and $\beta_{\omega M t}$ captures the gender interacted treatment and trend effects. The error term ε_{it} in this model represents other unobserved factors affecting our outcome variables. The randomization of treatment implies that ε_{it} is random and uncorrelated with other covariates in our model. Since the treatment was randomized at the microenterprise level, we cluster the standard errors at microenterprise level as well. Using the model above, treatment effect on the treated is as follows;

$$\frac{\partial Y_{it}}{\partial Treatment_{it}} = \beta_T + \beta_{TM} Sexbrwr_i$$

$Sexbrwr_i = 1$ implies male microentrepreneurs

Treatment for male microentrepreneurs = $\beta_T + \beta_{TM}$

Similarly treatment for female microentrepreneurs = β_T

To investigate gender-based heterogeneity in treatment effects, we use the following tests;

Test1: There are heterogeneous treatment effects if $\beta_{TM} \neq 0$

Test2: There is no effect for female entrepreneurs if $\beta_T = 0$

6.6 Results

6.6.1 Gender-based Heterogeneity in Monthly Profits-Baseline

Our baseline data suggest large and significant gender-based variations in business returns (*see* Table 6.6-1). On average female microentrepreneurs earn 20% less in monthly profits and 21% less in monthly revenues compared to their male counterparts. They also operate with 11% less capital.

Table 6.6-1: Baseline differences in Business Characteristics

H_0 : Both Groups have Equal Means	Male		Female		t-test <i>t</i> - statistics
	Mean	S.D	Mean	S.D	
Revenues	10,361	2,773	8,182	2,559	7.5***
Monthly Profits	8,563	1,155	6,892	1,205	13.4***
Capital Stock	24,642	4,029	22,125	4,031	5.86***
Number of Hours Worked in Day	10.1	2.08	9.06	1.86	4.81***

Significance levels (*=10%, **=5%, ***=1%)

Before proceeding to multivariate analyses, we conduct chow test on Model 5, which is our full model, to see if estimated parameters are stable across branches. Based on p-value of 0.57 (F-statistic = 0.94), we conclude that pooling of data is reasonable. Table 6.6-2 shows that male microentrepreneurs earn Rs. 1,671 more than female entrepreneurs in the base specification (Model 1). The gap actually increases when we control for education and age of the entrepreneurs in Model 2. Higher levels of capital are associated with higher profits as suggested by Model 3. Capital stock seems to be a significant driver of monthly profits which is quite intuitive. When we control for the capital stock and entrepreneur's own labor input in Model 3, the average difference in monthly profits shrinks to Rs. 1,126 compared to Rs. 1,671 in the base specification. In Model 4, we add personality traits to our set of covariates. Personality traits are intended to partially absorb variation in monthly profits and by adding them into our analyses, we are not trying to establish any causality. The R-squared only marginally improved (from 0.740 to 0.744) which shows that personality traits do not drastically improve the explanatory power of our model. The gender-based differences in monthly profits virtually stays at the same level (1,127 compared to 1,126). Model 5 shows that purdah is associated with lower monthly profits. Once we control for purdah, gender-based differences in monthly profits decline, however, they still remain large and significant. Male microentrepreneurs continue to earn Rs. 992 more in monthly profits than their female counterparts even after controlling for demographic characteristics, capital stock, effort, personality traits and purdah.

To further investigate the gender-based earning differentials, we split the difference of Rs. 1,671 into two components by estimating equation 6.5-4 using twofold decomposition (Jann 2008). Table 6.6-3 provides detailed decomposition. Column 2 reports the part of earning gaps which results from differences in observed characteristics. Column 3 reports the unexplained component of earning gaps which essentially captures the effects of differential return on male and female characteristics. Column 4 and Column 5 further decomposes the unexplained gaps arising from differences in male and female coefficients.

In our sample, there are significant gender-based differences in observed characteristics of male and female microentrepreneurs (*see* Table 6.3-3 and Table 6.3-4). In literature, these characteristics are referred to as endowments. Differences in endowments explain 41% (Rs.679 out of

Rs.1,671) of the gender gap in earnings (*see* Table 6.6-3). Capital stock and purdah are the only two variables which significantly *explain* earning gaps. In our sample, female microentrepreneurs operate their businesses with significantly lower levels of capital which also yield in lower business profits. Gender-based differences in levels of capital stock explain Rs.582 in earning differentials. Similarly, prevalence of purdah reduces females' monthly profits by Rs.133 compared to their male counterparts.

59% of the earning differentials are not explained by differences in observed characteristics. The unexplained earning differential may be due to market discrimination or gender-based differences in preferences. Table 6.6-3 shows that Extraversion domain of personality trait is the only significant predictor of the unexplained component. Extraversion is seen as a positive trait for male microentrepreneurs which results in a market premium of Rs.491. This premium comes directly from large difference in slopes. In pooled regression, the return on extraversion (β_p) is -14.95 whereas for male microentrepreneurs (β_M) it is 124.73. Coefficient on females' Extraversion is very large and negative ($\beta_F = -300.53$) which leads to a significant negative return of Rs.997. We do not know the precise reasons for this penalty. The personality test that we used mentions that a person high in Extraversion is assertive, active, talkative, sociable, gregarious and cheerful in disposition. Extravert person enjoys excitement and stimulation. Among other possible reasons, extraversion for female entrepreneurs may not be a likable trait in Pakistan's conservative and patriarchal society.

Column 2 in Table 6.6-3, shows that Extraversion alone creates a differential effect of Rs.1,488. Though the context and data are not comparable with ours, Mueller and Plug (2006) reported similar findings. Using data from Wisconsin Longitudinal Study, the paper finds that compared to that of men, female's Extraversion is significantly penalized. Our findings reveal that with exception of three personality domains (i.e. Neuroticism, Extraversion and Conscientiousness), all other characteristics of female microentrepreneurs are rewarded though insignificantly. This brings down the gender gap in monthly profits to Rs.992 which is same as the coefficient on male dummy in Model 5 of Table 6.6-2.

Table 6.6-2: Baseline - Gender-based Differences in Monthly Profits

Dependent Variable: Monthly Profits	Model1	Model2	Model3	Model4	Model5
Gender Dummy Male=1, Female=0	1671.291*** (127.06)	1697.783*** (132.47)	1126.204*** (79.81)	1127.249*** (81.22)	991.808*** (118.72)
Education of the entrepreneur		-9.108 (13.46)	-0.821 (7.90)	-1.404 (7.91)	-0.856 (7.95)
Age of the Entrepreneur		0.473 (5.56)	2.131 (3.06)	3.160 (3.12)	2.585 (3.12)
Capital Stock			0.232*** (0.01)	0.232*** (0.01)	0.231*** (0.01)
Number of daily hours worked			-25.026 (15.81)	-27.400* (15.73)	-25.636 (15.85)
Neuroticism				11.103 (79.05)	3.712 (79.12)
Extraversion				-5.538 (74.91)	-14.952 (74.89)
Openness				89.768* (45.86)	90.486** (45.83)
Agreeableness				15.918 (55.63)	21.723 (56.00)
Conscientiousness				-59.732 (46.69)	-57.210 (46.23)
Purdah=1, No-purdah=0					-250.484* (127.57)
Constant	6892.087*** (112.10)	6898.083*** (270.91)	1890.067*** (243.49)	1744.059*** (592.23)	1928.970*** (604.93)
N	488	488	488	488	488
R-Squared	0.271	0.271	0.740	0.744	0.745

Notes: Significance level (*** p<0.01, ** p<0.05, * p<0.1). Robust standard errors are provided in parenthesis. The baseline data (N=488) was gathered in June 2010 . Variable Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Working Capital excludes value of land and buildings.

Table 6.6-3: Decomposition of Gender-based Differences in Monthly Profits

Variable	Explained	Unexplained	Unexplained-Male	Unexplained-Female
	$\beta_p(\bar{X}_M - \bar{X}_F)$	$(\beta_M - \beta_p)\bar{X}_M - (\beta_F - \beta_p)\bar{X}_F$	$(\beta_M - \beta_p)\bar{X}_M$	$(\beta_F - \beta_p)\bar{X}_F$
Predicted Monthly Profits-Male	8563.38*** (59.77)		<i>Explained Difference</i>	679.48*** (130.26)
Predicted Monthly Profits-Female	6892.09*** (112.26)		<i>Unexplained Difference</i>	991.81*** (117.21)
Difference	1671.29*** (127.18)			
Education of the entrepreneur	-2.25 (20.65)	-8.64 (61.61)	2.05 (23.52)	10.69 (39.95)
Age of the Entrepreneur	-13.96 (16.89)	-268.99 (321.08)	-69.87 (56.03)	199.13 (271.60)
Capital Stock	582.06*** (100.73)	-558.69 (363.30)	-67.28 (89.95)	491.41* (285.13)
Number of daily hours worked	-26.76 (17.17)	-430.05 (325.83)	-106.98 (75.67)	323.06 (259.94)
Neuroticism	-0.00 (0.26)	439.49 (423.56)	143.91 (108.38)	-295.58 (329.37)
Extraversion	-0.31 (1.89)	1488.23*** (503.34)	490.78*** (170.81)	-997.45*** (370.35)
Openness	2.24 (7.49)	142.30 (306.49)	43.06 (65.76)	-99.24 (246.21)
Agreeableness	-0.96 (2.86)	-119.02 (490.01)	-93.07 (123.28)	25.95 (379.42)
Conscientiousness	6.56 (6.64)	9.17 (399.94)	-73.41 (90.87)	-82.58 (324.70)
Purdah=1, No-purdah=0	132.87* (67.92)	-8.24 (26.21)	0.00 (.)	8.24 (26.21)
Constant	-	306.24 (1330.30)	722.62** (335.77)	416.38 (1037.89)
Total	679.48*** (130.26)	991.81*** (117.21)	991.81*** (117.44)	0.00 (25.48)
N	488	488	488	488
Adjusted R-Squared (pooled)	0.740	0.740	0.740	0.740

6.6.2 Gender-based Heterogeneity in Treatment Effects-Panel Dataset

To explore gender-based heterogeneity in treatment effects, we start our analysis with single-difference estimators (*see* Table 6.6-4). We simply compare the means of treatment and control groups at the end of 5 and 10 months for both male and female microentrepreneurs. The monthly profits of treated male microentrepreneurs showed a significant increase of Rs. 396 after five months of treatment. Capital stock also increased by Rs. 2,842. Their own labor input, however, did not show any increase which lends credibility to the argument that increases in monthly profits and capital stock are due to exogenous capital infusion and not because of extra hours of work. After 10 months of treatment, monthly profits and capital stock for male microentrepreneurs were Rs. 349 and Rs. 2,636 respectively. Compared to treated male, treated female microentrepreneurs did not show any improvement in their monthly profits. Their capital stock, however, significantly increased in both periods. Just like male microentrepreneurs, treatment did not lead to more effort from female microentrepreneurs.

Table 6.6-4: Single Difference Estimates

Difference (Treatment - Control)				
At the end of 2nd wave (t=2)				
N=453				
	Male		Female	
	Difference	Standard errors	Difference	Standard errors
Monthly Profits	396***	133	99	249
Capital Stock	2,842***	454	2,187***	797
Number of Hours Worked in Day	0.0768	0.296	0.343	0.53

At the end of 3rd wave (t=3)
N=454

	Male		Female	
	Difference	Standard errors	Difference	Standard errors
Monthly Profits	349***	128	163	245
Capital Stock	2,636***	437	2,371***	789
Number of Hours Worked in Day	0.0933	0.245	0.0769	0.405

Using 6.5-4, we investigate gender-based heterogeneity in treatment effects. The panel data help us remove the time invariant factors by using fixed effects model. Table 6.6-5 shows that there is significant gender-based heterogeneity in monthly profits. On average, treated male microentrepreneurs earn Rs. 212 more than treated female microentrepreneurs. Overall, treatment effects for male microentrepreneurs is Rs. 306 which is equivalent to 3.6% increase in their baseline monthly profits. The treatment, however, had a small and relatively less significant impact on female microentrepreneur's monthly profits. Treated female microentrepreneurs reported a gain of Rs. 93 in their monthly profits which was equivalent to 1.3% increase in their baseline monthly income. We did not find any heterogeneous treatment effects on capital stock and effort measured in number of hours worked. The annual returns to capital for male and female microentrepreneurs are 156.9% and 50.1% respectively (see Table 6.8-4). The estimated returns to capital, especially for male microentrepreneurs, in our study are very high compared to the average interest rate charged by microfinance institutions in Pakistan which is approximately 33.5%.

Table 6.6-5: Treatment Effects - Gender-based Heterogeneity in Various Outcomes

Variable	Coefficients	Monthly Profits	Capital Stock	Hours Worked in a Day
Treatment	β_T	93.226* (47.95)	2229.716*** (263.48)	0.263 (0.26)
Ref: Baseline (t=1)				
t=2	β_{t2}	796.537*** (40.34)	111.665 (244.01)	-0.323 (0.25)
t=3	β_{t3}	763.046*** (35.92)	-99.373 (230.32)	-0.323* (0.18)
Interaction Terms				
Sexbrwr x time2	β_{of2}	-504.473*** (52.62)	132.900 (280.82)	0.285 (0.28)
Sexbrwr x time3	β_{of3}	-480.381*** (46.09)	28.709 (261.29)	0.334 (0.21)
Sexbrwr x treatment	β_{TM}	212.331*** (64.94)	106.496 (330.78)	-0.297 (0.29)
Constant		8171.831*** (11.77)	24053.045*** (54.33)	9.893*** (0.04)
N		1361	1361	1361
R ²		0.613	0.425	0.004
Treatment for male microentrepreneurs = $\beta_T + \beta_{TM}$		Test1: There will be heterogeneous treatment effects if $\beta_{TM} \neq 0$		
Treatment for female microentrepreneurs = β_T		Test2: Female entrepreneurs will see no effect if $\beta_T = 0$		

Robust standard errors are provided in parenthesis. Estimates are based on fixed effects model.

Notes: Significance level (***) p<0.01, ** p<0.05, * p<0.1). Robust standard errors are clustered at the microenterprise level and reported in parentheses. The data was collected in three waves (t=1,2,3). The baseline data (t=1) was gathered in June 2010 and a two follow up surveys were conducted 5 and 10 months after the baseline. Variable Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Working Capital excludes value of land and buildings.

6.7 Conclusions

In the global development discourse, women are considered relatively more credit constrained than their male counterparts. As a result, it is axiomatically believed that once women are given access to capital, they are able to generate very high returns to capital. Influenced by this belief, microfinance interventions generally target women entrepreneurs. Recent randomized studies in Sri Lanka, Philippines and Mexico have puzzled microfinance experts. Contrary to popular beliefs, these studies did not find significant impact of access to capital on returns of female owned businesses. The evidence so far is mixed. The purpose of this essay was to bring further evidence on gender-based heterogeneity in business returns from Pakistan.

For this research we partnered with Akhuwat Microfinance and gave a random shock to the capital stock of randomly selected microenterprises. This study employed two levels of analyses to investigate gender-based differences in business returns. In the *first* level of analyses, using baseline data, we found large and significant gender-based heterogeneity in business returns. Women, on average, earned 20% (i.e. Rs. 1,671) less in monthly profits than men did. A major part of gender-based differences in business returns were explained by variation in capital stock. Compared to men, female microentrepreneurs in our sample had significantly lower levels of capital and once we controlled for variation in capital stock, the differences in business returns shrunk by 33.67%. By adding personality traits to the set of covariates, the average earning gap reduced to Rs.992. Using Blinder-Oaxaca decomposition, our full model explained 41% of earning differentials. In our analyses, capital stock and *purdah* contributed significantly to the endowment effects. A major portion i.e. 59% of total earning gap could not be explained with gender-based differences in observed characteristics. Personality domains had significant differential effects on monthly profits for both male and female microentrepreneurs. Further examination of the unexplained differences revealed that compared to that of men, extraversion domain of female microentrepreneurs was associated with significantly lower monthly profits.

In the *second* level of analyses, we used panel dataset and estimated gender-based heterogeneity in treatment effects. We removed the gender specific time invariant effects by estimating a fixed effects model. For example, gender-based differences in entrepreneurial abilities were differenced out in the estimation process. We found large and significant gender-based heterogeneity in

treatment effects. In response to exogenous infusion of capital, the monthly profits of male microentrepreneurs showed a large and significant increase in monthly profits. Female microentrepreneurs, on the other hand, registered a rather small and less significant increase. The estimated monthly returns to capital for male and female microentrepreneurs were 13.1% and 4.2% respectively which were substantially higher than the market interest rate in Pakistan. Overall, we believe that in the presence of structural constraints (or social barriers), capital-alone approach will be of little help for female microentrepreneurs.

Notes

⁵⁸ The story about Murshida is taken from a memoir of Prof. Muhammad Yunus, founder of Grameen Bank and the story about Razia was broadcasted in a documentary by Dane Tom Heinemann called “The Micro Debt”.

⁵⁹ Women’s lower participation in entrepreneurship is a common phenomenon and is not restricted to developing countries only. Female self-employment rates are 25% in the US and 20% in the UK, Ireland and Sweden.

⁶⁰ Some studies (e.g. Cowling et al. 1995; Kalleberg and Leicht 1991) did not any gender-based differences in firms’ performance.

⁶¹ The manifestation of purdah though varies depending on geographical regions, socio-economic conditions of the household and ethnicity (Roomi 2013).

⁶² Source: http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/PAK.pdf [Last accessed: June 22, 2016]

⁶³ We captured the variable by asking a direct question. *‘Do the female members of the household do purdah?’*

6.8 Appendices

Table 6.8-1: Verification of Randomization-Male Microentrepreneurs

H_0 : Both Groups have Equal Means	Treatment		Control		t-test t-statistic
	Mean	SD	Mean	SD	
Total number of the HH	5.49	1.92	5.74	2.14	1.210
Household monthly income	13,223	4,744	12,794	4,421	0.903
Household assets	795,309	805,707	731,087	911,831	0.718
Household monthly expenditure	13,164	4,657	13,067	4,470	0.206
Number of school going children	1.47	1.55	1.64	1.75	0.983
Presence of Chronic ill in the Household	0.213	0.572	0.169	0.389	-0.880
Years of education of borrower	5.93	3.6	5.12	4.26	1.960*
Age	36.9	9.91	37.8	10.4	0.925
Monthly Profits	8,617	1,159	8,515	1,151	0.849
Revenues	10,452	2,981	10,278	2,574	0.603
Monthly sales	26,104	31,583	26,728	33,680	0.184
Business assets	32,050	56,174	31,921	48,010	0.024
Hours of work in a day	10.20	2.22	10.00	1.95	0.566
Capital Stock	24,870	3,751	24,434	4,266	1.040
Credit requirement	23,118	15,207	24,144	17,838	0.595
Neuroticism	2.49	0.661	2.48	0.651	0.063

Extraversion	3.5	0.626	3.53	0.639	0.397
Openness	3.32	0.735	3.24	0.821	0.967
Agreeableness	3.67	0.624	3.53	0.715	1.900*
Conscientiousness	3.81	0.684	3.85	0.671	0.547

Notes: Significance levels (*=10%,**=5%, ***=1%). The baseline data was collected in June 2010. Variable Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Capital stock excludes value of land and buildings.

Table 6.8-2: Verification of randomization-Female Microentrepreneurs

H_0 : Both Groups have Equal Means	Treatment		Control		t-test t-statistic
	Mean	SD	Mean	SD	
Total number of the HH	5.86	2.19	5.48	1.95	0.970
Household monthly income	11,846	6,046	10,996	4,491	0.832
Household assets	684,600	694,178	739,116	714,944	0.412
Household monthly expenditure	11,777	5,988	11,304	4,309	0.473
Number of school going children	1.55	1.66	1.64	1.74	0.271
Presence of Chronic ill in the Household	0.308	0.61	0.26	0.6	0.419
Years of education of borrower	2.68	3.58	3.14	4.41	0.621
Age	42.60	9.62	42.90	9.18	0.174
Monthly Profits	6,885	1,240	6,901	1,170	0.071
Revenues	8,142	2,992	8,235	1,881	0.192

Monthly sales	21,748	35,439	28,543	27,562	1.120
Business assets	24,840	23,079	22,174	4,146	0.806
Hours of work in a day	9.06	1.85	9.06	1.89	0.004
Capital Stock	22,086	3,973	22,174	4,146	0.115
Credit requirement	25,662	23,793	20,100	9,119	1.570
Neuroticism	2.50	0.64	2.46	0.65	0.326
Extraversion	3.47	0.73	3.52	0.66	0.320
Openness	3.29	0.793	3.21	0.729	0.597
Agreeableness	3.52	0.631	3.80	0.573	2.500**
Conscientiousness	3.98	0.652	3.90	0.685	0.671

Notes: Significance levels (*=10%, **=5%, ***=1%). The baseline data was collected in June 2010. Variable Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Capital stock excludes value of land and buildings.

Table 6.8-3: Treatment Effects - Difference in Difference Estimates for Male and Female

	Monthly Profits		Capital Stock		Daily hours of work	
	Male	Female	Male	Female	Male	Female
Ref: baseline						
Treatment	305.635*** (43.92)	93.226* (48.24)	2330.595*** (200.54)	2229.716*** (265.10)	-0.041 (0.14)	0.263 (0.26)
t=2	292.064*** (33.78)	796.537*** (40.58)	244.565* (138.94)	111.665 (245.51)	-0.038 (0.13)	-0.323 (0.25)
t=3	282.665*** (28.87)	763.046*** (36.14)	-70.665 (123.35)	-99.373 (231.73)	0.011 (0.10)	-0.323* (0.19)
Constant	8556.675*** (14.63)	6914.671*** (15.89)	24622.783*** (66.39)	22197.868*** (83.79)	10.142*** (0.05)	9.088*** (0.08)
N	1042	319	1042	319	1042	319
R2	0.473	0.867	0.398	0.533	0.001	0.013

Notes: Significance level (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$). Robust standard errors are clustered at the microenterprise level and reported in parentheses. The data was collected in three waves (t=1,2,3). The baseline data (t=1) was gathered in June 2010 and a two follow up surveys were conducted 5 and 10 months after the baseline. Variable Monthly Profits was measured by asking a direct question from the respondents on their monthly business profitability. Working Capital excludes value of land and buildings.

Table 6.8-4: Treatment Effects - Returns to Capital

Male			Female		
Monthly Profits	Capital Stock	Returns To Capital	Monthly Profits	Capital Stock	Returns To Capital
305.56	2,336.21	13.1%	93.23	2,229.72	4.2%

7

Concluding Remarks

An efficient financial system is vital for pro-poor and inclusive economic growth. Based on economic principle of diminishing returns, it is generally believed that poor entrepreneurs should be able to generate higher marginal returns to capital compared to richer entrepreneurs; and, therefore, in perfect markets, the capital should naturally flow to the poor (Armendariz and Morduch 2010). Financial markets, however, are not perfect and as a result, a large number of the poor households are systematically excluded. To ease market frictions, microfinance has arguably emerged as an effective development intervention and has so far reached millions of the poor households worldwide. Initial impact studies and inspiring stories of microfinance borrowers from around the world presented microfinance as a ‘development success’; however, recent randomized impact evaluation studies showed mixed results. Microfinance scholars and practitioners are clearly divided on the ‘undisputed success narrative’ of microfinance. Armendariz and Morduch (2010) acknowledges the importance of microfinance in improving lives of the poor but at the same time they consider microfinance to be neither a ‘panacea’ nor a ‘magic bullet’. Media reports regarding suicide of microfinance borrowers in India in 2010 have further put a question mark on the usefulness of microfinance.

In an effort to bring further evidence on the effectiveness of microfinance, in partnership with Akhuwat, we conducted a field experiment in Pakistan. Akhuwat Microfinance has been providing interest free loans to the poor since 2001. In this experiment, we gave exogenous shock to the capital stock of randomly selected microenterprises. The treatment was given in the form of interest free loans. Two follow-up surveys were conducted. The first follow-up survey was conducted 5 months after the baseline and the second follow-up was conducted 10 months after the baseline.

Along with estimating the treatment effects, we were also curious to know that why some microenterprises, otherwise eligible, do not apply for Akhuwat’s interest free microcredit. We presented our research findings in three

core essays. The first essay examined the determinants of non-participation in Akhuwat's microcredit program; the second essay estimated the impact of Akhuwat's microcredit on various business outcomes; and the third essay investigated the gender-based heterogeneity in monthly profits and treatment effects.

The stated aim of most microcredit programs is to target the poor, however, various research studies have documented that a large number of poor households, though eligible for microcredit, do not participate. We do not know if such high non-participation is triggered by limited supply or lack of demand. The supply side barriers to participation have been adequately researched; nevertheless, we know very little of its demand side which is caused by poor's voluntary or self-exclusion. The purpose of our *first* essay was to examine reasons for not participating in the Akhuwat's microcredit program by comparing group of Applicants and Eligible-non-Applicants. In our empirical analysis, besides household and business level covariates, we also controlled for personality traits of microentrepreneurs, different learning episodes related to their credit histories and their perceptions about microfinance institutions' loan recovery methods. For meaning traits, we used Big Five Personality Inventory developed by National Institute of Psychology, Pakistan. We conceptualized learning at two different levels; that is endogenous learning from *experimentation* and exogenous learning from *peers*.

Based on probit marginal effects, we found that relatively older microentrepreneurs are more likely to apply for Akhuwat's loan. Education in our sample had no effect on probability of participation. There are two possible explanations for this effect. The first explanation is sample specific. Microenterprises in our sample operate subsistence businesses which generally require lower levels of skills. In such businesses, education may not sufficiently explain business growth and hence appetite for more credit. The second explanation may arise from threshold effects. More often than not, businesses need minimum threshold investment to finance their growth cycle. More able entrepreneurs may require larger loans to meet that threshold and, therefore, they may not be interested in smaller loans. In other words, education does not lead microentrepreneurs to apply for smaller loans which may be a possible explanation in case of Akhuwat. In our opinion, institutions like Akhuwat should focus more on providing flexible products rather than sticking to a rigid product line where the loan amounts are predetermined. This step will better cater the diverse needs of microentrepreneurs operating at different growth cycles.

Our analysis revealed that Akhuwat attracted poor households who were relatively more vulnerable. The group of applicants reported higher incidence

of chronic illness in their household and they also reported to be doing business for survival. Survivalists operated smaller businesses with relatively lower profitability despite committing more hours to the business. It may be the case that part of the Akhuwat's loan may be spent on household consumption to cope with different vulnerabilities. We believe that instead of solely focusing on microcredit, microfinance institution should also offer affordable insurance products as well consumption loans.

Akhuwat follows a very innovative credit delivery model. They have partnered with a vast network of mosques in Pakistan. Since loans are disbursed inside the mosque, we expected that individual with higher mosque attendance will have better networks and access to information; and hence they will be more likely to apply for Akhuwat's microcredit. Contrary to our expectations, we did not find any effect of mosque attendance on participation.

Among five personality traits, only conscientiousness was a significant predictor of participation. Microentrepreneurs who reported a relatively higher score on conscientiousness scale were more likely to apply for Akhuwat's loan. A person high in conscientiousness is scrupulous, punctual, consistent, persevering, organized and reliable. We are aware that inclusion of personality traits in our model has little practical relevance as personality traits are stable and may not be influenced through a policy instrument especially in the shorter run. Their inclusion nonetheless improves the explanatory power of our model.

We found that both exogenous and endogenous learnings matter. We have strong evidence that individuals learn from credit histories which influence their participation decision in a microcredit program. Besides learning from their own experience, individuals have the ability to learn from others. Consistent with our findings, it is not surprising that most MFIs advertise success stories of their clients to create more demand for their products. Besides learning, microentrepreneurs' perception about contract enforcement is a key determinant of participation. When individuals perceive microfinance institutions' loan recovery methods to be coercive or high handed, it significantly reduces the probability of participation. The problem multiplies when negative reports on microfinance emerge in mass media. Suicide of microfinance borrowers in India and other similar stories further add to the pessimism of potential clients. Due to these incidents, potential clients, otherwise creditworthy, will shy away from microcredit. We believe that microfinance industry will benefit from improving their image with regards to contract enforcement. This step will stimulate more demand for microcredit.

The *second essay* estimated returns to capital. The global microfinance movement is driven by a fundamental claim that once poor microentrepreneurs are given access to capital, they are able to generate high returns. However, credible evidence on returns to capital is mixed and too limited to substantiate this claim. This essay reported on the outcomes of an experiment in which we gave exogenous shock to the capital stock of randomly selected microenterprises. The treatment was provided in the form of interest free loans which was equivalent to 41% of median capital stock of microenterprises.

Overall we found that microfinance does help. In our sample, the exogenous infusion of capital significantly increased capital stock and as result the monthly profits also increased. Using single difference and difference in difference estimators, we found that compared to control group, the monthly profits of the treatment group significantly increased in the range of Rs. 241 and Rs. 275. Additional capital did not induce more effort from treated microentrepreneurs. In other words, the incremental increase in monthly profits was caused by exogenous capital alone. Returns to capital for microenterprises in our sample were indeed very high. Using randomized treatment as an instrument for capital stock, the estimated annual returns to capital were 103.2% – 142.8% which were substantially higher than the market interest rate of 12.5% and microfinance annual lending rate of 33.5% in Pakistan. Our results are consistent with studies done in Sri Lanka and Mexico (De Mel et al. 2008, McKenzie and Woodruff 2008). One of the commonalities that we share with these studies is that we conducted this research on small subsistence businesses. This may be one of the reasons that all these studies including ours found very large and significant impact of microcredit on various business outcomes. Due to lack of data we could not control for spillover effects. In case of any positive spillovers, our results provide the lower bound of true estimates.

In this study, we used Akhuwat's family enterprise loan as a treatment. This product accounts for 91% of Akhuwat's loan portfolio. We believe that our results are at least valid in the context of Akhuwat which caters to the need of small microenterprises. In this paper we found that small microenterprises are indeed capable of producing very large returns which holds a great promise for development of a sustainable microfinance sector in Pakistan. 94% of small and medium enterprises in Pakistan have no access to formal credit. The market is wide open for microfinance industry in Pakistan to tap this huge potential.

In the *third essay*, we investigated gender-based heterogeneity in monthly profits and treatment effects. In developing countries, compared to men, women are believed to be more credit constrained and, therefore, they are considered to be more capable of generating higher marginal returns to capital. For this very reason, microfinance programs predominantly focus on female microentrepreneurs with a hope that improved access to capital will result in growth of their businesses. Surprisingly enough, recent randomized studies in Sri Lanka, Philippines and Mexico do not show any positive impact of access to credit on female microentrepreneurs which challenges the popular narrative of ‘women being more credit constrained’. To investigate this puzzle further, we examined the gender-based heterogeneity in business returns and treatment effects in a field experimental.

In this essay, we explored gender-based heterogeneity at two levels. In the first level of analyses, we used baseline data to establish and explain any gender-based differences in various business outcomes. In the second level of analyses, we investigated gender-based heterogeneity in treatment effects.

In the baseline data, we found significant gender-based heterogeneity in capital stock and monthly profits of microenterprises. Compared to men, women entrepreneurs earned 20% less in monthly profits. A major portion of gender-based heterogeneity in profits was explained by women’s lower level of capital stock. Once we controlled for *pardah*, which acts a structural constraint in labor markets, the differences significantly shrunk. The residual differences were still high and significant. Using Blinder-Oaxaca decomposition, we found that gender-based differences in observed characteristics explain 41% of earning gaps. Among all variables, capital and the prevalence of *pardah* were the only two significant predictors. The remaining 59% of the unexplained gap can be either through discrimination against women or gender-based differences in preferences. Compared to men, extravert women were significantly penalized. Mueller and Plug(2006)also found relatively lower returns on extraversion for women in the US. In the context of Pakistan, extraversion may not be a likable trait for female entrepreneurs because of its conservative and patriarchal society. *Pardah* –a possible impediment in access to labour markets –limits women’s entrepreneurship potential. Our findings suggest that capital alone approach is not enough. Policy makers should also focus on addressing women-specific structural barriers in the developing world.

Treatment in our sample had a differential effect on male and female microentrepreneurs. Using panel dataset, we found that both male and female microentrepreneurs benefited from additional capital though they exhibited

large and statistically significant heterogeneity in treatment effects. Monthly profits of treated men increased by Rs306. Treated women, on the other hand, could only see a modest and less significant increase of Rs.93 in their monthly profits. The estimated monthly returns to capital were 13.1% and 4.1% for men and women respectively. Albeit significantly heterogeneous, these returns are considerably higher than the interest rates charged by microfinance industry in Pakistan. Our findings are consistent with recent randomized studies in Sri Lanka and Mexico. Overall, male entrepreneurs in our study benefited more from access to capital than their female counterparts which is contrary to popular belief.

As concluding remark, I would also like to point out that Akhuwat microfinance in its own right is a unique model. On the one hand, major world development organizations and governments rely on grant-based programs for the poor and on the other hand they promote microfinance interventions to combat poverty. The underlying assumption behind these policies is that grant-dependent poor will eventually graduate to the next level and will be able to afford rather expensive microcredit. In our opinion, the introduction of Akhuwat-style interest-free model between grant-based programs and interest-bearing microfinance will make the transition smoother for the poor.

8

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