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The Role of Micro-credit Programmes in Alleviating Poverty in Bangladesh

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Declaration of Authenticity and Copyright

Signed:……

Date:……

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Abstract

Micro-finance institutions (MFIs) aim to reduce poverty by providing small loans to poor people. Governments and international agencies such as the World Bank are spending billions of dollars to increase the outreach of MFIs across the world. However, the empirical evidence of micro-credit on poverty reduction is mixed. Some of the studies claim that micro-credit has a positive impact on poverty reduction while some others find no impact. The purpose of this thesis is twofold. *First,* this thesis investigates the factors affecting the branch placement decision as well as branch density of MFIs in Bangladesh. Data, such as the presence of Grameen, BRAC and village market centre, were collected from all branches (2,936) of ASA Bangladesh and 2,936 non-ASA villages using a structured questionnaire. Secondary data on the rate of poverty and population were collected from the Bangladesh Bureau of Statistics. The findings reveal that there is no systematic relationship between the distance and branch placement. The results also suggest that ASA is highly likely to place a branch in a particular location where there is a branch of its competitors. ASA is less likely to place a branch in a village where there is a branch of a commercial bank. In addition, ASA is highly likely to place a branch in a village where the rate of poverty is high.

Second, another goal of this thesis is to evaluate the impact of micro-credit on poverty in Bangladesh. Particularly, it aims to investigate the impact of micro-credit on the two dimensions of poverty: the incidence of poverty and average deprivation of poverty. To do this, primary data were collected from 2,598 households. Five types of households are included in the sample and these are: current borrowers, drop-outs, refused, pipeline borrowers and non-borrowers. With this data set, it aims to control for some biases that arise in the impact assessment of micro-credit. In particular, this study controls for the non-random programme placement and selection bias while estimating the impact. The results suggest that the incidence of poverty is the highest among drop-out borrowers and the lowest among the current borrowers. Drop-out borrowers have the highest average deprivation of poverty, while the current borrowers have the lowest. The empirical evidence suggests that micro-credit has a positive impact on poverty reduction in Bangladesh**.**

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Chapter 1: Introduction

1.1 Background:

Micro-credit is widely recognised as a special type of financial service for those people who are underprivileged, unemployed and unable to pledge collateral often required by the traditional banking system and/or do not have access to the commercial banks (Grameen Bank, 2010). The term 'micro-credit' refers to the process of providing a small loan and other financial services, such as savings and micro-insurance, for reducing poverty (Harris, 2006). Micro-finance Institutions (MFIs) have been providing financial services to poor people by using the group-lending approach in Bangladesh. With this approach, collateral is not required other than considering the income sources, inventories of households for example bicycles, rickshaws, furniture, electric goods (*see* Fernando, 2005). Poor people have very limited access to organisational credit facilities because banks, financial institutions, investment banks do not provide loans without collateral security.

In Bangladesh, a large number of poor people do not have access to credit facilities due to their inability to provide collateral (Mahmud *et al.*, 2007). However, the micro-credit programme of the Grameen Bank created a new movement to increase financial inclusion and fight against poverty through the group lending approach (Murdoch, 1999). MFIs have been trying to reduce the gap between the demand and supply of credit especially for poor and disadvantaged people. According to the Micro-credit Summit Report (2015), as of December 2013, MFIs reached over 211 million borrowers world-wide. The main objective of micro-credit programmes is to improve

the income level of the borrowers so that they can consume more and improve their living standard (Mahmud *et al.* 2007).

There is, however, an ongoing debate over the perceived positive impact of micro-credit on poverty reduction. It is evident from quantitative studies that micro-credit programmes are an effective tool for poverty reduction (Latif, 1994; Rahman and Khandker, 1994; Pitt and Khandker, 1998; Matin and Hulme, 2003; Halder and Mosley, 2004; Chowdhury, Ghosh and Wright 2005; Khandker, 2005; Rahman and Khan, 2013).

Chowdhury, Ghosh and Wright (2005) claimed that the poverty rate of both objective and subjective have been reduced by 2.5 per cent and 6.5 per cent per year respectively. Khandker (2005) assessed the impact of micro-credit programmes on poverty reduction in Bangladesh by using panel data from the household surveys for the year 1991-92 and 1998-99. He found that the poverty rate was reduced by 20 percent over the period from 1991-92 to 1998-99 and nearly half of poverty reduction could be attributed to the micro-credit programme. Recent studies showed that micro-credit programmes have a positive impact on the economy by increasing business ownership and employment rates in the programme areas (Attanasio *et al.*, 2015; Tarrozi, Desai and Johnson, 2015). It was found that 'The Million Baht Village' micro-credit had a significant effect on beneficiaries' income and consumption (Kaboski and Townsend, 2009). It was also argued that micro-credit programmes have a positive impact on gender inequality, human rights, legal aids, disaster management and land reforms (World Bank, 1996:5).

Several studies argued that micro-credit programmes help those people who are not so poor (Zaman, 2000; Coleman, 2006; Kondo *et al.*, 2008). On the other hand, some studies argued that there was no impact of micro-credit on poverty reduction (Morduch, 1998; Coleman, 1999; Karlan and Zinman, 2011; Adebayo, Sanni and Baiyegunhi, 2012; Roodman and Morduch, 2014; Khan and Wright, 2015).Therefore, the effect of micro-credit programme on poverty reduction is still inconclusive.

The findings of the impact of micro-credit on poverty have been criticised mainly due to the non-random programme placement and self-selection bias (Coleman, 1999; Morduch 1999). The non-random programme placement bias occurs when branches of the micro-credit institutions are placed in the relatively wealthy regions to become financially sustainable. This problem could also occur if the branch is placed in the relatively poorest regions. Therefore, the non-random branch placement bias may be a problem either way (Pitt and Khandker, 1998). Over the last two decades, there is an argument in the literature that the non-random programme placement has biased the impact of micro-credit. There has been a concern in the literature that MFIs prefer to establish their branches in the wealthy villages in order to provide evidence of high repayment rate to their donors (Sharma and Zeller, 1999). Management of MFIs in Bangladesh confirmed that they often prefer to establish their branches in the relatively poorer regions or in the unbanked regions or where there is no branch of commercial banks in order to cover the people who are unbanked. With respect to control for the non-random programme placement bias, as suggested by Karlan and Goldberg (2011), this study interviewed treatment and control groups from the same neighbourhood and

hence, both the groups have access to micro-credit and share the common demographics.

As mentioned earlier, self-selection bias is a potential problem in the micro-credit programme and impact evaluation studies. Self-selection bias occurs when individuals select themselves into the micro-credit programme. These self-selected borrowers may have some unobservable characteristics, such as entrepreneurial skills, which could influence them to participate in the programme. Hence, the impact of micro-credit is questioned because self-selected borrowers could have done better even without micro-credit. Thus it is highly important to understand self-selection bias in order to net out the impact of micro-credit on poverty reduction.

Recently, some studies have applied the randomised control trial method in order to control for self-selection bias (Attanasio *et al.*, 2015; Augsburg *et al.*, 2015; Banerjee *et al*., 2015; Tarrozi, Desai and Johnson, 2015). It seems that applying a randomised experiment on the impact of micro-credit is costly as well as an extremely time consuming process. However, another empirical study, conducted by Khan and Wright (2015), used an innovative approach which is quasi-experimental design in order to control for self-selection bias. In their quasi-experimental settings, they assigned the current borrowers to the treatment group and included three different types (drop-out borrowers, pipeline borrowers and non-borrowers) of control groups. Given the budgetary and time constraints, this study will adopt a similar approach to that of Khan and Wright (2015) in order to tackle self-selection bias.

Some empirical studies expressed a concern that the impact of micro-credit on poverty reduction may be biased because most of the borrowers are not so poor. For

example, Morduch (1998) refuted the findings of Pitt and Khandker (1998) on the grounds that about 30 per cent of the borrowers included in that study were not so poor. Hulme (1999) also claimed that most of the micro-credit borrowers are either non-poor or moderately poor in East Africa. Amin, Rai and Topa (1999) believed that micro-credit has failed to target the poorest households in Bangladesh. Likewise, Fernando (2005) raised a concern that due to the strict selection process and perceived ability to repay, micro-credit is unable to reach the poorest poor. Therefore, the poorest people are considered as risky clients and eventually they are excluded from the micro-credit programmes. However, it is evident that ASA, BRAC (Bangladesh Rural Advancement Committee) and PROSHIKA are mainly targeting those people who are landless or almost landless households in Bangladesh (Sharma and Zeller, 1999). Recently, Rahman and Wright (2012) confirmed also that about half of the borrowers of ASA are landless and two-third of the borrowers reported having no formal education in Bangladesh.

1.2 Aims of the Thesis:

A large number of MFIs have been working in Bangladesh to fight against poverty. In Bangladesh, there are a large number of people, over 50 million, who live in poverty (HIES, 2010). According to the World Bank (2015) over one billion people are living in low-income countries across the world on less than US $1.25 a day and over 80 per cent of poor people live in South Asia and Sub-Saharan African regions. Typically, poor people have irregular sources of income, lack of education, lack of assets and limited access to institutional credit.

There are many reasons for assessing the impact of micro-credit programmes. First, many MFIs are receiving funds from various international organisations including *ADB (Asian Development Bank), USAID (US Agency for International Development), CIDA (Canadian International Development Agency)* and *DFID (Department for International Development)* for disbursing loans among poor people. Second, in order to support micro-credit programmes in Bangladesh, international agencies provided assistance which is worth $48 billion US dollar over the period of 1991 to 2008 (Quibria, 2010). According to the Second Poverty Alleviation Micro Finance Project, the World Bank has disbursed $15 million for the year 2008 and 2009 in Bangladesh (World Bank, 2009). Recently, the government of India has expressed concerns over the activities of MFIs because of some unexpected problems with the borrowers. For example, the unexpected death of some micro-credit borrowers was believed to be linked to the pressure put by the MFIs for repayment. Because of this, the government of India has stopped micro-credit activities in Andhra Pradesh (The Economist, 2010).

MFIs are aimed to remove credit constraints experienced by poor households by providing them collateral free micro-credit. With access to micro-credit, the poor households can start a new business or expand their existing businesses and hence, they can enhance their income and consumption. Although the empirical results of the impact of micro-credit on poverty reduction are mixed, the main goal of MFIs is to eradicate poverty with the provision of micro-credit.

This thesis contains two distinct chapters. First, it aims to investigate the factors affecting the branch placement decision of MFIs in Bangladesh. Second, it aims to assess the impact of micro-credit on poverty in Bangladesh. It is worth mentioning here

that the author has collected two sets of data from ASA Bangladesh (a large micro-finance institution in the world) based on the aims of the thesis.

With regards to the first broader aim, this thesis considers a number of factors such as distance, competitors, and other village level characteristics such as the rate of poverty which might influence the management of MFIs in deciding to place a branch in a particular location. In the general banking literature, several studies argued that the distance between the branch and the headquarter is a big constraint for both the lending and bank's performance (Petersen and Rajan, 2002; Alessandrini, Croci and Zazzaro, 2005; Mian, 2006; Udell, 2009; Alessandrini, Presbitero, and Zazzaro, 2010). Hence it may be the case that MFIs may not select a village for placing their branch if the distance from the headquarter or the decision centre is too far. Alessandrini and Zazzaro (2008) argued that the distance between the headquarter/decision centre and the branch might increase the economic, social and cultural disparities and thus, the loan applications are less likely to be approved. Studies also argued that the customers value the proximity or the distance of the branch and move their accounts to the bank which has a branch nearby (Kutler 1996; Cheng, Chaudhuri, and Jayaratne 1997). Therefore, the distance has been a great deal of interest in the general banking literature. In the light of general banking theory, this study tests whether the distance also matters for the branch placement of MFIs in Bangladesh.

To achieve this goal, this study conducted a survey on all ASA-villages (2,936) and the same number of non-ASA villages (2,936 villages where there is no branch of ASA). This study collected data on the presence of ASA's competitors such as Grameen, BRAC and other village level characteristics such as local market centres and

secondary data on the village level population and the rate of poverty were collected from the Bangladesh Bureau of Statistics. The distance between the branch and the headquarter was measured using Google Maps. The findings of this study reveal that there is no systematic relationship between the distance and branch placement of MFIs in Bangladesh. The results of this study also indicate that ASA is highly likely to place a branch in a village where there is at least one branch of its competitors such as Grameen and BRAC in the village. The findings also claimed that the likelihood of placing a branch increases in a village if the rate of poverty is high. Therefore, this thesis concludes that the non-random programme placement bias may be a problem in estimating the impact of micro-credit. To the best of my knowledge, this is the first empirical study which provides such evidence on the distance and branch placement. This chapter makes a significant contribution to the literature on banking and micro-finance branch placement.

With regards to the second broader aim, this thesis aims to estimate the impact of micro-credit on the two dimensions of poverty (incidence of poverty and average deprivation of poverty) proposed by Sen (1976). The incidence of poverty tells us the proportion of people living below the poverty line. And, the average deprivation of poverty tells us the average income short-fall of poor people from the poverty line. The details discussion about the poverty indicators can be found in the following sections. However, in order to capture these two dimensions of poverty, this study adopts Foster-Greer-Thorbecke (FGT) (1984) class of poverty measures because Sen's Poverty index (1976) is not additively decomposable by sub-group populations. Up until now, the

literature is mainly focused on the incidence of poverty. To the best of my knowledge, the impact of micro-credit on average deprivation of poverty is yet to be discovered.

To analyse the impact of micro-credit, a survey was conducted among 2,598 households, during June 2014 and September 2014, in 24-districts (out of 64 districts) in Bangladesh. In addition to the treatment group (current borrowers), the survey included four types of control groups, which include pipeline borrowers, drop-outs, refused and non-borrowers and each group is aimed to control for some aspects of self-selection bias. The results indicate that the incidence of poverty is the highest among the drop-out borrowers and the lowest among the current borrowers. Moreover, drop-out borrowers have the highest average deprivation of poverty while the current borrowers have the lowest. The empirical evidence of this thesis suggests that there is a positive impact of micro-credit on reducing the incidence of poverty. The empirical evidence also suggests that there is a positive impact of micro-credit on reducing the average deprivation. However, this study did not empirically estimate the impact of micro-credit on the relative deprivation of poverty, which is simply income inequality, due to the fact that the relative deprivation is a function of average deprivation which is being derived by squaring up the average deprivation.

Hence the objectives of this study are:

(1) To explore the factors affecting the branch placement decision of MFIs in Bangladesh.
(2) To evaluate the factors affecting the branch density at a Thana-level (Lower Administrative Unit) in Bangladesh.

(3) To investigate the impact of micro-credit on the incidence of poverty in Bangladesh.

(4) To examine the impact of micro-credit on the average deprivation of poverty in Bangladesh.

1.3 Sen's Poverty Measures:

Sen (1976) proposed two desirable properties of poverty indices and stressed that a good poverty measures must satisfy these two basic properties. The basic properties are stated below:

Monotonicity Axiom: which requires a rise in the overall poverty level if the income of a poor person is reduced and vice versa.

Transfer Axiom which demands an increase in poverty whenever a pure transfer is made from a poor person to someone with more income and vice versa.

- Sen Poverty Index: $P = H [I + (1-I)G]$

Where **H** is the Head Count Ratio which is "insensitive to the extent of the poverty shortfall per person" and '**I'** is the **income gap** which is **"**insensitive to the numbers involved" but it captures the absolute short-fall or deprivation of poor and **G** is the "Gini Co-efficient" in order to capture the inequality or relative deprivation of the poor but **G** is not decomposable by sub-groups such as ethnicity.

Sen Poverty index is a good measure of poverty which satisfies the above axioms but it is not decomposable. This study collected data from the five different groups as explained elsewhere, so it is important to measure the sub-group contributions to the

total poverty. Therefore, this thesis requires a poverty measure which is decomposable by sub-groups.

1.3.1 Foster-Greer-Thorbecke Poverty Measures:

Following Sen (1976), Foster-Greer-Thorbecke (1984) introduced a poverty measures which satisfies Sen's above mentioned axioms and it is also decomposable by sub-groups. Thus, this thesis aims to apply Foster-Greer-Thorbecke (1984, henceforth FGT) poverty measures.

According to FGT, let y = (y_1, y_2, y_3……y_n) is a vector of households income and a predetermined poverty line (z>0) and then G_i = z-y_i is the income shortfall of the i^{th} household; q = q(y,z) is the number of households whose income is less than the poverty line (z) and n = n(y) is the total number of households , considering the poverty measure P which is defined by:

$$P_{\alpha}(y; z) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{G_i}{z}\right)^{\alpha} \quad \text{.....(1.3.1)}$$

Where, $\boldsymbol{\alpha}$ is a parameter which is known as the measure of poverty aversion. This can take any positive value. When = 0, 1 and 2, it gives us headcount ratio, poverty gap and squared poverty gap respectively. A greater value of $\boldsymbol{\alpha}$ ($\boldsymbol{\alpha}$>1) gives greater emphasis on the poorest poor.

1.3.1.1 Head Count Ratio (P_0):

The head count ratio is the simplest and most widely used poverty measure. It simply counts the proportion of population whose income is less than the poverty line. When $\boldsymbol{\alpha}$ = 0, equation (1) becomes as follows:

$$P_0 = \frac{n_q}{n} \text{.....(1.3.2)}$$

Where n_q is the number of poor whose income is less than the poverty line (z) and n is the total sample size. P_0 represents the percentage of people who are deprived in relation to the poverty line. According to Sen (1979) head count ratio (P_0) catches one aspect of overall deprivation, for example, it catches how many people are deprived but never mind how much. The head count ratio is very simple to calculate and easy to understand but it is not a sole guide for allocating resources for two reasons. First, the head count ratio does not change when there is a reduction or increase in income of the poor. Second, this measure does not take into account the intensity of the poverty or inequality. Therefore, it does not satisfy both the monotonicity and transfer axioms proposed by Sen.

1.3.1.2 Poverty Gap Ratio (P_1):

The poverty gap ratio is also another widely used poverty measure. It measures the distance between a poor person's income and the poverty line and expressed as a percentage of the poverty line. The poverty gap is zero for the non-poor. Therefore, it tells us how much income of the poor should be raised in order to lift them out of poverty. When $\boldsymbol{\alpha}$ = 1, then equation (5.4.1) gives the poverty gap ratio that can be written as follows:

$P_1 = \frac{1}{n}\sum_{i=1}^{n}\frac{G_i}{z}$……..(1.3.3)

The poverty gap ratio satisfies the monotonicity axiom which means that an increase or decrease in the income of the poor changes the poverty measure. But this poverty gap measure does not satisfy the transfer axiom which focuses on the relative deprivation. According to Sen (1979) the poverty gap ratio (P_1) catches another aspect of deprivation, for example it catches the average deprivation of poverty but never mind suffered by how many. He further argued that despite P_0 and P_1 are completely insensitive to transfers of income among the poor ,P_0 and P_1 together may give us a meaningful estimate of poverty measure in terms of overall deprivation.

1.3.1.3 Squared Poverty Gap Ratio (P_2):

Squared Poverty Gap is simply a weighted sum of poverty gaps. This weighted scheme is closely related to the aspect of relative deprivation.

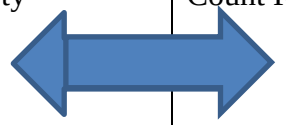
When $\boldsymbol{\alpha}$ = 2, the equation (1) gives us the squared poverty gap as follows:

$P_2 = \frac{1}{n}\sum_{i=1}^{q}(\frac{G_i}{z})^2$……..(1.3.4)

The squared Poverty Gap takes into account inequality among the poor whose income falls below the poverty line. Thus, the squared poverty index helps to capture the relative deprivation of poverty since this focuses on the well-being of the poorest or taking into account the inequality among the poor by putting weights on poverty gap. Let's give a simple example below based on the above discussion in order to clarify further the FGT poverty measures:

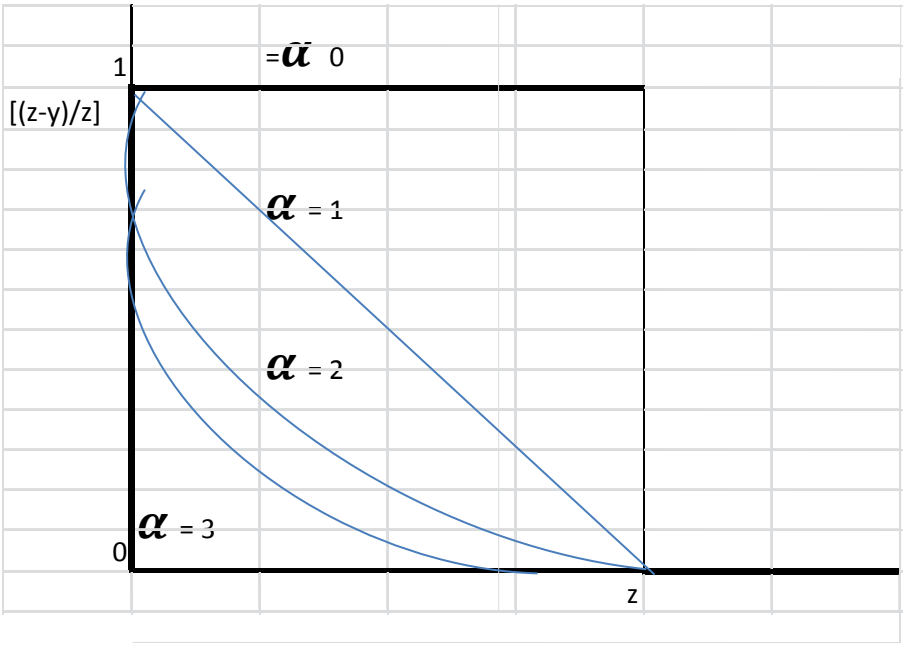
According to Sen (1979), suppose person A is relatively deprived compared with person B. There may be some others in between the two who are more deprived than B but less deprived than A. When a unit of income is transferred from person A to person B (and if person B is still below the poverty line), then it reduces the shortfall of income of a less deprived person and on the other hand, it increases that of someone who is more deprived. In this situation, P_2 gives us a meaningful estimate to measure the magnitude of the relative deprivation. However, after this transfer, P_0 and P_1 remained completely unchanged if they live below the poverty line. But certainly there is an increase in aggregate poverty as a result of this in terms of relative deprivation. Therefore, squared poverty gap index is sensitive to the income distribution and satisfies transfer axiom as explained by Sen (1976).

Table 1.1: Summarises the Concepts of Poverty and FGT Poverty Measures

Concepts of Poverty	FGT Poverty Measures	Advantages	Disadvantages
Incidence of Poverty 	P[0] = Head Count Ratio	It provides the percentage of people who are deprived in relation to the poverty line. It is easy to calculate. It provides helpful information for the policy makers	It only gives the number of poor people. It does not response when a poor person's income is increased or decreased. It does not tell the depth of poverty. It does not tell the severity of poverty. It does not satisfy Sen's two basic properties
Average Deprivation of Poverty 	P[1] = Poverty Gap	It gives information on the depth of poverty or tells average income short-fall from the poverty line. It satisfies Sen's monotonicity axiom. It provides insightful information for the policy	It does not tell how many people are poor. It does not satisfy Sen's transfer axiom.

		makers	
Relative Deprivation of Poverty	P[2] = Squared Poverty Gap	It gives greater emphasis on the poorest segment of population. It tells us the severity of poverty or income distribution of the poor. It satisfies Sen's transfer axiom.	It is difficult to estimate.

The following graph also shows FGT class of poverty measures. When α>1, the graph tells us the income distribution of the poor.



Graph 1.1: Shows the FGT Class of Poverty Indices

To sum up, the existing poverty measure such as Anand (1977), Kawkani (1980) and Takayama (1979) are not adequate because they either violate one or more basic properties proposed by Sen or cannot be decomposed by population sub-groups (FGT, 1984). Thus, this thesis applies FGT poverty measures to achieve the aims of this thesis for several reasons. *First,* FGT poverty measures are additively

decomposable by population sub-groups. *Second,* it also satisfies basic properties (monotonicity and transfer axiom) proposed by Sen (1976) and *finally,* it is justified by the relative deprivation of poverty.

1.4 An Introduction to Micro-credit:

Micro-credit programmes are the provision of financial services, such as small and affordable credit and savings, to poor households in order to increase their income and consumption. MFIs mainly target poor women to carry out micro-credit activities. This section discusses the important features of micro-credit programme such as group lending and joint liability.

1.4.1 Group Lending:

In Bangladesh, MFIs follow the group lending strategy. There are about 15-35 women in one group. All members of a group need to come and meet once a week in a particular time and location, preferably one of the borrower's house, which is called a *loan centre*. The transactions of all members of a group are completed by one loan officer. As a result, MFIs are saving transactions costs and time. The main purpose of this group meeting is to collect weekly instalment and savings and taking admission of new borrowers. With this group lending approach, potential borrowers are selected mostly by the existing borrowers because if someone fails to repay in a particular week then the borrowers are liable to repay the instalment. In each group, the loan officer recruits a group president, secretary and a cashier in order to keep control over the group members. Loan officers also take opinion from the management of the group in order to approve a loan to any existing or new borrowers. However, Grameen Bank has

a slightly different view in forming a group. For example, within a group, they form a sub-group which consists of 3-5 people. Potential borrowers of the Grameen Bank need to learn about their rules and regulations, which is called *16 decisions*, which include the importance of participation of the group meeting each week in time and group disciplines.

1.4.2 Peer Screening and Joint Liability:

MFIs promise to offer loans without collateral since most borrowers are too poor to be able to provide any collateral. Thus, the loans are secured through joint liability in which if someone fails to repay a weekly instalment, then other group members are most likely to pay the instalment on behalf of the default member. It is believed that both the peer screening process and joint liability help boosts the high repayment rate of micro-credit. However, in practice, some micro-finance institutions such as BRI (Bank Rakyat Indonesia) in Indonesia and Albanian MFIs do require collateral as tangible assets such as livestock and land (de Aghion and Morduch, 2005).

MFIs are very careful with the screening process of potential borrowers and loan approvals since there is no collateral required in Bangladesh. MFIs rely heavily on peers or neighbours for information about the potential borrowers, before offering membership. Usually, the loan officers gather information about the potential borrowers such as credit history, head of household's occupation and details of family members' income.

As explained earlier, group members are jointly liable for the repayment and thus people who have bad credit history are removed from the programme. Since all

members in a group are usually from the same neighbourhood, so the rest of the group members can apply social sanctions on the default members to ensure smooth repayment. Empirical studies showed that there is a positive impact of peer selection, peer pressure and peer monitoring on the repayment rates. For example, Wenner (1995) found that the borrowers use local information in the selection process which leads to the high repayment rate in Costa Rica. Similarly, Ghatak (1999) confirmed that peer selection process ensures to have a homogenous group in terms of age, education and income and that also leads to the high repayment rate. After investigating on 137 Guatemalan credit groups, Wydick (1999) also confirmed that there is a significant effect of peer monitoring and peer pressure on the repayment rates. Moreover, Carpena *et al.* (2013) found that the joint liability mechanism is correlated with the higher repayment rate.

In Bangladesh, MFIs become successful in obtaining truthful information through a peer screening process, which helps maintain a high repayment rate and on the other hand, protect existing borrowers from having multiple loans from different institutions at the same time. MFIs in Bangladesh are a good example of how borrowers and MFIs have been working together with this peer screening process, while this seems to be exploited at Andhra Pradesh in India because most of the borrowers had multiple loans, as many as 6 loans at a time from 6 different institutions and many of them failed to repay. Consequently, MFIs had to stop working in a particular area in Andhra Pradesh because of the high incidence of default rates.

1.4.3 Group Meeting:

The main purpose of the group meetings is to collect weekly instalments and savings from the borrowers. The borrowers need to visit a *loan centre* in which they are belong to and pay the instalment in public and it takes place every week at a scheduled location and time. Grameen Bank in Bangladesh has been strictly following this group meeting mechanism. For example, Grameen Bank loan officers start to receive repayments after all members of a particular group are arrived and sit down nicely in a group. In practice, the loan officers often become too strict and remind of the cancellation policy of the bank if someone fails to turn up on time unless there is any proper reason. There is also a negative impact on future loan approval for those borrowers who continuously fail to turn up to the meeting for several weeks. Absences from the group meeting without proper reason are treated as the borrowers' inability to stick to the Grameen Bank's micro-credit programme and as a result are often removed from the programme.

But some other MFIs in Bangladesh, such as ASA Bangladesh, have a slightly different strategy in maintaining the group meeting. During the group meeting, it is often not mandatory for each borrower to wait for their fellows to come and sit in a group for making the repayments. In other words, the loan officers accept individual repayments. This indicates that Grameen Bank focuses on the group relationship between the loan officers and group members but on the other hand, ASA Bangladesh shifted to the individual relationship between the borrowers and loan officers, although ASA's borrowers are making repayments in public and attending group meetings.

According to de Aghion and Morduch (2005) Grameen Bank replicator in Kenya carried out an experiment on the importance of the group meeting. As part of the experiment, the borrowers of Grameen Bank in Kenya were instructed to deposit their instalments directly into a bank account. Months later, the lender found that there was a steep increase in the incidence of default. Consequently, the lender was compelled to re-introduce the group meeting with the borrowers in villages each month and collect instalments face-to-face in order to bring the repayment rates under control.

There are several advantages of group meetings (de Aghion and Morduch, 2005). First, group meetings heighten the ability to generate stigma or a threat to stigma especially for those borrowers who delay in repaying or default, which prompts to repay the loans. Second, by meeting a number of borrowers as a group at a scheduled time and location, MFIs are able to save some transaction costs. The number of borrowers in a group decreases the operation costs of the MFIs. Third, the loan officers can directly elicit some information about the errant borrowers and put pressure as they need through group meeting. Fourth, to some extent, the group meeting is a platform through which the borrowers can share information on various experiences such farming, children schooling and so on. Fifth, MFIs could facilitate education on basic numeracy and health and create awareness about women's rights. Finally, by receiving repayments in group or public, MFIs enhance their internal control in order to prevent potential fraudulent transactions.

1.4.4 Loan Repayment by Weekly Instalment:

MFIs require their borrowers to repay the loans by frequent instalments such as weekly, bi-weekly or monthly. For example, almost all MFIs in Bangladesh such as Grameen Bank and ASA require their clients to pay weekly instalments and the first instalment is due in two weeks after the disbursement of the loans. However, BRAC international, a large MFI in Bangladesh, recently changed their requirement to monthly instead of weekly repayment. According to Khan (2011) most of the MFIs in Pakistan, such as Khushhali Bank, require monthly repayment, although some MFIs such as NRSP have an option to repay six months later or after a year.

Empirical studies suggested that the mechanism of the frequent instalments such as weekly instalments help boosts the recovery rate. For example in Nepal, Silwal (2003) showed that the delinquency rate, which is defined as a percentage of the loan paid after the due date, was about 20 per cent for the borrowers who were asked to repay their loans by monthly instalments, while it was only 11 per cent in the case of weekly instalments. According to de Aghion and Morduch (2005), in the past, BRAC in Bangladesh were experimenting to establish bi-weekly repayments but suspended the experiment due to rise in its delinquency rate.

1.4.5 Lending to women:

Historically Bangladesh is one of the most conservative countries in South Asia where women's social mobility is highly restricted. However, in the late 70s, Grameen Bank was largely focused on lending to men as well as women and keeping both groups separated by gender. In the early 80s, Grameen Bank shifted its focus on

women because of the higher incidence of default among the men groups. Although group meetings are a core feature of Grameen bank's micro-credit operations, absence from the group meetings was so high among the male group members. However, shifting the focus on targeting women for the micro-credit programmes was not an easy task at all. In the 80s, when the focus was being shifted to women by the MFIs, such as Grameen Bank, they experienced huge criticisms and waves of violent protests across the country, such as beating loan officers and burning MFIs offices, by the so called Islamist groups. Despite the high volume of protests, Grameen Bank recruited about 90 per cent female borrowers by the end of the decade and currently over 97 per cent borrowers are women(de Aghion and Morduch, 2005; Grameen Bank 2014). As of 2011, there are over 26 million borrowers in Bangladesh and of which over 90 per cent are women (MRA, 2011).

MFIs mostly target women for micro-credit programmes for two reasons. First, from the borrowers' perspective, it is believed that the impact of micro-credit is higher when it is delivered to women and women can gain access to the households' resources and decision making. Empirical studies claimed that micro-credit seems to be more effective when it is lending to women. For example, in Bangladesh, Pitt and Khandker (1998) found that an additional 100 Taka (US $ 1.4) of loan to women leads to an 18 Taka ($0.25) increase in the households' expenditures versus only an 11 Taka ($0.15) increase for men. They also provided further evidence that there is a positive impact of the Grameen Bank loans to women on the nutrition and schooling of children, while there is no significant impact on the nutrition of children when lending is made to men. A very recent study, conducted by Koloma and Alia (2014), also claimed that lending

to women has a higher positive (treatment effect is about 12 per cent) effect on poverty reduction, such as an increase in household income and expenditure, than men (treatment effect is about 7 per cent) in Mali.

It is also argued that delivering credit to women leads to female empowerment, such as giving women access to control over household resources and increasing social mobility for women, which enhances their status in the family. However, the results are mixed on the evidence of the effect of micro-credit on female empowerment such as social mobility and control over households' assets. For example, some of the studies concluded that there is no significant impact of micro-credit on female empowerment (Guetz and Gupta, 1996; Montgomery, Bhattacharya and Hulme, 1996 and Mahmud, 2003; Garikapati, 2013), while others showed that micro-credit does have a positive effect on female empowerment (Amin, Becker and Bayes, 1998; Hashemi, Schuler, and Riley, 1996; Pitt, Khandker, Cartwright, 2006; Osmani, 2007).

Second, from MFIs perspective, women are believed to be more reliable customers than men. Evidence suggests that female borrowers are more reliable customers than male borrowers in terms of repaying their loans. For example, Hossain (1988) provided evidence that about 26 per cent of male borrowers had repayment problems versus only 19 per cent of women and hence, men in Bangladesh are less reliable customers than women. In Malaysia, Gibbons and Kasim (1991) found that the repayment rate is higher (about 95 per cent) for female borrowers than male borrowers (72 per cent). Similarly, Khandker, Khalily and Khan (1995) claimed that only 1.3 per cent of the female borrowers had difficulties in making repayments, such as missed

some instalments before the final due date, while 15.3 per cent of the male borrowers were struggling to repay.

1.4.6 Compulsory savings:

Borrowers have to open both voluntary and compulsory savings account with the MFIs in Bangladesh. Compulsory savings is viewed as a flexible approach to collateral for the micro-lenders when borrowers lack assets and thus mitigate the risks of default (de Aghion and Morduch, 2005). Many MFIs such as Grameen Bank, BRAC and ASA require their borrowers to demonstrate such discipline (i.e. attending the group meeting without delay) and money management skills (i.e. start saving money) before they become eligible to borrow. The borrowers must deposit a certain percentage of the loan in both compulsory and voluntary savings accounts and they can deposit as little as 10 Taka ($0.13) every week. Savings can be withdrawn anytime from the voluntary savings accounts but withdrawals are not allowed from the compulsory savings account until the loans are paid back.

Grameen Bank in Bangladesh requires their borrowers to buy a share which is worth 100 Taka ($1.3) upon the disbursement of a loan and in addition, it requires 30 to 100 Taka ($0.39-$1.3) to be saved every week in their personal savings account depending on the size of the loans. It is noteworthy that currently, the borrowers own a 75 per cent stake in Grameen and the rest is owned by the government of Bangladesh. ASA Bangladesh also requires involuntary savings of 10 ($0.13) to 50 Taka ($0.65) per week depending on the size of loan. The borrowers of ASA are allowed to withdraw their savings at any time but requires to keep at least 10 per cent of the outstanding

loan. Similarly in Pakistan, National Rural Support Programme (NRSP) requires the borrowers to deposit10 per cent of the loan in the savings account before the disbursement of a loan. Although it is not mandatory in Pakistan, the borrowers are expected to deposit a certain amount of money every two weeks during the group meeting. The borrowers of NRSP programme cannot withdraw their savings until the loan is fully paid back (Khan, 2011).

Therefore, MFIs can seize their clients' savings for those who try to leave the programmes while in default or get into repayment trouble. Although the accumulated savings is considered as an alternative form of collateral and proved security for the loans, the borrowers are also able to build assets over time and develop the discipline of saving. Hence the savings help to facilitate the borrowers' various needs such as children's tuition fees and wedding expenses (de Aghion and Morduch, 2005). For example in Indonesia, a survey showed that 35 per cent of borrowers were saving for the households' consumption, of which nearly 14 per cent borrowers were saving to pay children's tuition fees. Similarly in Bangladesh, Rahman (2010) found that about 30 per cent of micro-credit borrowers withdrew their savings in order to pay for children's tuition fees.

1.5 Overview of the Thesis

The remainder of this thesis is organised as follows. Chapter 2 discusses an overview of the economy of Bangladesh and the extent of poverty and the structure of the banking sector and commercial banks in Bangladesh. The chapter presents GDP and unemployment over time. The average size of firms across sectors and the

percentage of self-employment are also discussed. The incidence of poverty, the distribution of GDP and the major industry across districts are briefly presented in this chapter. Micro-credit activity in the South Asian countries including Bangladesh is presented in chapter 2. The productivity and sustainability indicators, such as ROE and repayment rate, of the three large MFIs (Grameen Bank, BRAC and ASA) are briefly analysed in this chapter. This chapter also provides a description of the structure and spatial organisation of micro-finance industry in Bangladesh.

Bangladesh is one of the highly densely populated countries in the world. Literacy rate of the country was about 57 per cent in 2014. Although the agricultural sector contributes only 16 per cent of the country's GDP, about half of the total labour force is engaged in the agricultural sector. The largest contribution (56 per cent) to GDP comes from the service sector. The gross national income per capita was $1,184 US Dollar in 2014. The country's GDP has been increased from 355 billion US dollar in 1991 to 1,121 billion US dollar. The number of people unemployed was declined to 2.50 million in 1998 from 3.60 million in 1991. Then, the number of people unemployed peaked at 5.0 million in 2008 and again started to decrease gradually over the last few years (The World Bank, 2015).

About 26 million people are employed in the agriculture, forestry and fisheries industry which is the highest and then followed by the trade, hotel and restaurant industry (8.4 million) in 2010. There are about 22 million (41 per cent) people are self-employed in 2010 which is up from 20 million in 2003 (BBS, 2010). However, over the last 10 years, the gap between imports and exports has been increased by almost four times (The World Bank, 2015).

Chapter 2 discusses the banking sector and commercial banks in Bangladesh. There are 56 commercial banks, include state owned (8), private (39) and foreign (9), in Bangladesh. With respect to the advances and the rate of recovery, it has been observed that the private commercial banks are outperforming compared to the state owned commercial banks. However, the discussion on the firms' constraints in access to bank loans reveals that the firms are credit constrained due to the fact that the banks require high value, as much as three times higher the value of the loan, collateral against the loans.

Chapter 2 also presents micro-credit activities across the globe as well as in South Asian countries to understand the depth of micro-credit activities. As of December 2012, the number of micro-credit clients has been reached over 200 million across the world. The majority of the clients, about three-quarters, are women and poorest. After making a comparison between the three large MFIs (Grameen Bank, BRAC and ASA), ASA has been outperforming with regards to the sustainability and profitability indicators such as repayment rate, ROE and operating self-sufficiency whereas Grameen Bank appears to be subsidy dependent. It is argued that ASA is one of the most sustainable and cost effective micro-finance institutions in Bangladesh.

Chapter 3 reviews the literature on the impact of micro-credit programme on various households' outcomes such as income and expenditures. A number of empirical studies have been carried out so far but there is no consensus about the impact of micro-credit on poverty. Some of the empirical studies find that micro-credit programme has a positive impact on households' income and consumption and thereby poverty reduction while some other studies find no impact. For example, Pitt and

Khandker (1998), Khandker (2005), Chowdhury, Ghosh and Wright (2005), Rahman and Khan (2013), Khandker and Samad (2013), Mozumder and Lu (2015) and Ghalib, Malki, and Imai (2015) claim that micro-credit programme has a significant positive impact on poverty reduction. On the other hand, Morduch (1998), Coleman (1999), Roodman and Morduch (2014), Khan and Wright (2015) and Angelucci, Karlan and Zinman (2015) find that micro-credit programme has no significant impact on poverty reduction. Several studies also argue that micro-credit programme has failed to reach the poorest of the poor (see Datta, 2004; Hulme, 1999 and Rahman and Wright, 2012).

The literature on the factors affecting the branch placement decision of MFIs is also reviewed in chapter 3. It is argued that MFIs are more likely to place their branches in the relatively developed regions. Therefore, poor people live in deprived regions are excluded from the micro-credit programme. There are two concerns about the assessment of micro-credit programme on poverty reduction in the existing literature. One is self-selection bias and another one is non-random programme placement bias. The outcome of the existing studies is heavily criticised due to these problems. Self-selection bias occurs when individuals select themselves in the micro-credit programme. These self-selected borrowers might have some unobservable characteristics such as enterprising skills which motivate them to join the programme and correlate with the outcome of interests. And, the non-random programme placement bias may occur when the management of MFIs decide to establish their branches in relatively developed regions in order to become financially sustainable. Hence, it is worth looking at whether the non-random programme placement is a bias or not before turning to assess the impact of micro-credit. The main goal of this thesis

is to assess the impact of micro-credit on poverty in Bangladesh. The author also puts in extra effort in controlling for self-selection bias while assessing the impact.

There are two empirical chapters in this dissertation and each chapter aims to make distinct contribution to the literature. The first empirical chapter (Chapter 4) is focused on the issue of the branch placement of MFIs. The second empirical chapter (Chapter 5) is focused on the impact assessment of micro-credit programme.

Chapter 4 clearly discusses the distinction between MFIs and conventional banking. Then it critically discusses the motivation of the research. To complete this empirical chapter, this study collected both primary and secondary data. The data on village level characteristics such as presence of ASA's competitors, and commercial banks were collected from both ASA villages and non-ASA villages. Secondary data on location specific characteristics such as population and the rate of poverty was collected from the Bangladesh Bureau of Statistics. Chapter 4 presented the summary statistics of the data.

In chapter 4, this thesis aims to cover two research objectives in the context of programme placement. *First*, it aims to explore the factors affecting the branch placement decision of MFIs in Bangladesh. This study found that there is no systematic relationship between the distance and the branch placement. The results of this study indicate that ASA is highly likely to place a branch in a village where there is at least one branch of Grameen or BRAC or both. The results also suggest that ASA is less likely to place a branch within the vicinity of a commercial bank. Lastly, ASA is more likely to place a branch in a village where there is a high poverty rate.

Second, it aims to evaluate the factors affecting the branch density of MFIs at the Thana-level in Bangladesh. Again this study tests a hypothesis that there is a relationship between the distance and the branch density. Although this study found that the distance has a significant relationship with the branch density but it disappears after controlling for the number of branches of ASA's competitors and other Thana level characteristics. As similar to the branch placement, the results of this study suggests that the number of branches of ASA increases as the number of branches of both Grameen and BRAC increase. This study found that as the poverty rate increases, the number of branches is increased at the Thana-level in Bangladesh.

Chapter 5 provides a brief introduction to self-selection bias in the context of micro-credit and the impact evaluation studies. Then it discusses how a quasi-experimental design became instrumental in order to control for self-selection bias. The chapter also discusses how per capita income is calculated and the poverty line. The methodology and details of the data collection process for assessing the impact of micro-credit on poverty in Bangladesh are discussed. The summary statistics and finally, the empirical results of this study are also presented in this chapter.

To estimate the impact of micro-credit on poverty in Bangladesh, primary data were collected from ASA Bangladesh. To collect the data, this study selected 54 branches of ASA from 54 Thanas in Bangladesh based on the poverty indicators such as poverty head count ratio and literacy rate. Moreover, this study selected Thanas where the rate of literacy is low and the ratio of poverty is high. In addition, some Thanas were also selected where there is a relatively high literacy rate and the ratio of poverty is low. Data were collected from five types of households (HHs). These are:

current borrowers (HHs who were receiving micro-credit for a number of years), pipeline borrowers (HHs who did not receive a loan yet at the time of the survey), drop-outs (HHs who had received the loans in the past), refused borrowers (HHs who were declined to receive the loan) and non-borrowers (HHs who never applied for a loan). In total, this study collected the data from 2,598 households.

This thesis adopts Foster-Greer-Thorbecke (FGT) class of poverty measures in order to estimate the impact of micro-credit on poverty in Bangladesh. This study finds that the incidence of poverty is the lowest among the micro-credit borrowers, while drop-out borrowers have the highest incidence of poverty. The current borrowers have the lowest average deprivation of poverty as well as the relative deprivation of poverty, while drop-out borrowers have the highest. The mean equality F-tests indicates that there is a significant difference in the average deprivation of poverty and relative deprivation of poverty across the five groups.

Since the pre-treatment characteristics of the treatment and control groups are statistically significantly different, therefore this study suspects there might be selection bias problem. Hence this study first applied propensity score matching method to evaluate the impact of micro-credit. And then applied Probit model and standard Tobit model in order to estimate the incidence and average deprivation of poverty respectively. However, the empirical findings suggest that the micro-credit programme of ASA has a significant impact on poverty reduction. This study also claims that the micro-credit programme of ASA reduces the average deprivation of poverty by 3.3 per cent after netting out the effect of self-selection bias. It is also found that female education is a key factor to reduce the households' poverty. Household's age and

gender composition also appear to be one of the important determinants in reducing the households' poverty. However, this study did not provide empirical evidence on the relative deprivation of poverty due to the fact that the relative deprivation of poverty (squared poverty gap) is a function of average deprivation (poverty gap). Therefore the results of the one may follow another.

Chapter 6 discusses the summary of the main findings and conclusions of the study. This chapter also discusses policy implications and limitations of the study. Finally, it provides some suggestions for the future research.

Chapter 2: Overview of the Economy, Poverty, Banking and Micro-credit Activities in Bangladesh.

2.1 Introduction:

Bangladesh emerged as an independent country in December 1971. Geographically, Bangladesh shares borders with India, Nepal, Bhutan and Myanmar. The size of the country is about 148,000 Sq. km. Bangladesh is an agrarian economy, with a population of over 158 million and of which 80 per cent lives in rural areas (BBS, 2014). According to BBS (2010) there are about one-third (32 per cent) of the total population living below the poverty line. Poor people in Bangladesh are concentrated in rural areas as like many other low-income countries such as Nepal and Pakistan. Poor people have limited access to financial services because commercial banks require collateral as well as prefer to expand their operations only in developed regions. Being deprived of the formal financial services, the poor people often borrow from the local money lenders for which they need to pay high interest rates.

The rest of the chapter is structured as follows. Section 2.2 discusses the overview of the economy of Bangladesh and the macroeconomic indicators are presented in section 2.3. The extent of poverty and the structure of banking sector are presented in section 2.4-2.6. Global statistics of borrowers and micro-credit activities in the South Asian countries are presented in section 2.7 and section 2.8, respectively. The discussion on spatial MFIs is presented in section 2.9. Section 2.10 presents a brief history of three large MFIs (including the case study institution). Section 2.11 provides firms' constraints in access to bank loans. Finally, the summary of the chapter is provided at the end.

2.2 Overview of the Economy of Bangladesh:

According to the Millennium Development Goals Progress Report (2013), there has been a significant reduction in the incidence of poverty over the past decades. The life expectancy at birth has been increased slightly and the maternal mortality rate has been dropped. According to BBS (2014), per capita GDP is increased to US $1,110 in 2014 from $976 in 2013 and expected to rise by about 11 per cent by the end of this year. Per capita GNI (Gross National Income) is also up from US $1,054 in 2013 to $1,184 in 2014 and this is expected to go up to approximately $1,314 by the end of the current year. Exports of goods and services as a percentage of GDP constituted 20 per cent in 2014. On the other hand, imports of goods and services as percentage of GDP constituted 25 per cent in the same year. Hence, there is a deficit of exporting goods and services. Foreign direct investment (FDI) was US $1.5 billion in 2013. However, Bangladesh has now become a lower middle-income country and expected to be a middle-income country by 2021.

The following table shows a sector-wise share of GDP in Bangladesh from 2010 to 2014. The core economy of Bangladesh consists of agricultural sector, as this sector employs about 48 per cent of the total labour force and contributes to meet the county's growing demand for food. Although about half of the total labour force is employed in this sector, agricultural sector contributes only 16 per cent of GDP (BBS, 2014) in 2014. However, the contribution of agricultural sector has been declined by 2.5 per cent over the last five years. Given that agricultural activities mainly last about six months of a year and most of the people remain unemployed for the rest of the year, which indicates that almost half of the labour force is under-employed and they have limited access to the alternative economic activities.

The second largest sector of the economy is industry which contributes about 28 per cent to the country's GDP and the contributions remained almost same over the last five years. In the industrial sector, almost half of the contribution is made by the large and medium scale manufacturing and about one-fourth of the contribution is made by the construction sector. Despite the manufacturing sector (large, medium and small scale manufacturing) contributes about 17 per cent to GDP, only 13 per cent of the labour force is employed in this sector.

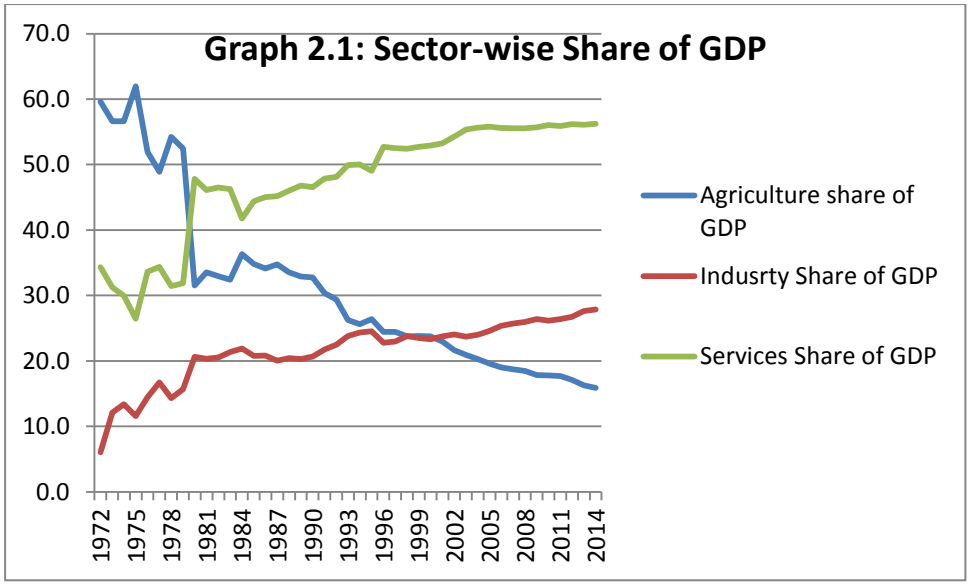
Table 2.1: Sector-wise Share of GDP in Bangladesh from 2010 to 2014

Sector	2009-10	2010-11	2011-12	2012-13	2013-14
Agriculture and Forestry (Total)	**18.6**	**18.3**	**17.7**	**17.2**	**16.1**
crops and Horticulture	11.2	11.1	10.6	10.1	9.2
Animal Farming	2.4	2.4	2.4	2.4	2.2
Forest and Related Services	1.3	1.3	1.2	1.2	1.4
Fishing	3.6	3.5	3.5	3.6	3.3
Industry (Total)	**28.5**	**28.2**	**28.5**	**28.9**	**27.7**
Mining and Quarrying	1.2	1.2	1.2	1.2	1.7
Large Scale	12.6	12.6	12.6	12.7	14.1
Small Scale	5.2	5.0	4.9	4.9	3.4
Construction	8.3	8.3	8.6	9.0	7.1
Electricity, Gas and Water Supply	1.1	1.1	1.1	1.1	1.4
Services (Total)	**53**	**53.5**	**53.9**	**53.9**	**56.2**
Whole Sale and Retail Trade	14.9	15.1	14.7	14.3	13.5
Hotels and Restaurants	0.8	0.8	0.8	0.8	1.0
Transport, Storage and Communication	10.7	11.1	11.5	11.8	10.5
Financial Intermediation	1.8	1.9	2.0	2.1	3.8
Real Estate, Renting and Business Services	6.8	6.6	6.7	6.6	7.1
Public Administration and Defense	2.8	2.9	2.9	2.8	3.5
Education	2.7	2.8	2.7	2.8	2.5
Health and Social Services	2.3	2.3	2.3	2.4	2.1
Community, Social and Personal Services	10.2	10.1	10.3	10.4	12.2
Gross Domestic Product (Total)	**100**	**100**	**100**	**100**	**100**

Source: Bangladesh Bureau of Statistics, 2014

The service sector is the largest contributor to the country's GDP, with a 56 per cent share in 2014. Over the period from 2010 to 2014, the contribution of the service sector to the country's GDP has been increased by over 3 per cent. In the service sector, the biggest share comes from the whole sale, retail trade and repairing motor which constitutes 13.5 per cent, followed by the community, social and personal services (12.2 per cent) in 2014. Transport, storage and communication and real estate, renting and business activities contribute about 11 per cent and 7 per cent respectively in 2014. Surprisingly the lowest share (1 per cent) of the country's GDP comes from the hotels and restaurants in 2014. The other service sector which included financial intermediations (3.8 per cent), public administration and defence (3.5 per cent), education (2.1 per cent), health and social works (2.1).

The following graph shows the sector-wise share of GDP from 1972 to 2014. The share of agriculture sector to the country's GDP was highest, about 60 per cent, and the share of the industry sector was the lowest, about 6 per cent, in 1972. Over the decades, the share of agricultural sector has been reduced by over 70 per cent and on the other hand, the share of service sector has been almost doubled during the same periods. After the independence, the share of industry sector to country's GDP has been increased by six times in 2014.



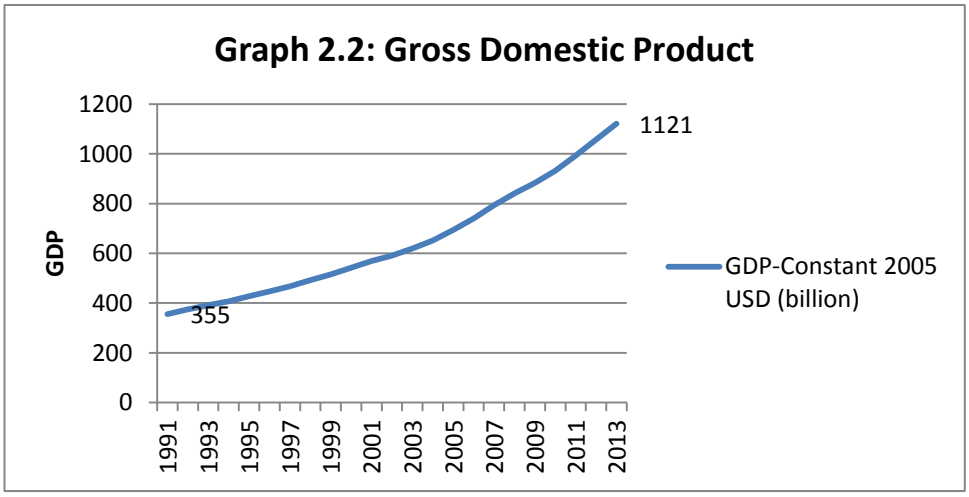
Source: The World Bank, 2015

To conclude, the above discussion suggests that although the service sector is the largest contributor to GDP, the economy of Bangladesh relies heavily on agriculture. About of half of the total labour force involved in agricultural sector and most of them remain unemployed during the off-peak season. Therefore, the improvement of financial services is necessary for the country's half of the labour force. With access to the financial services, the poor people can start-off new small businesses during the off-peak season and/or improve their existing economic activities, which can be helpful to improve their underemployment situation and smooth households' income and consumption throughout a year.

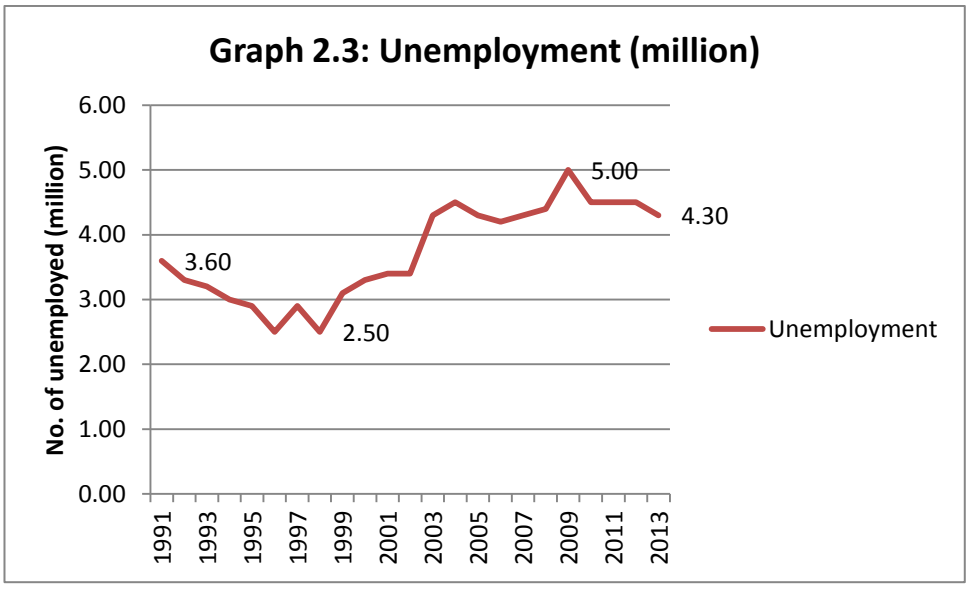
2.2.1 GDP and Unemployment:

The following graphs show the country's GDP and unemployment over the period from 1991 to 2013. The country's GDP has been increased from 355 billion US dollar in 1991 to 1,121 billion US dollar. The number of people unemployed was declined to 2.50 million in 1998 from 3.60 million in 1991. Then, the number of people

unemployed peaked at 5.0 million in 2008 and again started to decrease gradually over the last few years (The World Bank, 2015).



Source: The World Bank, 2015

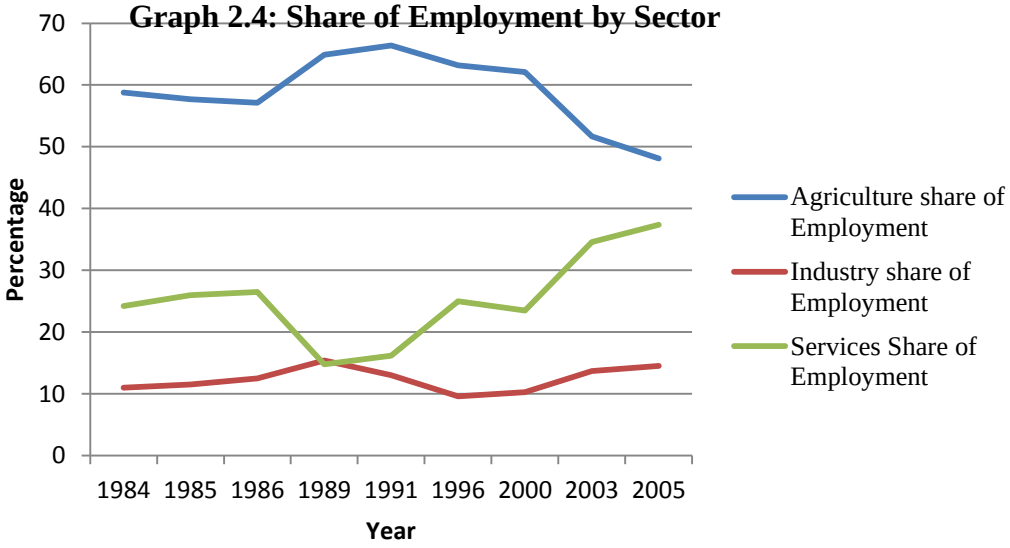


Source: The World Bank, 2015

2.2.2 Shares of Employment by Sector:

The following graph shows the shares of employment by sector from 1984 to 2005. The highest number people are employed in the agricultural sector which constitutes about 48 per cent of the total labour force, followed by the service sector, 37 per cent. The lowest share of employment, about 14 per cent of the total labour force, comes from the industry sector. The share of agricultural sector to the country's GDP has decreased by over 70 per cent over the years whereas the share of employment only decreased by 11 per cent. This could be explained by the fact that Bangladesh is an agrarian economy. As mentioned earlier, the contribution of the industry sector to GDP has been increased by six times but the contribution to the labour force only increased by about 2 per cent between the period from 1984 and 2005 (The World Bank, 2005).

Graph 2.4: Share of Employment by Sector



Source: The World Bank, 2005

2.2.3 Employment by Major Industry:

The following table shows the number of people employed by major industries in Bangladesh. About 26 million people are employed in the agriculture, forestry and fisheries industry which is the highest and then followed by the trade, hotel and restaurant industry (8.4 million) in 2010. The number of people employed in the manufacturing industry has increased from 4.3 million in 2003 to 6.7 million in 2010. Transport, storage and communication industry constitute about 7.4 per cent of the total labour force. Health, education, public administration and defense industries employed only about 4.3 per cent of the total labour force in 2010 (Labour Force Survey, 2010).

Table 2.2: Employment by Major Industry (million)

Name of the industry	**2003**	**2006**	**2010**
Agriculture, Forestry and Fisheries	22.9	22.8	25.7
Mining and Quarrying	0.1	0.1	0.1
Manufacturing	4.3	5.2	6.7
Electric, Gas and Water	0.1	0.1	0.1
Construction	1.5	1.5	2.6
Trade, Hotel and Restaurant	6.7	7.8	8.4
Transport, Storage and Communication	3.0	4.0	4.0
Finance & Business Services and Real Estate	0.3	0.8	1.0
Health, Education, Public Administration and Defense	2.5	2.6	2.3
Community and Personal Services	2.7	2.6	3.4
Total (million)	**44.0**	**47.0**	**54.0**

Source: Bangladesh Labour Force Survey, 2010

2.2.4 Status in Employment:

The following table shows the status in employment in Bangladesh. There are about 22 million (41 per cent) people are self-employed in 2010 which is up from 20 million in 2003. Of the total number of people employed, about 12 million (about 22 per cent) people are unpaid family helpers. This is not surprising in the context of Bangladesh because parents employ their children in their own businesses not only to reduce the costs on wage but also they are trustworthy. The number of day labourers has increased from 8.9 million in 2003 to 10.6 million in 2010. The number of employers has decreased from 0.2 million to 0.1 million in 2010 (Labour Force Survey, 2010).

Table 2.3: Status in Employment (million)

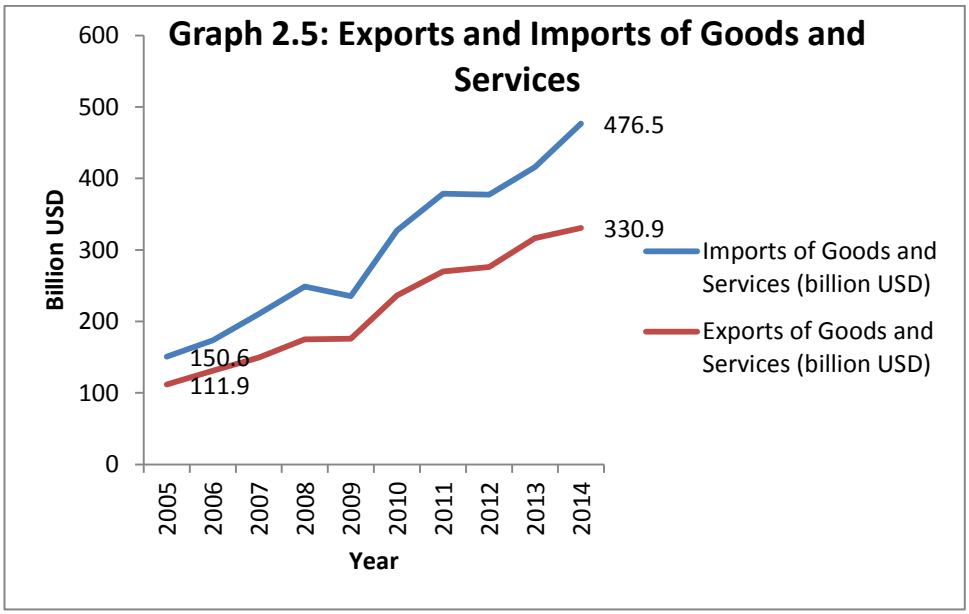
Employment Categories	**2003**	**2006**	**2010**
Self-employed	19.8	19.8	22
Employer	0.2	0.1	0.1
Employee	6.1	6.6	9.4
Unpaid Family Helpers	8.1	10.3	11.8
Day Labourers	8.9	8.6	10.6
Household Aid	1.2	1.9	1.4
Total (million)	**44.0**	**47.0**	**54.0**

Source: Bangladesh Labour Force Survey, 2010

2.2.5 Exports and Imports of Goods and Services:

The following graph shows the exports and imports of goods and services in Bangladesh over the period from 2005 to 2014. The imports of goods and services were

150.6 billion US dollar in 2005 whereas the exports were about 112 billion US dollar at the same period. The imports have increased to $476.5 billion US dollar in 2014. The exports of goods and services have also increased by three times in 2014. However, over the last 10 years, the gap between imports and exports has increased by almost four times (The World Bank, 2015).

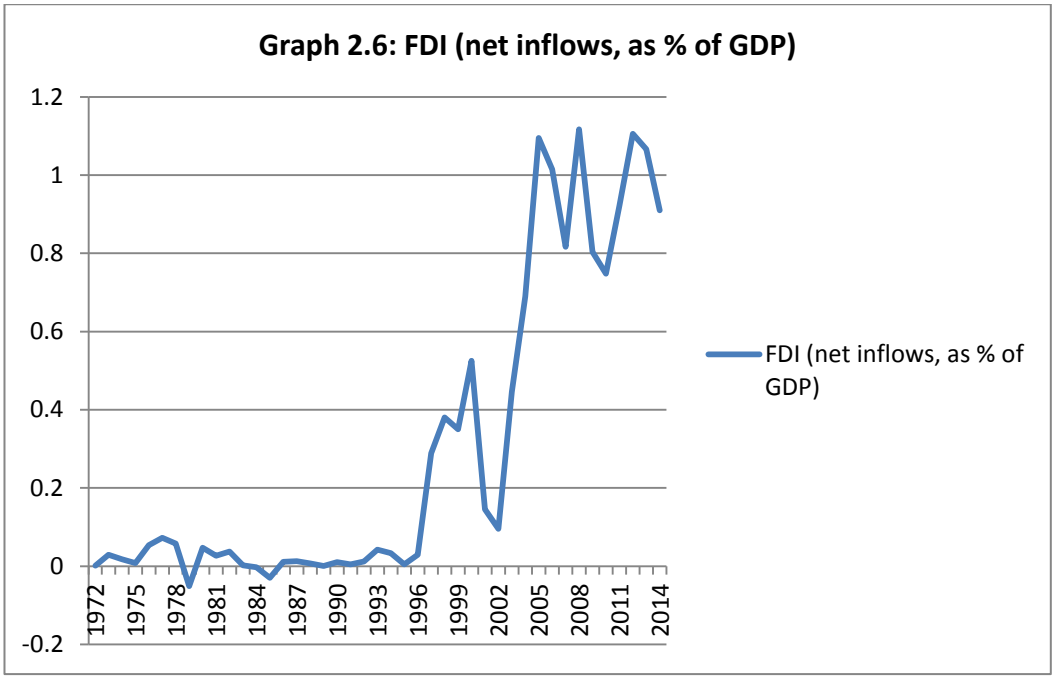


Source: The World Bank, 2015

2.2.6 Foreign Direct Investment (FDI):

The following graph shows the flow of foreign direct investment (as percentage of GDP) in Bangladesh over the period from 1972 to 2014. The FDI was negative as percentage of GDP in 1978 and 1985. This could be the explained by the fact that the political instability during those periods. From 1972 to 1995, the FDI was just above the zero as percentage of GDP. The amount of FDI has started to pick up from 1996 and then again sharply dropped in 2001. Then the FDI again sharply increased after

2002 and peaked at 1.1 per cent of the country's GDP and it was fluctuating up until 2014 (The World Bank, 2015). It appears that the FDI is negatively correlated with the political instability which indicates that the political instability lowering the FDI in Bangladesh.



Source: The World Bank, 2015

2.3 Average Size of the Firms and Employment:

The following table shows the size of the firms and the number of people employed in the manufacturing industry in Bangladesh. According to the Bangladesh Bureau of Statistics (BBS), the size of the firms is split into four categories by the number of workforce. These are: micro-firms in which 10 to 24 people are employed; small firms in which 25 to 99 people are employed; medium firms in which 100 to 250 people are employed and large firms in which more than 250 people are employed. The

survey of manufacturing industry 2012 has not included those firms which employed less than 10 employees. There are about 41 per cent firms are categorised as micro-firms, followed by small firms (37 per cent). Only 9 per cent of the total firms are categorised as large in the manufacturing industry. However, the highest number of people, about 3 million, are employed in the large firms whereas only 0.3 million people are employed in the micro-firms which is the lowest. The medium firms in the manufacturing industry employed over one million people. Of the total people employed in the manufacturing industry, about 39 per cent of them are women (The Survey of Manufacturing Industry, 2012).

Table 2.4: Size of the Firms and no. of People Employed in Manufacturing Industry

Size by workforce	Number of industry	Number of Male Employed	Number of Female Employed	Total no of people are employed
Micro (10-24)	17,384 (41%)	229,407	42,237	271,644
Small (25-99)	15,666 (37%)	615,426	123,374	738,801
Medium (100-250)	6,103 (14%)	673,821	367,399	1,041,220
Large (250+)	3,639 (9%)	1,543,355	1,420,918	2,964,272
Total	**42,792**	**3,062,009**	**1,953,928**	**5,015,937**

Source: BBS, The Survey of Manufacturing Industry, 2012.

2.3.1 Size of the Firms across Major Industries:

The following table shows the size and the number of firms across major industries in Bangladesh. There are about 22 per cent firms are belonged to food, beverage and tobacco industries and of which, 66 per cent are categorised as micro-

firms whereas only 1.7 per cent firms are large in size by workforce. The highest number of firms, about 42 per cent, is belonged to textile and ready-made garments industries and of which, over 34 per cent are micro-firms and over 17 per cent of them are large firms. Of the total large firms, over 85 per cent large firms are belonged to the textile and ready-made garments industries and this is the highest number of large firms in any industry. The firms belong to other non-metallic mineral products are constituted about 11 per cent and of which, 60 per cent of them are small firms.

Table 2.5: Size and No of Firms across Major Industries

Name of the Major Industries	**Micro**	**Small**	**Medium**	**Large**	**Total**
Food, Beverage and Tobacco Products	6,144	2,739	254	158	9,295
Textile and Ready Made Garments	6,188	5,130	3,539	3,110	17,967
Leather and Related Products	533	274	100	23	930
Furniture and Other Wooden Products	1,059	266	22	10	1,357
Paper, Printing and Reproduction of Recorded Media	632	1,101	73	0	1,806
Chemicals, Chemical Products and Refined Petroleum	151	337	65	29	582
Pharmaceuticals, Medicinal Products	15	392	50	37	494
Rubber and Plastics Products	528	460	35	13	1,036
Other Non-metallic Mineral Products	162	2,782	1537	173	4,654
Manufacture of Basic Metals	119	689	347	50	1,205
Machinery and Equipment and Fabricated Products	926	683	31	4	1,644
Computer, Electronics and Electrical Products	406	596	16	15	1,033
Transport and Motor Vehicles, Repairing	313	183	27	10	533
Other Manufacturing	208	34	7	7	256
Total	**17,384**	**15,666**	**6,103**	**3,639**	**42,792**

Source: BBS, The Survey of Manufacturing Industry, 2012.

2.3.2 Size of the Agricultural Farms:

The following table shows the size of the agricultural farms in Bangladesh. According to the Bangladesh Bureau of Statistics, the size of the agricultural farms is

divided into three categories. These are: small farms which are between 0.05 to 2.49 acres of land; medium farms which are between 2.50 to 7.49 acres of land and large farms which are 7.50 acres and above. There are over 84 per cent agricultural farms are small whereas only 1.5 per cent agricultural farms are large (BBS, 2012).

Table 2.6: Size of the Agricultural Farms

Agricultural farms size by land	**No of Holdings**	**Percentage of Holdings**
Small Farms (0.05-2.49 Acres)	12,812,372	84.4
Medium Farms (2.50-7.49 Acres)	2,136,415	14.1
Large Farms (7.50 Acres and Above)	234,396	1.5
Total	**15,183,183**	**100**

Source: BBS, 2012

2.4 Poverty in Bangladesh:

The extent of poverty in Bangladesh is briefly discussed in this section. Bangladesh is one of the poorest countries in the world. It is believed that poor people were excluded from the formal financial system due to their inability to provide collateral. Being credit constraint, the poor people used to receive loans from the informal sources such as loan shark and the interest rate was exorbitant (Halder and Mosley, 2004). In the late 70s, Professor Yunus introduced an innovative approach how to lend small amount of money among poor people without taking any collateral. Since then, this lending approach became so popular among the poor people. Over the last two decades, micro-credit programmes have been spread out right across the country. Now there are millions of poor people who have been borrowing from the MFIs. But the evidence of the impact of micro-credit on poverty reduction is unclear.

Bangladesh is one of the most densely populated countries in the world with a population of over 158 million. The majority of the population, about 80 per cent, lives in rural areas whereas the remaining, about 20 per cent, lives in urban areas. With regards to the access to public and private services, education, health and economic opportunities, there are clear distinction between rural and urban areas. One of the major problems is the government and private service offices and manufacturing industries are centralised in Dhaka and Chittagong city. Therefore, people who live in rural areas are less likely to receive good education and health services.

According to the Bangladesh Bureau of Statistics (BBS) (2011), the overall literacy rate in Bangladesh was only 56 percent in 2011. Literacy rate in urban and rural areas makes this segregation even more clear. The literacy rate is 53 per cent in rural areas, 3 per cent less than the national average while 70 per cent in urban areas. It appears that there is a significant difference in literacy rate across urban and rural areas. The literacy rate is also varied between male and female. According to BBS (2011) 59 per cent of men are literate, while only 53 per cent of female are literate.

Bangladesh is one of the poorest countries in the world, with a gross national income per capita of $1,184 US dollar in 2014. The human development index is low. According to the Human Development Index Report of 2014, Bangladesh is at the bottom of the Medium Human Development Index Category and was ranked 142nd out of 187 countries, with a Human Development Index of 0.558. Gender inequality index is 0.529 (ranked 115th) which is slightly better than India, 0.563 (ranked 127th) (UNDP, 2014).

There is difficult to find a common poverty line to measure absolute poverty in Bangladesh. Poverty is measured by using the Cost of Basic Needs (CBN) method in which the quantities of a basket of basic food items are scaled according to the nutritional requirement of 2,122 calories per day per person and then estimated costs of the foods are considered as food poverty line (BBS, 2010). According to the Bangladesh Bureau of Statistics (BBS, 2010) households are considered to be extremely poor (extreme poverty line) if the total households' expenditures on food and non-food items are equal to less than the cost of the basket of basic foods (lower poverty line). Households are considered to be moderately poor (moderate poverty line) if the total households' expenditures on the food items as well as non-food items are above the cost of a basket of food items. In other words, the moderate poor households are those households whose total households' expenditures, including food and non-food items, are almost twice the cost of the basket of basic foods.

2.4.1 Incidence of Poverty in Bangladesh:

The following table shows the incidence of poverty in Bangladesh over the period between 1991 and 2010. In 2010, the Bangladesh Bureau of Statistics estimated the trend of the incidence of poverty using a national poverty line of BDT 1,651 (US $22/person/month). The incidence of poverty tells us the percentage of people living below the poverty line. Using the moderate poverty line in HIES's data, the incidence of poverty was reduced to 31.5 per cent at national level in 2010 from 56.7 per cent in 1991. In particular, between 2000 and 2010, the incidence of poverty has been reduced by 17.4 per cent in Bangladesh (1.7 per cent per year) which is a quite significant

reduction. Up until 2010, urban and rural poverty have been reduced by almost 50 per cent and 40 per cent, respectively.

Table 2.7: Incidence of Poverty at National Level

	Incidence of Poverty		
Years	National	Rural	Urban
2010	31.5	35.2	21.3
2005	40	43.8	28.4
2000	48.9	52.3	35.2
1995	50.1	54.5	27.8
1991	56.7	58.8	42.8

Source: HIES, 2010

The following table shows the incidence of poverty by the level of education. According to BBS (2010), the incidence of poverty is the highest, about 43 per cent, amongst those people who have no education while the lowest among those people who have education at or above the secondary school certificate (SSC) level. However, about 12 per cent of the poor people who had no education have come out of poverty between 2005 and 2010. It can be seen that there is a non-linear relationship between the level of education and incidence of poverty.

Table 2.8: Incidence of Poverty by Educational Level

Educational Level	2010	2005
No education	42.8	54.7
1-4 years of schooling	35.7	37.5
5-9 years of Schooling	22.6	29
SSC	7.5	9.3

Source: HIES, 2010

2.4.2 Average and Relative Deprivation of Poverty in Bangladesh:

The average and relative deprivation of poverty are the two important dimensions of poverty. The average deprivation of poverty tells us the extent to which poor households' income fall below the poverty line and relative deprivation of poverty tells us the income inequality among the poor.

The following table shows the average and relative deprivation of poverty in Bangladesh over the period from 2005 and 2010. The average deprivation of poverty has been reduced to 6.5 per cent in 2010 from 9 per cent in 2005 at national level (BBS, 2010). The magnitude of relative deprivation of poverty has also been reduced by about 1 per cent over the same period. Both the average and relative deprivation of poverty are higher in rural areas than urban areas in Bangladesh.

Table 2.9 Average and Relative Deprivation of Poverty in Bangladesh:

	Average Deprivation of Poverty			Relative Deprivation of Poverty		
Year	National	Rural	Urban	National	Rural	Urban
2010	6.5	7.4	4.3	2	2.2	1.3
2005	9	9.8	6.5	2.9	3.1	2.1

Source: HIES, 2010

To sum up, although the recent success of moving up the country's income level to lower middle income country and the incidence of poverty has been reduced significantly, still there are about 50 million people (equivalent to about 10 times of Scotland's population) live below the poverty line in Bangladesh. The average and relative deprivation of poverty are also decreased over the years.

2.5 Incidence of Poverty across Districts:

The following table shows the incidence of poverty across the districts. The incidence of poverty across all 64-districts can be seen in appendix-1. In the following table, districts have been ranked according to the lowest incidence of poverty and provided the name and rank of 5 (five) richest districts and also given the name and rank of 5 (five) districts where the incidence of poverty is highest in this table. It can be seen from the table that Kustia has the lowest incidence of poverty, 3.6 per cent, and Dhaka, the capital city, has fifth lowest incidence of poverty in Bangladesh. On the other hand, Kurigram, located at the northern part of Bangladesh has the highest incidence of poverty, 63.7 per cent, and Chandpur, located at the southern part of the country, has fifth highest poverty, 51.0 per cent.

Table 2.10: 5-Richest Districts and 5-Poorest Districts in Bangladesh

	5 Richest Districts			5 Poorest Districts	
Rank	Name of District	Poverty (%)	Rank	Name of District	Poverty (%)
1	Kustia	3.6	1	Kurigam	63.7
2	Noakhali	9.6	2	Barishal	54.8
3	Chittagong	11.5	3	Shariatpur	52.6
4	Meherpur	15.2	4	Jamalpur	51.1
5	Dhaka	15.7	5	Chandpur	51.0

Source: BBS, 2014;

2.5.1 GDP Per Capita across Districts:

The following table shows GDP per capita across districts in Bangladesh. GDP per capita for all 64-districts can be seen in appendix-1. The capital city, Dhaka, has the

highest GDP per capita and followed by Khulna and Chittagong which is the largest port city in the country. On the other hand, Khagrachhari, located at the south-east part of the country, has the lowest GDP per capita. It appears that there is a significant difference between the districts in terms of GDP per capita and the incidence of poverty.

Table 2.11: GDP Per Capita: Top and Bottom 5-Districts

Top 5-Districts			**Bottom 5-Districts**		
Rank	Name of District	GDP Per Capita	Rank	Name of District	GDP Per Capita
1	Dhaka	66,548	1	Khagrachhari	24,556
2	Khulna	58,346	2	Comilla	24,705
3	Chittagong	55,281	3	Sunamganj	25,872
4	Bagerhat	48,696	4	Feni	26,225
5	Narayangonj	47,707	5	Nilphamari	27,870

Source: BBS, 2014; Note: GDP Per Capita at current price in Taka 2010-11

2.5.2 Major Manufacturing Industry across Districts:

The following table shows the major manufacturing industries across 6-districts in Bangladesh. In these districts, over 80 per cent of the industries are based in the capital city (Dhaka) and followed by Chittagong (about 15.4 per cent). The majority, about 88 per cent, of the apparel industries are based in the capital city. Similarly, the majority, about 90 per cent, of the leather industries are located in the capital city. In Dhaka city, there are about 86 per cent and 72 per cent other manufacturing and other services industries respectively.

Table 2.12: Major Industries in 6-Districts

Industries/Districts	Dhaka	Chittagong	Khulna & Jessore	Rajshahi & Bogra	Total
Food	749	343	104	81	1,277
Apparel	4,120	570	0	16	4,706
Leather	574	54	2	7	637
Chemicals	324	207	30	30	591
Transport	128	36	2	5	171
Furniture	1,217	183	19	47	1,466
Other Manufacturing	5,835	732	96	149	6,812
Retail	558	104	29	17	708
Other services	3,571	1,053	124	180	4,928
Total	17,076	3,282	406	532	21,296

Source: BBS, 2009.

2.6 Banking Sector and Commercial Banks in Bangladesh:

There are three types of scheduled bank in Bangladesh. As it can be seen from the table below, there are 4 state owned commercial banks (SCBs) and 4 state owned development financial institutions (SDFIs) which are considered as non-scheduled banks. Also, there are 39 private commercial banks (PCBs) and of which, 8 of them are Islamic Shariah based and the rest of them are conventional. There are 9 foreign commercial banks (FCBs) in Bangladesh. In addition, there are 31 non-bank financial institutions. The PCBs have the highest number of branches, 3,602 branches, across the country, followed by SCBs (3,520 branches). The total number of bank branches has increased to 8,794 in 2014 from 8,685 in 2013. About 62 per cent of the total assets as well as 63 per cent of the total deposits are belonged to PCBs (Bangladesh Bank

Annual Report, 2014). Therefore, it could be claimed that the PCBs are playing an important role in the banking sector in Bangladesh.

Table 2.13: Commercial Banks activities in Bangladesh

Type of Banks	Number of Banks	No of Branches	Total Assets (billion BDT)	% of Total assets	Deposits (billion BDT)	% of deposits
SCBs	4	3,520	2,109	26	1,631	26
SDFIs	4	1,494	455	6	343	6
PCBs	39	3,602	4,948	62	3,939	63
FCBs	9	69	489	6	360	6
Total	56	8,685	8,000	100	6,273	100

Source: Bangladesh Bank Annual Report, 2014. (BDT= Bangladesh TAKA)

2.6.1 Advances of Commercial Banks by Sector:

The following table shows the advances of scheduled banks by sector in Bangladesh. The highest amount of money, about 39 per cent, invested in the trade sector. The advances in working capital was 571 billion Taka in 2013 and then, the following year it was increased by 53 per cent whereas the financing in agricultural, forestry and fishing industry was increased by 14 per cent only in the same period. However, there is a significant drop in investment in transport and communication industry, about 41 per cent (Bangladesh Bank Annual Report, 2014).

Table 2.14: Advances of Scheduled Banks in Bangladesh (billion BDT)

Sector	2013	2014
Agriculture, forestry and Fishing	230	262
Industry	898	797
Working Capital Financing	571	875
Construction	386	420
Transport and Communication	91	53
Trade	1,594	1,822
Others	479	468
Total (billion BDT)	4,248	4,696

Source: Bangladesh Bank Annual Report, 2014.

2.6.2 Industrial loans of Banks and Non-bank Financial Institutions:

The following table shows the industrial loans of banks and non-bank financial institutions. The table also shows the recovery and outstanding and overdue amount for the year 2013 and 2014. The PCBs disbursed 287 billion Taka in 2013 and which is increased to 325 billion Taka in 2014. Of the total disbursement, the PCBs disbursed about 77 per cent in 2014, followed by non-bank financial institutions (NBFIs), 14 per cent (58 billion Taka). The SCBs have reduced their disbursement, about 76 per cent, sharply in the same period. In 2014, the SDFIs and SCBs overdue as percentage of outstanding is 32 and 16 per cent respectively. The financial institutions have the lowest overdue, about 6 per cent, as percentage of outstanding amount in 2014 (Bangladesh Bank Annual Report, 2014). Again, the private financial institutions and PCBs are outperforming as compared with the government banks and financial institutions.

Table 2.15: Industrial Loans of Banks and Non-bank Financial Institutions (billion BDT)

	Disbursement		Recovery		Outstanding		Overdue		Overdue as % of Outstanding	
Banks/Financial Institutions	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
SCBs	57.2	13.9	54.5	29.6	193	195	39.0	31.6	20.2	16.2
PCBs	287	325	248	316	530	594	52.9	50.5	10.0	8.5
FCBs	17.5	12.8	14.3	14.8	22.6	21.9	1.1	1.7	4.9	7.8
SDFIs	14.6	13.2	9.5	9.0	49.6	53.9	6.4	17.2	12.9	31.9
NBFIs	48.8	58.0	39.6	48.5	108	140	7.8	8.2	7.2	5.9
Total (in billion TK)	425	423	365	418	903	1004	107	109	12	11

Source: Bangladesh Bank Annual Report, 2014.

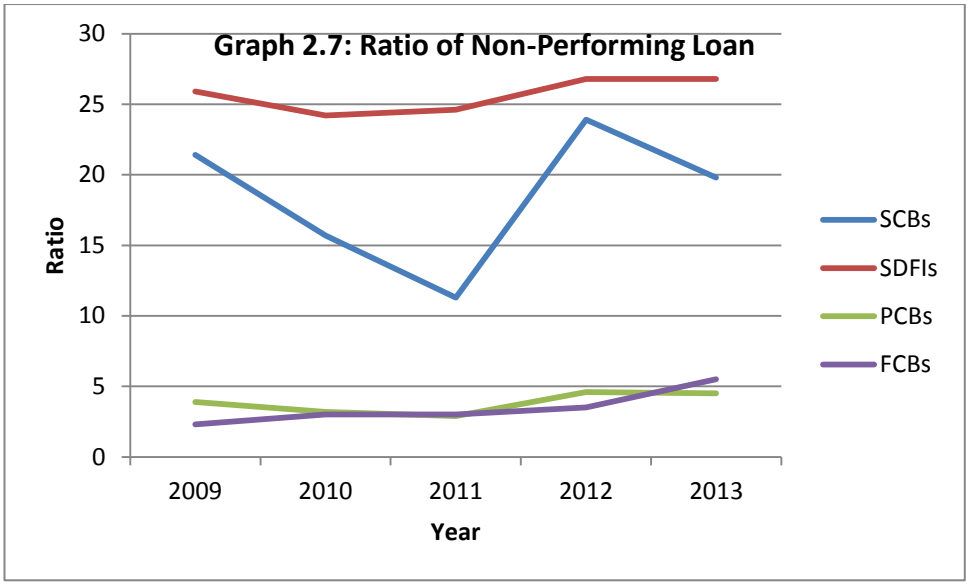
2.6.3 Non-Performing Loan Ratio by type of Banks:

The following table shows the non-performing loans to total gross loans over the period between 2009 and 2013. The PCBs have the lowest ratio, 4.5 per cent, of non-performing loans, followed by the FCBs, 5.5 per cent in 2013. The government scheduled banks and financial institutions have the highest ratios of non-performing loans. The ratios of non-performing loans indicating the poor performance of the government banks.

Table 2.16: Non-performing Loan Ratio by type of Banks

Type of Banks	2009	2010	2011	2012	2013
SCBs	21.4	15.7	11.3	23.9	19.8
SDFIs	25.9	24.2	24.6	26.8	26.8
PCBs	3.9	3.2	2.9	4.6	4.5
FCBs	2.3	3	3	3.5	5.5

Source: Bangladesh Bank Annual Report, 2014.



Source: Bangladesh Bank Annual Report, 2014.

2.6.4 Expenditure-Income Ratio by Types of Bank:

The following table shows the expenditure and income ratio by types of bank. For the state owned development financial institutions, the ratio of expenditure and income was 112 per cent in 2009 and reduced it to 95 per cent in 2013. The FCBs have the lowest expenditure and income ratio, about 50 per cent, in 2013 whereas the PCBs expenditure and income ratio was 78 per cent in 2013 (Bangladesh Bank Annual Report, 2014).

Table 2.17: Expenditure-Income Ratio by type of Banks

Type of Banks	2009	2010	2011	2012	2013
SCBs	75.6	80.7	62.7	73.2	84.1
SDFIs	112.1	87.8	88.6	91.2	94.8
PCBs	72.6	67.6	71.7	76	77.9
FCBs	59	64.7	47.3	49.6	50.4

Source: Bangladesh Bank Annual Report, 2014.

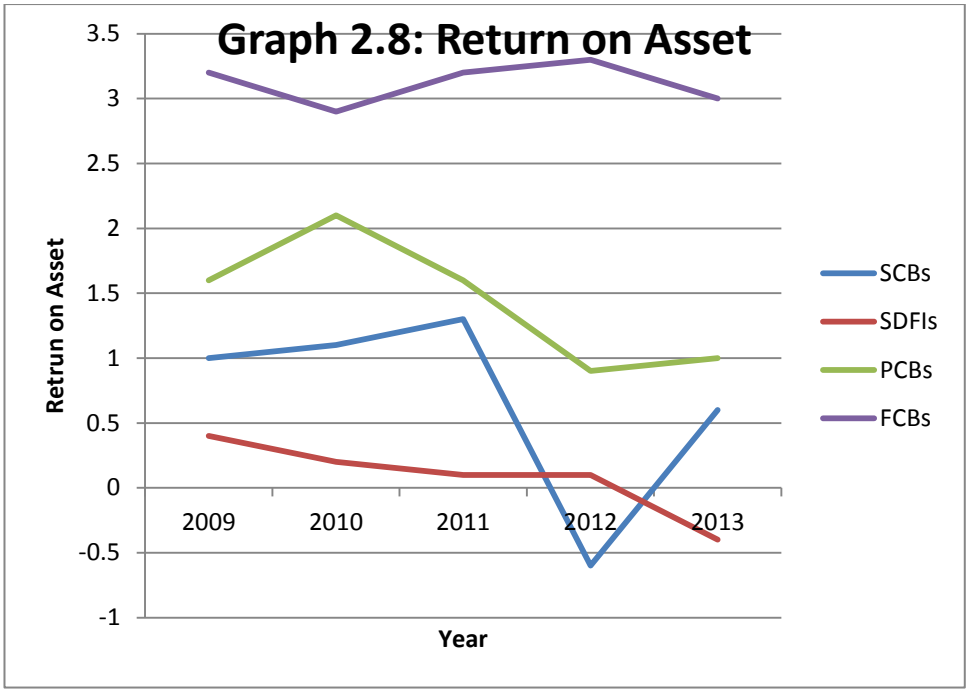
2.6.5 Return on Assets by Types of Bank:

The following table shows the return on assets (ROA) by types of bank over the period from 2009 to 2013. ROA is a profitability indicator of a company relative to its total assets. The FCBs have the highest ROA, 3 per cent, followed by the PCBs, 1.0 per cent in 2013. The ROA was 0.4 per cent for the SDFIs in 2009 but the ROA turned out negative 0.4 per cent in 2013 (Bangladesh Bank Annual Report, 2014). With respect to this indicator, the FCBs are outperforming as compared with private and state owned commercial banks in Bangladesh.

Table 2.18: Return on Asset by type of Banks

Type of Banks	2009	2010	2011	2012	2013
SCBs	1.0	1.1	1.3	-0.6	0.6
SDFIs	0.4	0.2	0.1	0.1	-0.4
PCBs	1.6	2.1	1.6	0.9	1.0
FCBs	3.2	2.9	3.2	3.3	3.0

Source: Bangladesh Bank Annual Report, 2014.



2.6.6 Return on Equity by Types of Bank:

The following table shows the return on equity (ROE) by types of bank in Bangladesh. ROE measures the ability to generate profits from its shareholders investment in the company and thus it indicates how effective management in using the equity financing to fund the operations and grow the company. Both the state owned banks, SCBs and SDFIs, had negative ROE in 2012. However, the ROE is the highest, 17 per cent, for the FCBs in 2013, followed by SCBs, 11 per cent. The ROE of the PCBs has decreased to 10 per cent in 2013 from 21 per cent in 2009 ((Bangladesh Bank Annual Report, 2014). Again, both the FCBs and PCBs are performing better than the state owned financial institutions.

Table 2.19: Return on Equity

Type of Banks	2009	2010	2011	2012	2013
SCBs	26.2	18.4	19.7	-11.9	10.9
SDFIs	-17.7	-3.2	-0.9	-1.1	5.8
PCBs	21	20.9	15.7	10.2	9.8
FCBs	22.4	17	16.6	17.3	16.9

Source: Bangladesh Bank Annual Report, 2014.

2.7 Global Micro-credit Clients:

The "State of the Micro-credit Summit Campaign" collects data from the MFIs around the world. They provide updated global micro-credit activities to donors, policy makers and international agencies in order to help making poverty reduction strategies. According to the Micro-credit Summit Campaign Report (2013), as of December 2012, there are 3, 718 Micro-financial Institutions (MFIs) across the world and almost half of the MFIs were from Asia and Pacific which includes India and Bangladesh. According to the report, MFIs reached over 200 million clients in 2012 and of which, about 152 million (about 75 per cent) clients were women. The report also claimed that, of the total clients, about 57 per cent of the clients were considered as poorest clients who live below $1.25 dollar a day and of the total women clients, about 63 per cent of them are poorest clients.

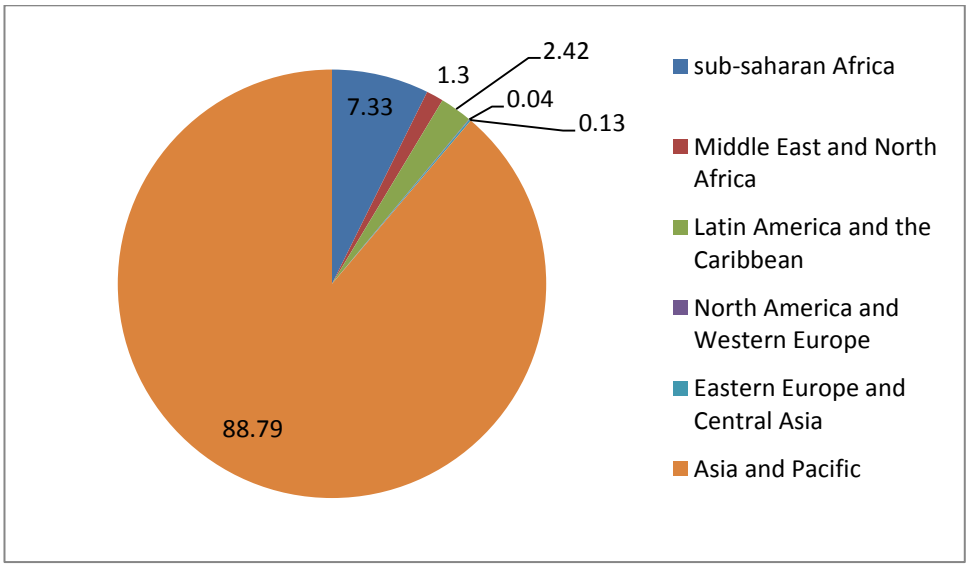
Table 2.20: Shows the Micro-credit Borrowers World-wide.

Region	MFIs	Total clients (m)	Total Women Clients (m)	Poorest Clients (m)	Poorest Women Clients (m)
Sub-Saharan Africa	1,042	15.2	8.2	8.5	6.0
Asia and Pacific	1,747	161	131	103	87.1
Latin America and Caribbean	670	16.5	10.2	2.8	2.04
Middle East and North Africa	95	5.23	2.78	1.5	1.07
North America and Western Europe	88	0.170	0.06	0.04	0.03
Eastern Europe and Central Asia	76	5.4	0.28	0.15	0.07
Global Totals	3,718	203.5	152.3	116	96.3

Source: State of the Micro-credit Summit Campaign Report, 2013

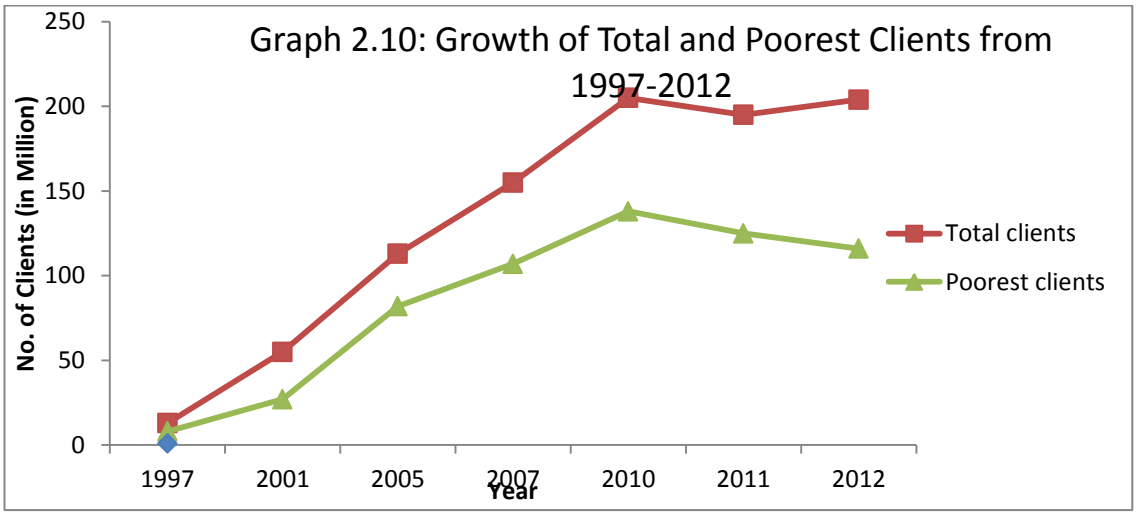
The following graph shows the percentage of the poorest clients by region. It can be seen that Asia and Pacific have the highest poorest clients (about 89 per cent), followed by Sub-Saharan Africa (7.3 per cent). In Asia and Pacific, about 57 per cent and 17 per cent of the poorest clients were from India and Bangladesh respectively. Only about 0.04 per cent of the total poorest clients were from North America and Western Europe regions.

Graph 2.9: Poorest Clients by Region



Source: State of the Micro-credit Summit Campaign Report, 2013.

The following graph shows the growth of total number of clients and poorest clients across the globe over the period of between 1997 and 2012. According to the report, both the total number of borrowers and poorest borrowers were increased over the years but the gap between the total borrowers and poorest borrowers have widened. This indicates that the MFIs are targeting the relatively wealthy clients to become financially sustainable.



Source: Micro-credit Summit Campaign Report, 2013

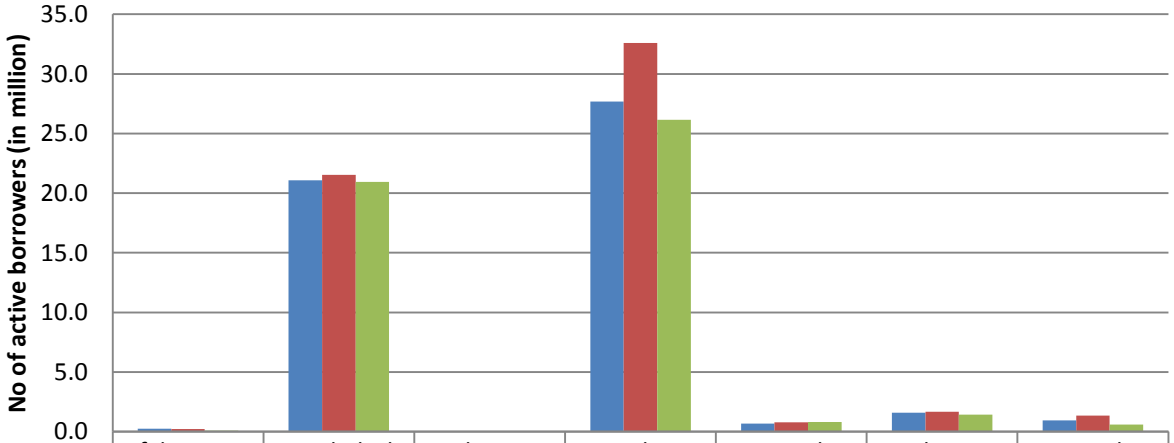
To sum up, the total number of micro-credit clients reached over 200 million across the world. The majority of the clients, three-quarters, are women and poorest. However, the gap between the total clients and poorest clients are increased.

2.8 Micro-credit Activities in South Asian Countries:

The following graph shows the total number of active borrowers in the South Asian region including Bangladesh. It should mention here that the members of MFIs who borrow and make repayment every week are considered as active members or

borrowers. According to the Micro-finance Information Exchange (MIX) (2011), the total number of active micro-credit borrowers was reduced to about 50 million in 2011 from about 58 million in 2010 in the region. It appears that about 6.4 million borrowers were reduced in India alone because the micro-credit activities were suspended for some reasons by the government of India in 2010. About 0.6 million and about 0.7 million borrowers were reduced in Bangladesh and Sri Lanka respectively during the same period. Of these countries, only Nepal and Bhutan saw some increase in the total number of micro-credit borrowers.

Graph 2.11: No of Active Borrowers in South Asian Countries from 2009 to 2011



	Afghanistan	Bangladesh	Bhutan	India	Nepal	Pakistan	Sri Lanka
2009	0.2	21.1	0.02	27.7	0.7	1.6	0.9
2010	0.2	21.5	0.02	32.6	0.8	1.7	1.3
2011	0.1	20.9	0.03	26.2	0.8	1.4	0.6

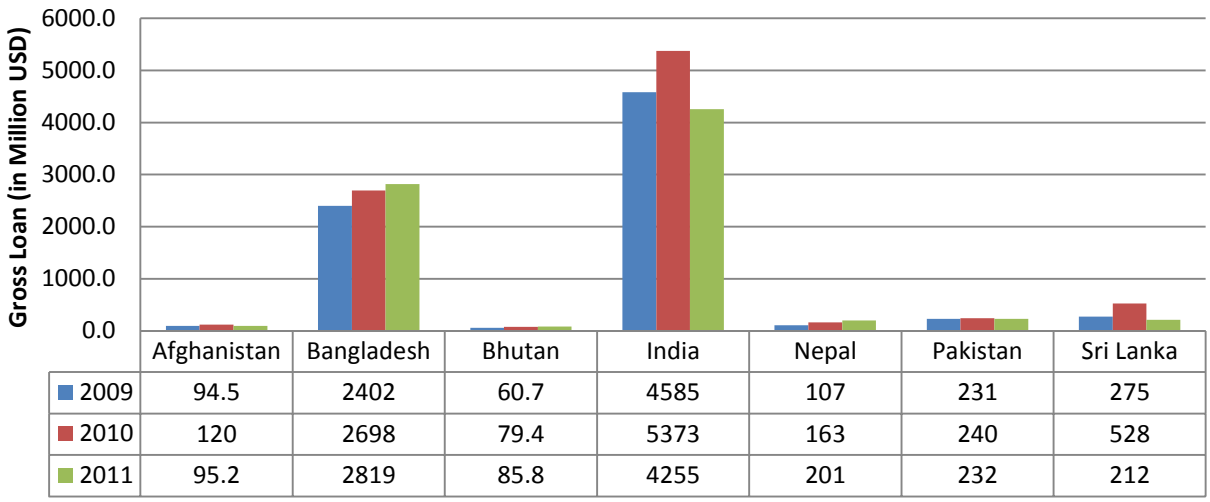
Source: www.mix.org

The following graph shows the gross loan portfolio in South Asian countries from 2009 to 2011. According to MIX (2011), the gross loan portfolio was reduced from $9.2 billion US dollar in 2010 to $7.9 billion in 2011 in South Asian countries. The gross loan portfolio was reduced by about $1 billion in India alone because of, as mentioned earlier, a huge drop in the total active micro-credit borrowers. Similarly, the

gross loan portfolio was reduced by about $316 million US dollar in Sri Lanka, whereas Pakistan saw only $8 million decrease. However, although the total number of micro-credit borrowers was reduced by about over half million in Bangladesh, the gross loan portfolio was increased by about $121 million US dollar in 2011.

To sum up, the portfolio of micro-credit market in South Asia has mainly been driving by India and Bangladesh. There is still plenty of opportunity to continue to grow the market both in India and Bangladesh because there are millions of poor people who are unbanked.

Graph 2.12: Gross Loan Portfolio in South Asian Countries from 2009 to 2011



	Afghanistan	Bangladesh	Bhutan	India	Nepal	Pakistan	Sri Lanka
2009	94.5	2402	60.7	4585	107	231	275
2010	120	2698	79.4	5373	163	240	528
2011	95.2	2819	85.8	4255	201	232	212

Source: www.mix.org

2.9 Micro-credit Coverage in Bangladesh:

Since there are about over four thousand NGOs-MFIs distributing micro-credit to the poor, the government of Bangladesh has established Micro-credit Regulatory Authority (MRA) Act-2006 to control their activities. It is a special division under the

Bangladesh Bank to monitor micro-credit operations carried out by the MFIs. Previously, both NGOs and MFIs used to get approval for micro-credit operations from the Ministry of Social Welfare and NGO Bureau, Bangladesh. After forming this regulatory body, it was announced that those organisations that are involved in delivering credit and receiving savings from their clients have to get the licence from the MRA. In response to this announcement, 4,240 NGOs applied for the MRA licence in 2007 but only 349 applications were approved. In 2008, some of the licence holding MFIs lost their licence, which may be because of underperformance such as less borrowers, lack of capital or neglecting the rules and regulations of MRA. However, the number of licenced MFIs has increased to 576 in 2011 in Bangladesh (MRA, 2007; MRA, 2011). It should be mentioned that since Grameen Bank was approved as a specialised bank by the Bangladesh Bank in 1983, it does not need to get the licence from the MRA. The following table showed the details of micro-credit coverage by the MRA licenced holder MFIs and also showed the details of Grameen Bank coverage within the parenthesises.

Table 2.21: MFIs Coverage in Bangladesh

Items	2008	2009	2010	2011
No of Licenced MFIs	293	419	516	576
No of Branches	15,077(2,539)	16,851(2,562)	17,252(2,565)	18,066(2,565)
No. of Clients (Million)	23.45 (7.7)	24.85 (8.0)	25.28(8.3)	26.08(8.4)
No. of Borrowers (Million)	17.79(6.2)	18.89(6.4)	19.21(6.6)	20.65(6.6)
Outstanding Loan (Billion-TK)	134.68(44.4)	143.13(54.7)	145.02(66.4)	173.80(75.3)
Clients Savings (Billion-TK)	47.4	50.6	51.4	63.3

Source: MRA, 2011 and Grameen Bank, 2012

It can be seen from table 4.1 that the numbers of branches of MFIs have gradually increased by about 3,000 over the period from 2008 to 2011. However, it appears that the number of branches of Grameen Bank increased from 2,539 in 2008 to 2,565 in 2011. ASA and BRAC have 3,177 and 2,501 branches respectively which together constitute one-third of the total branches of MFIs in 2011. It can be confirmed that the number of Branches of ASA has been reduced to 2,936 over the last two years. Over the period from 2008 to 2011, the number of borrowers increased by about 2.6 million. Of the total number of borrowing members, ASA and BRAC separately have 4.5 million and 5.5 million respectively which is half of the total borrowers in Bangladesh. In addition, Grameen Bank, ASA and BRAC have been serving more than two-thirds of the total borrowers in Bangladesh.

2.9.1 Are the MFIs Concentrated in the Poorest Regions?

It can be seen from table 4.2 that the poverty head count ratio is higher for both the Barisal and *Rajshahi* divisions where ASA has 8.5 per cent and about 30 per cent of the total number of branches in Bangladesh, respectively. In other words, about 39 percent of the total branches are established in the regions where the poverty head count ratio is higher. ASA has established about 29 per cent of the total branches in the Dhaka division where the poverty head count ratio is lowest. Both average area and population size for each branch indicate that ASA's branch density is higher in the division where rate of poverty is higher. For example, per branch area coverage is almost double, over 80 square kilometres per branch, for both *Sylhet* and *Chittagong* division (richest divisions) while comparing with *Rajshahi* division (poorest division),

39 square kilometres per branch. Therefore, there are higher numbers of branches for the poorest regions than the relatively rich regions. According to MRA (2009) almost half of the total MFIs in Bangladesh have their branches or activities in the Dhaka Division. It could also be argued that the MFIs are clustered in those regions in Bangladesh where poverty is low.

Table 2.22: ASA Coverage and No. of MFIs in Bangladesh by Division

Name of the Division	Districts (64-districts)	Poverty Head Count Ratio	Average Income (TK)	No. of ASA Branches (%)	Avg. area for each Branch (Sq. km)	Population for each ASA branch	No of MFIs in each division*
Barisal	6	0.458 to 0.520	9,158	248 (8.5)	55	32,960	30(6.1)
Chittagong	11	0.337 to 0.339	14,092	422 (14.4)	80	57,559	64(13.1)
Dhaka	17	<0.319	13,226	849 (28.9)	37	45,988	223(45.6)
Khulna	10	0.339 to 0.458	9,569	375(12.8)	39	39,213	73(14.9)
Rajshahi	16	0.458 to 0.520	9,342	888(30.3)	39	34,011	89(18.2)
Sylhet	4	0.319 to 0.337	11,629	154(4.9)	82	51,558	10(2)

Sources: Survey on ASA (2013); *MRA (2009)

According to MRA (2009) there are only maximum of five MFIs working in the four districts such as *Rajbari, Shariatpur, Bandarban and Rangamati,* while over 60 MFIs are operating their micro-credit activities in the Dhaka City. Hence, it is quite interesting to look at the reasons for MFIs operations being highly focused on a few districts while some other parts of the country are less focused on.

Given this variation, it could be explained by the fact that both *Bandarban and Rangamati districts* have a lower population density and the head of household's literacy rate is very low for example, only up to 11 percent of the head of households had completed their primary level of education (BBS, 2005). Also, more than half of the total population is poor in these two districts. Moreover, both *Shariatpur* and *Rajbari* are located in the severe flood warning regions. Agricultural labour wage rate

is lowest *in Shariatpur* which is between 39 and 60 *Taka* (BBS, 2005). On the other hand, maximum numbers of MFIs (60 or more) have their branches in the *Dhaka*, *Gazipur* and *Chittagong* districts. Again, this variation could be explained by the fact that these three districts are heavily industrialised. There are many types of industries including garments, printing and packaging, shipping industry, cement and chemical industries, pharmaceutical and fertilizer companies are located in these areas. It is also found that the poverty head count ratio is lower, the rate of literacy is higher and the labour wage is higher than elsewhere in Bangladesh. There is a very low risk of natural disasters such as flooding in these districts (BBS, 2005). The management of MFIs could be encouraged to start their initial activities in these three districts because of low risk, higher wage income, higher literacy rate and thus more developed than the rest of the districts.

Therefore, MFIs are clustered in these districts. It should be noted that there are only three MFIs, such ASA, BRAC and Grameen Bank, which have been managed to cover all 64-districts of the country. However, ASA has the lowest number of Branches, only five, in *Bandarban* district, while 110 branches in the *Dhaka* districts which is the maximum for one particular district.

2.9.2 Are the Poor People Covered?

As there are many MFIs working across the country, it is also quite interesting to calculate how many poor people are covered in each district. According to MRA (2010), almost all the borrowers are from poor families in four districts (*Feni, Meherpur, Sylhet* and *Narshingdi).* MRA has explained that micro-credit borrowers

might be overlapped in these districts. Of the 64 districts, 70 to 100 percent of poor people are covered in the eight districts while only up to 20 percent of poor people are covered in the four districts (*Khagrachari*, *Barisal*, *Bhola* and *Jamalpur)*. Between 20 and 30 percent of poor people became borrowers of micro-credit in five districts. On average about half of the poor people are uncovered in the 48 districts in Bangladesh. Therefore, it could be argued that although MFIs have established their branches across the country, there are still huge numbers of poor people out of micro-credit in 52 districts.

2.10 Brief History of Top 3 MFIs in Bangladesh:

As mentioned earlier, this study considers ASA is a case study to complete the thesis and collects data from the institution. This section focuses on the three large MFIs (Grameen Bank, BRAC and ASA) in Bangladesh in order to understand how ASA is performing comparing with the other two world renowned MFIs. However, there is a micro-credit regulatory authority (MRA), a special division under the Bangladesh Bank, which oversees the activities of the MFIs in Bangladesh. According to MRA (2011) there were 576 MFIs in Bangladesh in 2011. Of these MFIs, Grameen Bank, BRAC International and ASA are the three largest institutions. They have also expanded their operations in many countries across the world. This section briefly discusses about their sustainability and profitability indicators.

Grameen Bank was recognised as a specialised bank by the Bangladesh Bank in 1983. It is actually originated from the research project on how to design a credit delivery system in order to provide financial services especially for the poor in rural

areas in Bangladesh. In 1976, Professor Yunus started the activities of this project at a village called Jobra which is adjacent to the University of Chittagong, Bangladesh where he was a professor in Economics. Based on this project, he designed a credit delivery system in which it does not require collateral security. The micro-credit model of Grameen Bank has now been replicated over 100 countries in the world including the USA and UK. Both Professor Yunus and Grameen Bank have won Nobel Peace Prize in 2006 for their outstanding efforts to create economic and social development in Bangladesh as well as across the world. It is currently serving about 8 million borrowers in Bangladesh.

BRAC International was established in 1972, right after the independence of Bangladesh in December 1971 by Dr Fazle Hasan Abed. It started with the aim to re-build the country's infrastructures, roads, houses, education and other development activities such as health and family planning alongside the government and other NGOs. Now it is working in many countries in Asia and Africa including Pakistan, Sri Lanka, South Sudan and Uganda. It is now one of the largest MFIs in the world. It is currently serving about 4.5 million borrowers in Bangladesh.

ASA Bangladesh was established in 1978 by Mr Shafiqual Haque Choudhury. Initially it was working to organise the poor people in order to create awareness about their social and political rights such as fair wages. ASA Bangladesh started its micro-credit programme in the late 80s. ASA is now a famous MFI for its cost-effective lending approach. It became number one MFI in the world by Forbes Magazine in 2007. Now it is also working in many countries in Asia and Africa including India,

Pakistan, Nigeria and Ghana. It is currently serving about 4.2 million borrowers in Bangladesh.

2.10.1 Sustainability and Profitability Indicators of Grameen, BRAC and ASA:

The following table shows some indicators of the three largest institutions in relation to the MFIs sustainability and profitability such as financial self-sufficiency (FSS) and return of equity (ROE). It can be seen from table 2.8 that the repayment rate of the three institutions is impressive. ASA has the highest repayment rate (99.4 per cent), followed by BRAC (99.3 per cent).

Portfolio at Risk (PAR) measures the quality of the loan portfolio of the MFIs and it is a widely accepted sustainability indicator. If portfolio at risks (PAR>30) is more than 10 per cent, then it is a major concern for the MFIs because their loans are not backed up by the collateral security. The PAR>30 was the highest, 6.1 per cent, for BRAC in 2013. The PAR>30 for ASA and Grameen Bank are almost the same (3.7 per cent) in 2013. ASA has the highest return on equity (ROE) (19 per cent) and return on assets (ROA) (11 per cent). Surprisingly, Grameen Bank has the lowest ROA, 0.7 per cent.

Operating self-sufficiency (OSS) measures the ability of the MFIs to generate enough revenue in order to cover its day to day operating costs, while financial self-sufficiency (FSS) evaluates the self-sufficiency or subsidy of dependence of MFIs. The FSS is a reliable indicator of sustainability because it takes into account the adjusted income relative to its adjusted costs. An MFI is defined as subsidy dependent if the FSS

measure is below 100 per cent. On the other hand, an MFI is defined as self-sufficient if the FSS measure is above 100 per cent. It can be seen that ASA has the highest OSS (177 per cent) and FSS (127 per cent), followed by BRAC. Again the OSS of the Grameen Bank was just over 100 per cent but the FSS was slightly below 100 per cent. This indicates that the Grameen Bank generates enough revenue to cover its costs but almost failed to become financially self-sufficient. With regards to the assets, Grameen Bank, BRAC and ASA have just over US $2 billion, $0.95 billion and $1.2 billion worth of assets respectively.

Table 2.23: Shows Sustainability/Profitability Indicators of Grameen, BRAC and ASA:

Sustainability/profitability Indicators	GRAMEEN	BRAC	ASA
Repayment Rate (%)	97.2	99.3	99.4
Portfolio at Risk (PAR>30 days) (%)	3.7	6.1	3.7
ROE (%)	13.7	11.1	19
ROA (%)	0.7	6.2	11.4
Operating Self-sufficiency (%)	105	128	177
Financial Self-sufficiency (%)	99.6	112	127
Asset (in USD-Million)	2002	954	1200

Source: MRA, 2013 and Grameen Bank, 2013 and MIX, 2013

2.10.2 Efficiency and Productivity Indicators of Grameen, BRAC and ASA:

The following table shows the efficiency and productivity indicators of the three largest MFIs in Bangladesh. It can be seen that the Grameen Bank has the highest number of borrowers (553) per staff in 2013, while BRAC has the lowest (347). The average loan balance per borrower is the highest (US $220) for BRAC, followed by the Grameen Bank (US $210). With regards to the gross loan portfolio, Grameen Bank, BRAC and ASA have US $1 billion, $0.9 billion and $0.8 billion, respectively.

Operating costs equals to the costs on savings, borrowing funds and administrative costs. ASA has the lowest operating costs which is 13 Taka ($0.17) per 100 Taka ($1.25) lent as compared with Grameen Bank and BRAC. Grameen Bank has nearly US $2 billion public deposits whereas BRAC and ASA have only $376 and $366 million US dollar respectively. This could be explained by the fact that the Grameen Bank has nearly 8 million borrowers which is almost double as compared with ASA and BRAC. Also the Grameen Bank is considered to be more trustworthy financial institution because it is a specialised bank as well as it has some deposit schemes for attracting not only the poor people but also the middle class people.

Table 2.24: Shows Efficiency/Productivity Indicators of Grameen, BRAC and ASA:

Efficiency/Productivity Indicators	GRAMEEN	BRAC	ASA
Borrowers per staff	553	347	397
Avg. Loan Balance per borrower ($)	210	220	172
Loan outstanding per staff (million-TK)	6.6	3.8	4.8
Gross Loan Portfolio (in USD-Million)	1001	930	764
Operating Cost (per 100 TK lent)	16.1	18.7	13.5
Deposits (in USD-Million)	1900	376	366

Source: MRA, 2013; Grameen Bank, 2013 and MIX, 2013.

To sum up, it could be argued that ASA has been outperforming with regards to all the sustainability and profitability indicators whereas Grameen Bank appears to be subsidy dependent. However, with regards to the efficiency and productivity indicators, Grameen Bank has been performing well except the operating costs. Therefore, it could

be claimed that ASA is the most sustainable and profitable and cost effective micro-finance institution in Bangladesh.

2.11 Firms Constraints in access to Bank loans in Bangladesh:

Small and medium enterprises (SMEs) are considered as engine of economic growth and empirical evidence suggests that there is a link between SMEs, economic development such as GDP per capita growth, and poverty reduction (Beck, Demirguc-Kunt and Levine, 2005). Empirical studies suggest that access to finance has a significant positive impact on firms' growth, in particular that urgently need the finance (Rajan and Zingales, 1998; Aisen and Franken, 2010). However, several studies argued that firms' constraint in access to finance is one of the major obstacles for growth particularly in low-income countries such as Bangladesh (Beck and Demirguc-Kunt, 2006; Afandi and Kermani, 2014). Ayyagari, Beck and Demirguc-Kunt (2007) showed that access to finance, corruption and political instability are the major obstacles which have a direct impact on firms 'growth and among those, access to finance or availability of finance is the most robust one. A recent study carried out by Afandi and Kermani (2014) expressed concerns that the domestically owned small and medium firms in Bangladesh are having higher financing constraints than the large firms as well as experiencing problem in access to bank loans due to the sophisticated loan application process. They further argued that in recent years, commercial banks in Bangladesh have not only tightened their loan approval procedures but also requiring high collateral and high interest rates which badly affected the small and medium firms in accessing to bank loans.

The enterprise survey (2013) reveals that political instability, electricity, access to finance and corruptions are the major obstacles for firms' growth in Bangladesh. This could be explained by the fact that businesses remain closed for months after months when political uprising begins within the country. Over the last few years, businesses in Bangladesh experienced this political instability at least 3 to 4 months a year. Moreover, there is also inadequate power supply to the industries which forced them to remain closed for most of the time a day. Thus the firms are unable to use their full capacity in order to produce at an optimum level due to both power shortage and political instability.

The following table shows the firms constraints in access to bank loans in Bangladesh and also comparing with South Asia and all countries (135 countries) in the world.

Table 2.25: Firms Constraints in Access to Bank Loans in Bangladesh.

Firms Constraints	**Bangladesh**	**South Asia**	**All Countries**
Percent of firms with a bank loan	34.1	27.0	34.3
Proportion of loans requiring collateral (%)	84.4	81.0	77.8
Value of collateral needed for a loan (% of the loan amount)	271.1	236.0	194.4
Percent of firms whose recent loan application was rejected.	15.6	14.4	12.1
Percent of firms using banks to finance investments	19.8	21.8	24.4
Proportion of investment financed by banks (%)	12.4	14.4	14.3
Percent of firms using banks to finance working capital	29.9	25.0	30.1
Percent of firms identifying access to finance as a major constraint	22.8	26.5	28.6

Source: The Enterprise Surveys, 2013

According to the survey, about 34 per cent of the firms with a bank loan in Bangladesh, whereas 27 per cent of the firms with a bank in South Asia. The percentage of firms with a bank loan is much higher than the South Asian countries and almost equal to all countries.

The proportion of loans requiring collateral in Bangladesh is, 84.4 per cent, much higher than the rest of the world. Similarly, the value of collateral needed for a loan is almost three times in Bangladesh which is much higher than the rest of the countries in the world. This indicates that the firms which can provide such a high value of collateral only they can have access to the bank loans. About 16 per cent of firms in Bangladesh whose loan application was declined and of which, 29 per cent of them are small firms. The rate of rejection of loan application is slightly higher than the South Asian countries and the world's average. The number of firms using banks to finance investments is less than the rest of the countries in the world. About 12 per cent firms confirmed that a proportion of investment is financed by banks in Bangladesh. Almost 30 per cent firms using banks to finance working capital which is higher than the South Asian countries, 25 per cent, but almost the same as all countries in the world. About 23 per cent firms identified access to finance as a major constraint which is much lower than the rest of the countries in the world. Therefore, it could be argued that the firms in Bangladesh can have access to bank loans if they are able to provide high value of collateral.

2.12 Summary:

The economy of Bangladesh relies on the agricultural sector in which about half of the total labour force is engaged. Although the incidence of poverty has been reduced to 31.5 per cent in 2010, still there are over 50 million people living below the poverty line. Micro-credit programmes have been sprung across the country as a tool for poverty reduction. Micro-credit programmes of the three Bangladeshi MFIs (Grameen, BRAC and ASA) have been replicating in many countries across the globe in order to lift the poor people out of poverty. Currently, there are over 200 million borrowers world-wide. However, the firms in Bangladesh could be financially constraint due to the requirement of high value of collateral by the commercial banks.

The next chapter critically discusses the studies that have evaluated the impact of micro-credit on household's income and consumption and business outcomes in Bangladesh as well as in other countries around the world. The next chapter also reviews of main theoretical contributions on micro-credit.

Chapter 3: Review of Literature:

3.1 Introduction:

Micro-credit can assist potential borrowers in a number of ways. Having access to micro-credit, borrowers may increase income and expenditure because they can either expand their existing businesses, start a new business, or both. Increasing income can lead to a rise in expenditure, which will improve the living status of borrowers. Typically when income increases, demand for better health and children's education also increases.

The effectiveness of micro-credit has been questioned by economists such as Jonathon Murdoch, David Roodman and Richard Palmer-Jones. They pointed out that certain studies find that the positive impact of micro-credit on poverty is due to various biases such as self-selection bias. They expressed concern that researchers were still failing to address these biases. Although micro-credit institutions have a clear set of rules for the selection of their potential borrowers, the selection is made only after careful consideration of income and financial status. In this circumstance, researchers have taken no useful steps for their study in order to control this non-random borrower's selection process. Certainly, studies that failed to control this may be led to a biased outcome, since it is perceived that MFIs select relatively rich or not-so-poor clients for achieving financial sustainability.

Unobservable characteristics such as enterprising skills of the self-selected borrowers may also lead to a biased outcome of the study. Hence, it is important to identify borrowers' skills and factors that lead to becoming a borrower in comparison with those who did not borrow or dropped out, and why. Micro-credit borrowers who

live in developed areas where there are schools, hospitals, electricity, local markets, and good transportation systems have more chances of being wage employed or engaged in small businesses which result in a rise in income. On the other hand, micro-credit borrowers who live in deprived areas, have less opportunity to earn money. Therefore, conducting a survey among only the borrowers who live in developed areas or urban areas may lead to a biased outcome.

The rest of the chapter is organised as follows. Section 3.2 presents a short review of main theoretical contributions on micro-credit. Section 3.3 critically discusses the empirical studies carried-out in Bangladesh and then followed by, section 3.4, the impact assessment studies in the rest of the world. Studies on the poverty status of micro-credit borrowers and the branch placement are presented in section 3.5 and 3.6 respectively. Finally, section 3.7 presents a summary of the literature review and anticipated contribution to the literature.

3.2 Micro-credit: A Brief Theoretical Discussion

In recent years development economists and practitioners have devoted significant attention to micro-finance institutions that use unconventional methods to lend successfully to poor people. A number of studies made significant theoretical contributions on micro-credit and laid foundations of this novel lending mechanism (Stiglitz, 1990; Varian, 1990; Ghatakand Guinnane, 1999; Morduch, 1999, Gangopadhay, Ghatak, and Lensik, 2005). This section briefly reviews the main theoretical contributions on micro-credit.

Traditional financial intermediaries (commercial banks) are having severe limits in fuelling the flow of financial resources from investors to the poor agents. The poor people are typically excluded by the traditional intermediaries because they are unable to meet basic requirements of lending such as collateral (Becchetti, Boot, Lensik, and Zazzaro, 2013). Micro-finance institutions addressed this problem by introducing new approaches such as group lending, peer monitoring and joint liability for bringing poor people into traditional financial systems. Stiglitz (1990) expressed a concern that a major problem for the financial intermediaries is ensuring that the borrowers use their good judgement in the use of the loans so that the probability of repayment is enhanced. In this circumstance, he proposed that peer monitoring could be a solution in which neighbours, who are in good position, are required to monitor the borrower and pay back if the borrower goes bankrupt.

Most of the micro-finance institutions lending in particular to the poor in low-income countries and achieved a considerable degree of financial sustainability and having higher repayment rates than conventional banks (Morduch, 1999). The literature identifies two reasons for this success. One is joint-liability and another one is strong loan monitoring in which micro-lenders promise to deliver repeat loans with bigger loan size over time for those borrowers who perform well (Ghatak and Guinnane, 1999). While the literature focuses only on the aspects of joint liability by which micro-finance institution increases repayment rates, Ghatak and Guinnane (1999) explained that joint liability alleviates the four problems experienced by the financial intermediaries that lend to poor borrowers who are unable to pledge any collateral. These are: adverse selection problem, moral hazard, costly audits and enforcement.

They showed that the joint liability affects group formation and then induces group members to influence other group members to select their projects, thus it helps the lender to avoid costly audits, and encourages borrowers to pay back their loans without imposing any costly sanctions by the lender.

Theories of peer monitoring are motivated by the fact that because of joint liability, group members can put social sanctions or take remedial action against other group members who do not use their loans properly (Stiglitz, 1990; Varian, 1990; Banerjee, Besley, and Guinnane,1994). The non-conventional bank such as micro-finance institution might function better than conventional banks because of availability of social sanctions and repeated interactions, at least once a week, among the borrowers through group meeting (Banerjee, Besley, and Guinnane,1994). Besley, Coate, and Loury (1993) explained that individuals likely to have sufficient information about the reliability of their neighbours and credit worthiness and can put social and economic sanctions if someone goes bankrupt without any proper reason.

The effect of group lending on repayment rate is mixed (Besley, and Coate, 1995). The effect is positive when some successful borrowers might have an incentive to repay the loans of group members whose projects have failed to generate enough revenue to make repayment worthwhile. The negative effect arises when whole group defaults because of joint liability, even when some borrowers would have repaid under individual lending.

In the early stage, much of the theoretical work largely focuses on joint liability feature of micro-finance. However, there are several other important features of this lending mechanism that received much attention in recent years and these are: frequent

repayment and progressive lending and dynamic incentives (Fischer and Ghatak, 2011). With respect to the frequent repayment, Rai and Sjostrom(2004) highlighted that micro-finance institutions are able to extract borrowers' information on their ability to continue repayment and uses of the funds. Fischer and Ghatak, (2011) viewed frequent repayment slightly different way such that it focuses on the meetings with the borrowers rather than the act of repayment itself and it requires cross-reporting at the group meetings which can improve efficiency of the micro-financial institutions.

Chowdhury (2005) and Aniket (2006) stressed another important mechanism of micro-finance is sequential lending in which loans are not usually given to all borrowers in a group simultaneously. In his model, Chowdhury (2005) implicitly assumed that there is an escrow account such that part of the first round borrower's revenue is taken away and return to the first round borrower only if the second round borrower repays. This could be viewed as a form of collateral creation and overcome some underlying problems that may create credit constraint.

Fischer and Ghatak (2009) explained quasi-hyperbolic preferences in their theoretical model in order to capture the belief of the micro-finance practitioners in which borrowers benefit from the fiscal discipline required by a stringent repayment schedule. The micro-finance practitioners are also motivated by their work and believed that frequent repayment is critical in order to achieve high repayment rates. As Muhammad Yunus, founder of Grameen Bank, observed the poor people's spending behaviour very closely, this belief is also well captured in his following statement (Muhammad Yunus, 2003:114).

"*It is difficult for the poor people to pay the bills as well as pay the lender [out of one's pocket] because the majority of the households rely on only one person's income. The poor people are tempted to use their money to meet immediate consumption needs. Borrowers find this frequent repayment [relatively small instalment size] is much easier than having to accumulate money to pay a lump sum since their lives are constantly under strain*"

As the behavioural factors motivating frequent repayment, it can also create demand for savings products among customers. This importance of savings products for poor households are now extensively recognised by the literature (Collins et al, 2009, CGAP, 2002), although de Aghion and Morduch (2005) claimed that the borrowers savings could be viewed as collateral by which MFIs mitigate the risks of default. Economists also unfold the constraints households face when attempting to save or encouraged by the lender to save.

To sum up, micro-finance generated a great deal of interest among economic theorists since its inception in the early 70s in Bangladesh. The micro-finance theories largely focus on the various features of micro-finance such as joint liability, group formation, progressive lending, repayment and savings. Empirical work is necessary in order to refine existing theories on micro-finance and suggest new ones.

3.3 Impact Assessment Studies in Bangladesh:

A number of studies have been conducted in order to estimate the impact of micro-credit on borrowers' income, expenditure and small businesses. Table 3.1 presents a summary of the studies that investigated the impact of micro-credit on

poverty reduction. The evidence on the impact of micro-credit on household outcomes is ambiguous. Economists are also debating over the effectiveness of micro-credit programmes. On the one hand, some researchers find that micro-credit has a positive impact on a household's income, expenditure and consequently on poverty. On the other hand, some studies find negative or no impact of micro-credit programmes on household outcomes or poverty reduction. Few studies raised a concern that although micro-credit was designed for poor and very poor people, micro-credit was given to those who are not so poor, or sometimes people who are well above the poverty line. This section critically reviews the studies that evaluate the impact of the micro-credit programme on poverty in Bangladesh.

An empirical study was conducted by Pitt and Khandker (1998) to evaluate the impact of micro-credit on poverty alleviation in Bangladesh. They used a multipurpose quasi-experimental survey that was conducted in 87 villages of 29 Thanas (Lower Administrative Unit called Thana) in Bangladesh from 1991-92. Data was collected from 1,538 targeted households in Bangladesh. Of these households, 905 households were micro-credit programme participants and 260 households were non-target households. They found that consumption increased by 18 per cent and 11 per cent for the female borrowers and male borrowers, respectively. Female borrowers tend to buy more non-land assets for households than male borrowers. The impact of micro-credit on children's school enrolment was mixed. The number of schooling year for boys was increased after their parents became involved in the micro-credit programme.

The findings of the above study were rejected by Murdoch (1998). Murdoch (1998) had used the same data set used by Pitt and Khandker (1998), but he applied

different econometric methods. He found that micro-credit had no significant impact on borrowers' consumption status and children's school enrolment compared to the non-borrowers. However, he confirmed that micro-credit had a positive impact on labour supply across the various seasons in Bangladesh. He raised two main concerns about the study conducted by Pitt and Khandker (1998). First, potential borrowers must own less than half an acre of land. This is one of the major criteria for borrower selection set by most micro-credit organisations. They included about 30 per cent of Grameen Bank borrowers in the sample who own more than half an acre of land which may overestimate the impact of the micro-credit programme. Second, they did not control for regional fixed effects. He explained that the impact of the micro-credit programme is overestimated when a programme chooses a region which is doing well.

Khandker (2005) conducted further research on micro-credit in Bangladesh with panel data. The first wave of data was collected in 1991-92. The last wave was collected in 1998-99. This panel data set was gathered by the Bangladesh Institute of Development Studies in association with the World Bank. Khandker (2005) analysed the impact of micro-credit on both men and women separately. He found that micro-credit had a significant and positive impact upon female borrowing on per capita consumption, while male borrowing had no such effect. Moreover, total consumption was increased by 18 per cent for female borrowing. However, there is no evidence found on the marginal returns to men borrowing. Per capita expenditure increases as the amount of borrowing increases by women, whereas men's borrowing has no such impact. Therefore, the impact of female borrowing is much stronger than male borrowing. Furthermore, he claimed that moderate poverty was reduced by 18 per cent

and 13 per cent in programme and non-programme areas, respectively. He also claimed that at the individual and village level, the impact of micro-credit is slightly lower for moderate poverty than extreme poverty.

A village-level fixed effect method was adopted by Khandker (2005) in order to control unmeasured village-level demand for credit by men and women. He had taken into account the effect of past borrowing as well as cumulative borrowing in terms of measuring the impact of micro-credit on the households' consumption. However, his study included approximately 31% non-targeted borrowers who own more than 0.5 decimals of land, into the total samples which may overestimate the impact of the micro-credit programme. He conducted the first wave of the survey during the three cropping seasons which may overestimate the consumption or expenditure of the respondents, since during these seasons people usually spend more than the rest of the months of a year. It focuses merely on the demand for credit influences by the land ownership and educational attainment at a household and individual level. However, there might be some other reasons for a rise in demand for credit, such as entrepreneurship skills and village level characteristics such as local markets. This study did not address the issue of self-selection bias.

This thesis remains sceptical towards the view that the effectiveness of micro-credit varies based on the sex of the borrowers in the context of Bangladesh. In practice, micro-credit institutions prefer women as members or borrowers than men. Many institutions in Bangladesh such as TMSS (Thengamara Mohila Sabuj Sangha), do not want to lend to men, since one perception is that it is easy to reach or convince women for repayment. In Bangladesh, most of the women are dummy users or dummy

borrowers of micro-credit institutions, since Guetz and Gupta (1996) argued that most of women had no control over the use of loans. In other ways, women are the vehicle for passing micro-credit on to a family where the head of the household is male.

Zaman (2000) attempted to evaluate the impact of BRAC's micro-credit programme in Bangladesh. To collect primary data, the author administered a questionnaire survey among 547 members, and 525 eligible non-members of micro-credit programmes in 1995. It was found that borrowers who received credit more than TK. 10,000 ($125) managed to raise their household's consumption by nearly 19% in comparison with identical non-borrowing BRAC members. He also pointed out that the impact of micro-credit was positive and statistically significant for the borrowers who have more than ten decimals of land. However, he argued that the households with a loan amount of more than TK. 10,000 ($125) were 13.8% better off compared to eligible non-members of micro-credit programmes in Bangladesh. He made a comment that the result of the impact of the micro-credit programme is varied based on the selection of the econometric specification and control group. It appears that this study attempted to control the problems of counterfactuals by taking two different control groups such as eligible non-members, and non-borrowing members.

Chowdhury, Ghosh and Wright (2005) assessed the impact of micro-credit programmes in Bangladesh by conducting a survey among the borrowers of three organisations, ASA, BRAC and Grameen Bank. They measured the rate of objective poverty (based on the consumption of 2,112 calories per day for an adult) and subjective poverty by asking respondents whether they would consider themselves as poor or not. They reported that the objective poverty and subjective poverty rate had

decreased by 2.5 per cent and 6.5 per cent every programme year respectively. They also claimed that micro-credit programmes had a positive and significant effect on poverty reduction for those borrowers who were involved with this programme for six years or more. They controlled for self-selection bias by including new members, who had not yet received credit, into the sample for this study as well as non-random programme placement by taking into account the village level characteristics.

In 2007, the Asian Development Bank (ADB) explored the fact that Rural Livelihood Project participants were earning above the national poor average monthly income ($59) in Bangladesh. However, average monthly income of Participator Livestock Development Project (PLDP) participants was lower compared to the monthly income for the poor in Bangladesh. This could be an impact of having landless households' women for the PLDP (ADB, 2007). Hence it may be argued that micro-credit programmes do not help the poorest of the poor.

Zapalska, Brozik and Rudd (2007) assessed the impact of Grameen Bank's micro-credit programme on small and micro-enterprises in Bangladesh. They randomly picked up 100 small and micro-enterprises from a list provided by the Micro-credit Association of Small Businesses and Grameen Bank, Dhaka. Information was collected on the size and nature of businesses, operations, levels of employment, business training and micro-credit financing. In Bangladesh, women are involved in various types of micro-enterprises and the manufacturing of wide ranges of products such as garment manufacturing, pottery, weaving clothes, and rice-milling. They showed that the profit of micro-enterprises has increased due to access to the micro-credit programme. A small amount of credit ($100) brought significant changes to poor

women's lives by both creating employment and increasing the level of firms' productions. With the help of micro-credit, most of the micro-enterprises managed to grow and moved to the development stage.

Mahmud *et al.* (2007) focused on the impact of a project called the Agricultural Diversification and Intensification Project (ADIP) in Bangladesh. ADIP provided micro-credit to the clients for improving their businesses such as crop production, poultry, livestock, fisheries and other agricultural businesses. They interviewed 330 borrowers randomly who were members of the ADIP project in Sripur Thana in the Gazipur districts, Bangladesh.

Mahmud *et al*. (2007) discovered that the ADIP's micro-credit programme had a positive impact on the borrowers' well-being. After joining the ADIP's micro-credit programme, borrower's average income, annual expenditure on clothing, healthcare and other expenditures such as social festivals, irrigation, transportation and fuel, increased significantly by 18 per cent, 15 per cent, 24 per cent and 18 per cent respectively. Results of the Logit model indicated that the borrowers' amelioration was more likely to be associated with education, amount of training received, mobility, and size of households. They revealed that about 44 per cent borrowers of the ADIP projects hold over 0.5 acres of land, which may overestimate the impact of the micro-credit programme. Also 42.42 per cent of the ADIP's borrowers were employed as wage-earners, although this project was strictly designed for financing businesses or agri-businesses. Hence, the outcome of this study may be biased due to the selection problem. It failed to address the issue of village level effects and did not include a control group either.

Chemin (2008) also used the panel data set collected by Khandker. Unlike Pitt and Khandker (1998), Chemin (2008) employed propensity score matching (PSM) to estimate the impact of micro-credit programmes in Bangladesh. Chemin (2008) found that per capita expenditure is 3% more for a treated individual than a comparable individual in the control group. Therefore micro-credit increases household consumption. Chemin also showed that there is a positive effect of micro-credit on girls' school enrolment. Male borrowers tend to have bigger amounts of loans than women which results in male borrowers increasing the supply of labour in the labour market. It seems that the propensity score matching technique can overcome some problems, such as selection bias by matching treatment and control group borrowers based on the observable socio-economic characteristics related to the impact evaluation of micro-credit on poverty reduction. Hence the outcome of this study might be biased due to self-selection bias.

Mahjabeen (2008) used a computable general equilibrium (CGE) model to evaluate the impact of financial interventions such as micro-credit on the poor people's livelihoods. She found that MFIs are the helping poor people by raising their borrowers' income and household consumption in Bangladesh. She also claimed that micro-credit institutions and NGOs are playing an important role in the reduction of income inequality and enhancing social welfare in Bangladesh. However, in the sample, consumption includes agricultural expenses which may overestimate the borrower's consumption. This study does not provide answers that are related to the programme placement and self-selection bias.

Nawaz (2010) found that the majority of the borrowers (75 per cent) reported an increase in income for the borrowers, who were involved in micro-credit programme for three to five years, in Bangladesh. The most striking results found that 93.5 per cent of borrowers, who were members of micro-credit programme for over five years, had increased their income. Therefore, there is a positive relationship between the length of programme participation and income. He also discovered that there is a greater impact of micro-credit on borrower's socio-economic well-being such as food, clothing, health, drinking water, sanitation, social status, dowry, and children's education than non-borrowers. This study suggests that MFIs should provide skill enhancement training, education and health along with a micro-credit programme. However, the findings of this study may be biased due to the following reasons. First, about a quarter of the respondents who are not eligible for micro-credit are included. Second, there might be endogeneity problem because he surveyed villages where micro-credit programmes worked for at least five years and made a comparison of non-borrowers. Third, the sample size was fairly small (n= 176) to make statistical inference about the impact of micro-credit. Finally, this study failed to focus on problems such as non-random programme placement and self-selection bias.

Rahman (2010) used Engel Curve suggested by Leser (1976) to discern the consumption behaviour of micro-credit borrowers in Bangladesh. Food items include cereals, meat, fish, temptation goods such as cigarettes, milk, eggs and vegetables, and non-food items include education, health, clothing, electricity and fuel. She conducted a survey among 387 borrowers of both BRAC and Grameen Bank, and 184 non-borrowers in three districts in Bangladesh.

Rahman (2010) revealed that micro-credit borrowers are spending more on nutritious foods and education than the non-borrowers. On the other hand, non-borrowers spend more on temptation goods such as cigarettes, betel-leaves and nuts than borrowers. However, she did not find any impact of micro-credit programmes on non-food items. There was an increase in expenditure on education and health for both the borrowers and non-borrowers, while there was a decrease in expenditure on clothing. She explained that expenditure on non-food items actually depends on the size of the family as well as the number of earners in the family. She controlled for endogeneity problem through collecting data from the non-programme villages. However, although it is found that borrowers are better off than non-borrowers, this study made an ambiguous conclusion about the impact of the micro-credit programme. For example, she argued that the borrowers' improvements might have occurred because they may be from a well-off segment of the population.

Afrin, Islam and Ahmed (2010) attempted to find out the impact of micro-credit loans, provided by two large micro-credit organisations in Bangladesh: one is ASA, Bangladesh and other one is BRDB (Bangladesh Rural Development Board), for rural women's entrepreneurships. They have found that micro-credit programmes of the ASA, Bangladesh and BRDB had a significant and positive impact on the borrowers' financial management skills, as well as the development of entrepreneurship skills of the rural women in Bangladesh. It appears that the study reported on the management skills of small enterprises rather than the impact of micro-credit on the profit or volume of the businesses. This study did not control for the village level characteristics such as

local markets, schools, roads and transportation in terms of measuring the impact of micro-credit on rural female entrepreneurships.

Hossain (2012) aimed to assess the impact of the micro-credit programme of BRAC, Bangladesh and interviewed 208 borrowers who were received a loan and were involved in the micro-credit programme of BRAC for at least three years. Hossain (2012) found that both the borrowers' incomes and expenditures have increased significantly after joining the micro-credit. With the micro-credit loan, borrowers tend to engage in self-employment activities which generate higher income. However, this study did not compare borrowers' rise in income and consumption with the non-borrowers i.e. no control group was included. Therefore, it is difficult to claim that the borrowers' income and expenditure have been increased unless there is an appropriate control group was considered.

Shahriar (2012) revealed the impact of micro-credit in the Northern part of Bangladesh, where most people suffered from a seasonal famine called *Monga*, an annual occurrence, from September-October. He found that micro-credit plays an important role in terms of reducing the food poverty during the seasonal famine. Micro-credit also reduces the vulnerability of borrowers by smoothing income and consumptions in the famine stricken areas of Bangladesh. It is also confirmed that relatively poorer households in micro-credit participants benefit more in terms of coping with the famine. However, short-term micro-credit participants are less likely to suffer from the fluctuations in daily income and food consumption than long-term participants (Shahriar, 2012). It appears that the study controlled for the selection bias problem through the propensity score matching method but could not deal with the

effect of self-selection bias on poverty reduction, despite the fact that the study was conducted in one of the poorest regions in Bangladesh.

A study by Alam (2012) examined the impact of the micro-credit programme in Bangladesh and used the World Bank Survey data from 1991-92 with a follow-up survey in 1998-99. He confirmed that the households spend more on food, education, medicine and clothing when there is an increase of return to borrowing from a micro-credit bank rather than conventional institutions such as Banks, and local money lenders. Female borrowers have larger positive impacts on health, child education, nutrition and food compared to male borrowers. Group-based micro-credit programmes help to build up a relationship among the women borrowers in the same village. Therefore, they can share information and exchange knowledge about how to invest in income generating activities to become self-reliant, to generate higher self-esteem, and contribute to their family. Alam assumes that the women borrowers own their businesses which might not be true for most of the cases, since it appears that most of the women are dummy users of micro-credit. He also assumes that the income from businesses is attributed to a woman if she is a borrower, which may not be true unless she is the head of the household or widowed or divorced.

Rahman and Khan (2013) interviewed 397 borrowers of ASA, Bangladesh to examine the effectiveness of the micro-credit programme on poverty reduction there. The results of the multivariate logistic model suggested that the likelihood of a borrower's improvement is associated with the number of variables such as length of the membership, size of the loans and training provided by the microfinance institutions. However, they also found that almost 43 per cent of the ASA borrowers

overlapped and received credit from multiple sources and consequently, the likelihood of a borrower's improvement was negative. However, Rahman and Khan (2013) used their discretion upon establishing a binary dependent variable, for example borrowers' improvement was considered a 90 per cent score of Likert-scale questions which are related to the borrower's betterment, otherwise not improved. It is also appeared that they did not control for regional fixed-effects and self-selection bias.

Khandker and Samad (2013) examined the long-term effects of a micro-credit programme on household income and expenditure and poverty reduction in Bangladesh. They used three data sets such as the World Bank and Bangladesh Institutions of Development Studies Survey 1991/92, a follow-up survey in 1998/99, and a recent follow-up survey by both World Bank and the Institute of Microfinance in 2011. Their results indicate that the micro-credit participants have higher income and expenditure and consequently, many poor people managed to get out of poverty in Bangladesh. This study further confirmed that the micro-credit borrowers, who had been involved continuously over 20 years, were significantly more successful than borrowers who dropped out. This study concluded that due to the intervention of micro-credit, extreme poverty was reduced by almost nine per cent of the total poverty reduction in the last 12 years in Bangladesh. It appears that they considered three waves of survey over 20 years which may cause bias in the outcomes of the study. For example, many households might have increased their income through various ways such as foreign remittance, or an increase in the number of earners within the household over this long period of time. This study looked at the impact of micro-credit

through one side of the mirror. It ignores the households' income contribution that may be made by family members to help in getting out of poverty.

Pitt and Khandker (1998) claimed that children's school enrolment was increased for those who were micro-credit borrowers in the early and mid-90s. If this was true, then this study ignored the contribution that may have been made by those children within the families who became educated and involved in income and then contributed to their families. This study concluded that the micro-credit programme has a positive impact on poverty reduction without controlling for the government or United Nations interventions such as *Vulnerable Group Development* (VGD) programmes or free meals for children in terms of reducing poverty as well as increasing children's school enrolment.

Mazumder and Lu (2015) analysed the impact of micro-credit programme on poverty reduction in Bangladesh. They collected data from a government operated (GO) micro-credit institution which is called BRDB (Bangladesh Rural Development Board) and also collected data from a non-government (NGO) micro-credit institution called AID-Comilla in Bangladesh. They interviewed 500 households comprises 300 micro-credit beneficiaries and 200 control respondents between 2010 and 2012. Of the total respondents, 140 treatment respondents and 115 control respondents from the BRDB and 160 treatment and 85 control respondents from the AID-Comilla. They found that the micro-credit programmes have a significant impact on the borrowers' and their family members' calorie intake. After comparing the GO with the NGO providers, they found that the NGO micro-credit provider has a higher impact on calorie intake than GO micro-credit provider. With regards to the food security, there is

a significant positive impact of micro-credit on the borrowers' food stock. A comparison between the GO and NGO reveals that the GO micro-credit borrowers had slightly higher food stock than NGO borrowers. They also claimed that the micro-credit borrowers spent more on clothing than the non-borrowers. The majority of the micro-credit borrowers have remarkably improved the quality of their house.

3.4 Impact Assessment Studies in the Various Countries of the World:

This section critically discusses the empirical studies carried out in the various countries in Asia, Africa, Americas and central European countries. A study was carried out by Coleman (1999) to examine the impact of village banks micro-credit programmes on various aspects of households, for example households' expenditure, sales and businesses in Thailand. To do this, Coleman conducted a survey among the potential borrowers in 14 villages, and then one year later loans were given to the eight villages and six villages which did not receive bank supports. He found that the micro-credit programmes of Village Banks had a significant, negative impact on a number of variables such as households' physical assets, savings, production, sales, healthcare and education.

Coleman (1999) also estimated the impact of micro-credit by using four different types of econometric models such as fixed effects models, non-fixed effects models, naïve models and super-naïve models. He concluded that the naïve model overestimated the impact of micro-credit. He has controlled for village level fixed effects, endogenous programme placement, and self-selection bias.

In a later study, Coleman (2006) attempted to tackle the self-selection bias by selecting some households to be members of the village banks from a particular village, while other selected households from that particular village were not given memberships. However, he expressed a concern that some observable characteristics, for example age, education, and wealth endowments can be measured, while unobservable characteristics such as entrepreneurship skills, attitudes regarding the roles of women in households and risk preferences cannot be measured. He has broken down the total sample into committee members and rank, and file members. It is concluded that members who are nominated for president, vice-president and treasurer are wealthier than the rank and file members.

Coleman (2006) found the micro-credit programme had a negative impact on men's agricultural expenses, business and sales, and labour time for rank and file members and these results are statistically significant. However, he also estimated the impact of micro-credit programmes on the committee members, such as the president, vice-president and treasurer, physical assets, healthcare and education, and found a positive impact. It appears that after controlling for selection bias, Coleman's (2006) study reported that micro-credit does not work for relatively poorer borrowers.

Mosley (2001) discovered that microfinance had a positive effect on changing the income of the borrowers, and thus reducing poverty in Bolivia. He found that low income borrowers are not willing to hire workers in order to maintain their businesses. He argued that microfinance affects not only the income of borrowers, but also the economic activities. Micro-credit borrowers have better knowledge on managing a business, higher levels of savings, and a diversified assets portfolio.

Mosley (2001) further examined whether micro-credit schemes impose any vulnerability onto its clients. It was revealed that there is no evidence that micro-credit forced borrowers into poverty, but anecdotal evidence suggested that there is a small fear that some of the poorer borrowers may fall into extreme poverty. He argued that micro-credit programmes do not help borrowers who are extremely poor. He stated that the main goal of the MFIs is to achieve financial sustainability in Bolivia. This study provided fair results for the following reasons. First, it controlled for selection bias and control group borrowers were the members of micro-credit institutions, but those who had not yet received any credit, and having the same geographical and occupational background. Second, he estimated the impact of micro-credit and its impact of asset on poverty reduction, separately, for all borrowers and poor borrowers. Finally, the empirical findings are backed up by the focus group discussion and key informant interviews (micro-credit staffs, selected clients and dropped out borrowers).

Copestake, Bhalotra and Johnson (2001) explained that the first time or initial borrowing has no significant effect on households' income or growth of the businesses. However, positive effect of micro-credit on the growth of borrowers' businesses or household income strictly comes from the second loan. They also reported that personal income of 37 per cent of borrowers, and 28 pipeline borrowers, had fallen. Therefore, some borrowers were actually worse off due to taking out of loans from Peri-Urban Lusaka Small Enterprise Project (PULSE), in Zambia. This is happened because of the strict repayment schedules and inconsistent incomes which arose from ill-health, theft, and job losses.

Afrane (2002) also investigated the impact of micro-credit programmes in Ghana and South Africa by using a flexible research method that includes quantitative, qualitative and participatory methods. Here the quantitative methods deal with economic indicators, for example business turnover, and employment whereas the qualitative and participatory methods deal with examining social indicators and spiritual issues. Afrane (2002) found that micro-credit participants had a positive impact on economic indicators. These include business turnover, income and expenditures, as well as social facilities such as housing, health, children's education, food and nutrition.

Montgomery (2005) assessed the impact of the micro-credit programme on a number of households' variables such as consumption, health and education in Pakistan. He surveyed 1,454 Khushali Bank clients and 1,427 non-borrowers from the same villages. He further categorised the sample, such as 70 per cent of respondents were poor and living just below $1 per day, while 20 per cent were the core poor who were living on less than $0.50 per day.

He showed that micro-credit programme participation had no impact on borrowers' consumption. However, he found that people who were involved in micro-credit were more likely to receive better medical treatment than the non-borrowers. He further showed that micro-credit borrowers tend to be involved in starting-up small businesses, but there is no evidence that micro-credit helps borrower to raise sales and profits of their businesses.

Montgomery (2005) further examined the impact of micro-credit programmes on the welfare of poorer households in Pakistan. He found that there is no statistically

significant difference between the core poor borrowers and the control group in terms of the consumption status. However, there is evidence that micro-credit has a positive impact on children's educational expenditure and health benefits for the very poor borrowers. The total amount of expenditure on education is increased as the number of loan cycles increase. Poorer borrowers tend to engage in producing agricultural products such as rice, and wheat and statistically significant results on the sales of the agricultural products, especially for the poorer borrowers, were found. It seems that this study controlled for selection bias but did not control for the village level unobservable characteristics. The results of this study may be biased due to the comparison of the core poor borrowers and non-borrowers who might not have the same socio-economic characteristics.

In 2007, the Asian Development Bank (ADB) carried out a study in three countries, Bangladesh, the Philippines and Uzbekistan, where they aimed to investigate the impact of micro-credit programmes. They showed that the impact of micro-credit was positive on programme participants in the Philippines. For instance, micro-credit borrowers have larger per capita income, expenditures and savings than the control group. Incidences of hunger (2%) and of having insufficient food (11%) were the same for both the treatment and the control group. ADB (2007) also revealed that half of micro-credit borrowers in Uzbekistan have valuable assets like cars, while the majority of households have livestock, poultry and electricity; all respondents own a television and jewellery. In Uzbekistan, micro-credit borrowers have relatively more household assets than Bangladesh and the Philippines. In Uzbekistan, it appears that micro-credit

programmes target people who are well above the poverty line. Hence, micro-credit programmes suffer from selection bias of the borrowers in Uzbekistan.

Karlan and Validivia (2007) conducted a rigorous study on the impact of micro-credit in Peru with the assistance of a microfinance institution called Foundation for International Community Assistance (FINCA). They aimed to examine whether or not the borrowers of FINCA have enough innate skills or need training in how to run a business. Karlan and Validivia (2007) formed a treatment group where borrowers received weekly training along with the financial services provided by the FINCA and the control group which included existing borrowers involved in credit and savings only. Freedom from Hunger, a US-based, non-profit organisation, provided entrepreneurial training materials as well as training to the FINCA's credit officers. However, it was found that after receiving the business training, the treatment group borrowers gained better business knowledge such as keeping records of sales, profits, and marketing strategies, and most of the entrepreneurs managed to reduce the fluctuations in sales, and eventually increased business profits. They also revealed that the business training programme had a positive impact on the micro-credit institutions such as good repayment rates, a 3% higher repayment rate for treatment groups, and client retention. However, some clients left the training programme due to longer meetings. They suggested that voluntary participation in training may reduce the dropout rate of the clients. This study controlled for selection bias by both selecting and organising borrowers into a treatment group without considering how well the borrowers adhered to the training programme, as well as without considering how

actively the borrowers attended the programme. However, attrition rates were about 24% for both groups which may cause a biased result.

Tedeschi (2008) explored the impact of the micro-credit programme on micro-enterprises in Peru and confirmed that there is a significant and positive impact of micro-credit on weekly and monthly profits of micro-enterprises in Peru. After applying the branch fixed-effects, Tedeschi (2008) claimed that the programme placement bias does not appear to be a problem in order to estimate the impact of micro-credit. This study appears to put efforts to control for the self-selection bias by interviewing pipeline borrowers and the non-random programme placement bias by using branch fixed-effects.

Kondo, Orbeta, Dingcong and Infantado (2008) also investigated the effect of micro-credit programmes on household income and expenditure. To do this, they conducted a large scale survey among 2,200 households including borrowers and non-borrowers of micro-credit on three islands of the Philippines: Luzon, Visayas and Mindanao in 2006. They revealed that the impact of the micro-credit programme was positively and marginally significant on per capita income, per capita total expenditure and per capita food consumption. More precisely, the results of the difference-in-difference technique showed that there is a negative and insignificant impact of borrowings on poorer households, household assets and human capital investment such as education and health in the Philippines.

Morris and Barnes (2008) investigated the effect of micro-credit on micro-enterprises in Uganda and found that micro-credit programme clients are more likely to have added a new product or service in their businesses and increased the amount of

stock or reduced costs through buying large amounts of stock than non-clients over the study period between 1997 and 1999. They argued that about 48 per cent of the micro-credit programme clients owned a second business whereas only 25 per cent of non-clients owned a second business between 1997 and 1999. They also reported that the clients are likely to have more durable goods in their households, such as a mattresses, TV, Radios, stoves, and refrigerators than non-clients. The study raised a concern that most of the households (80 per cent) spent a significant portion of their income on medical treatment associated with HIV/AIDS and the deaths of household members.

Dzafic, Rovcanin and Grzinic, (2008) conducted a survey among the small and medium sized entrepreneurs in Bosnia-Herzegovina to discern the barriers to development of small businesses. They discovered that 66 per cent of small business owners think that a shortage of capital is the biggest problem in terms of developing their businesses, and that the state is providing a very low support in terms of aiding the development of those types of businesses, resulting in 70 per cent of entrepreneurs being badly affected. Moreover, there is no evidence of training programmes for start-up private businesses in Bosnia-Herzegovina. They also confirmed that micro-credit programmes are playing an important role and are considered to be one of the leading forces behind the transition process, as well as in the economic development of entrepreneurships in Bosnia-Herzegovina. Micro-credit institutions are providing training in order to develop the entrepreneurship skills and adaptation of new technologies in the market.

Hartarska and Nadolnyak (2008) focused on the impact of micro-credit on micro-enterprises in Bosnia and Herzegovina through a financing constraints approach.

The sample of this study includes not only MFI borrowers and non-borrowers, but also micro-entrepreneurs who were not eligible for an MFI loan based on the criteria set by the MFIs. They found that when comparing micro-enterprises that both are eligible for micro-loans, although the ones that actually receive the loan generated higher levels of income than the ones that did not. Moreover, with the presence of MFIs, micro-enterprises that receive micro-credit are having higher fixed assets and return on assets than the micro-enterprises that are not eligible for micro-credit. However, annual household income and expenditure of credit constrained areas were higher than the unconstrained areas.

Panda (2009) selected 150 samples randomly from three states, Orissa, Chhattisgarh and Jharkhand in India through a multi-stage sampling method for evaluating the impact of micro-credit. Panda (2009) confirmed that annual income of target households is 4.81 per cent higher than the control group, but the difference is statistically insignificant. Micro-credit borrowers had significantly higher annual savings, about 56 per cent, than the control group. Target group respondents had nearly 10.50 per cent higher total assets compared with the control group.

Panda (2009) suggested that it is useful to compare the pre-intervention versus post-intervention effect of micro-credit and at the same time, make a comparison between factual and counterfactual to address the problem of endogenous. With the absence of base-line information of borrowers, recall bias may also affect the outcome. Identical characteristics of households were considered in the control group and target group, apart from the micro-credit programme involvement to reduce self-selection bias (Panda, 2009).

Imai, Arun, and Annim (2010) analysed household data to investigate poverty reduction through financial interventions such as microfinance in India. They measured poverty by using an Indexed Based Ranking (IBR) Indicator in which they captured various aspects of poverty, for instance households' assets, income sources, sanitations, livestock and housing. They confirmed that having access to MFIs resulted in a significant decrease in poverty in India, a finding which is cross-checked by the results of the Propensity Score Matching technique. It was also claimed that a larger amount of loans actually accelerate the well-being of micro-credit borrowers, therefore, reducing poverty. They stated that poverty reduction is one of the major challenges in India, despite the fact that poverty reduced to 28 per cent in 2005 from 36 per cent in 1994. They controlled for selection bias by applying a treatment effects model which is a version of the Heckman sample selection model (Heckman, 1979).

Banerjee, Duflo, Glennerster and Kinnan (2010) carried out an extensive research study examining the impact of the micro-credit programmes of Spandana, India. Spandana selected 104 localities in Hyderabad, India to start their micro-credit programme. Initially, micro-credit programmes were initiated in 52 areas and these areas were considered as treatment areas and the remaining 52 areas were considered as control areas since there was no micro-credit programme. The authors first conducted a survey in 2006, among potential households and then a follow-up survey in 2007-08 including treatment and control areas.

They confirmed that MFI loans contributed to the opening of new businesses in the treatment areas. One in five of additional MFI loans in treatment areas are associated with the opening of new businesses. The survey also reported that the

average profits of businesses in treatment areas were higher than those of control areas and this result was statistically significant. It was claimed by the authors that the owners of businesses in the treatment areas did not hire or employ new people. Furthermore, the average household's expenditure is slightly higher in treatment areas than control areas. Respondents from the treatment areas tend to spend less on temptation goods such as alcohol, tobacco, betel leaves, gambling, and food consumption outside the home.

Nudamatiya, Giroh and Shehu (2010) found that the majority of the clients were women, while over half of the clients were petty traders, and about 30 per cent of the borrowers were civil servant in Nigeria. They also showed a positive correlation between beneficiaries' income and micro-credit which is explained by the fact that the income of the beneficiaries increases due to the increase in credit. The regression analysis of their study determined that changes in income of the borrowers, 53 per cent, can be assigned to micro-credit. The t-test results showed a significant difference between the income of the borrowers before and after joining the micro-credit, and the result is also statistically significant. It appears that most of the borrowers have their own businesses, and about one-third have secure jobs. Hence the outcome of this study may be biased due to the sample selection.

In order to assess the impact of micro-credit in South Africa, Karlan and Zinman (2010) interviewed 787 applicants who applied for a loan in an organisation in Cape Town. Of these 787 applicants, 325 applicants were marginally accepted (based on credit scores) for loan and assigned to the treatment group, while the remaining 462

rejected applicants were assigned to a control group. For instance, scores of 31 or below are rejected, and scores from 31 to 45 are marginally accepted.

They found that food consumption had significantly increased in the treatment group compared to the control group. They also found a positive impact of borrowing on economic self-sufficiency such as employment status or earnings from employment. They suggested that expansion of the supply of credit actually helps poorer people to improve their economic well-being. More explicitly, the supply of credit is limited to a particular level of borrowers who have good credit history, or have sufficient income to afford weekly or monthly instalments.

In a later study, Karlan and Zinman (2011) examined the impact of a micro-credit programme in The Philippines. They administered a survey among 1,272 households who were marginally accepted in order to receive a loan from the First Macro Bank, as well as 329 households who were rejected to receive a loan from the same organisation because of having a bad credit history. No strong evidence that micro-credit helps to foster the growth of businesses in The Philippines was found. They also raised a concern that micro-credit decreases the subjective well-being of the borrowers (for instance, subjective well-being was measured in increasing life satisfaction, self-esteem and optimism and decreasing levels of stress) as well as increases stress on male borrowers. However, their study revealed that micro-credit programmes play an important role to overcome market failure. For instance, expansion of micro-credit programmes has significantly increased borrowings from financial institutions. Furthermore, it is argued that the First Macro Bank borrowers have

improved their capacity to manage risks by using credit or precautionary savings instead of insurance (Karlan and Zinman, 2011).

The above two studies selected respondents who approached a micro-credit institution for a loan only. It appears that micro-credit was approved and delivered based on the certain limits of the credit score. This study might be biased due to both the non-random programme placement and sample selection problems. Hence, this study may be incomparable with the micro-credit programmes in Bangladesh, since micro-credit institutions depend on peer screening and group-liability.

Kaboski and Towsand (2011) identified several groups of households that may or may not be able to increase their consumption. First, poorest borrowers (hand-to-mouth) are consumption constrained because they either have low liquidity (income and savings) or are using current liquidity (pre-programme) to finance lumpy investments. Since these households are liquidity constrained, they may use their available credit to finance current consumption. Second, since the increase in available credit in the future decreases the desired buffer-stock savings, the households that are not liquidity constrained may increase their consumption even without borrowing. Third, with access to credit, some households tend to invest in high-yield projects. Thus some of these households may be decreased their consumption, as they supplement credit with reduced consumption in order to finance sizable indivisible projects. Finally, some households may be used available credit to repay their existing loan, therefore they might have little effect on investment or consumption.

Kaboski and Towsand (2011) revealed that Million Baht Village Fund Programme does have a discernible impact on consumption rather than investment.

This is because the funds or available credit may go to prevent households being default and the defaulted households may be trapped with the increased borrowing limit. Since the households did not need to show any specific reason for borrowing under the rules of the programme, they suggested that in order to tackle the households being defaulted, policy makers may allow borrowing only for investment. Since money is fungible, so villagers can see some increase in investment but it casts doubt whether these investments would have been undertaken even without the loans. They expressed a concern that the loans are simply consumption loans. They concluded that since micro-credit programme saddle the households with the interest payment, thus it seems less cost effective than a simple transfer programme.

Berhane and Gardebroek (2011) showed that the DECSI's (Debit-Credit Savings Institution) microcredit programme in Ethiopia had a significant and positive impact on the borrowers' consumption. Consumption increases as the length of membership increases with the DECSI. For example, this study found that consumption was about 16 per cent higher for the participants who were involved in the programme at least for two years. Similarly, the consumption effect was also significant for the participants who were involved in the programme for more than three years in Ethiopia.

A recent study conducted by Al-Mamun *et al.* (2012) has used a Household Economic Portfolio (HHEP) Model in order to investigate the impact of *Amanah Ikhtiar Malaysia* (AIM)'s micro-credit programme in Malaysia. This HHEP Model considered borrowers consumptions, production and investment activities conducted over a specified period of time. They interviewed both the Old Clients (161) and New Clients (172), who were involved in AIM's micro-credit programme in Malaysia.

They reported that the average monthly income has increased for both the new and old borrowers after being involved in AIM's micro-credit programme. However, income growth was significantly higher for the old borrowers compared with the new. They discovered that AIM's micro-credit programme lifted 62.1 per cent of AIM's old borrowers out of poverty who were actively involved in the programme for more than four years; 11 per cent of AIM's new borrowers managed to get out of poverty in two years. Further investigation was carried out on certain clients who had failed to escape poverty and it was found that their monthly income was decreasing due to the illness of the clients or a household member, poor sales in their businesses, and poor agricultural seasons, thus they failed to escape poverty. AIM provides education and training to its borrowers for developing entrepreneurship skills. However, Malaysia is a high income country, therefore, borrowers may experience high returns on their investment and the standard of living must be higher. Hence, the result of this study is difficult to compare with the low- income countries such as Bangladesh.

Adebayo, Sanni and Baiyegunhi (2012) explored the fact that 39 per cent of the UNDP micro-credit borrowers in Nigeria were experiencing food insecurity, compared with 37 per cent of the non-participants. Results of the Propensity Score revealed that the UNDP micro-credit programme had no impact on the status of beneficiaries' food security and these findings were confirmed by the negative (-60.68) average treatment effect on the participants.

Augsburg e*t al.* (2012) focused on the borrowers from the microfinance institutions who had been rejected by the formal banks in Bosnia. They found that a significant number of borrowers started small-scale businesses and expanded their

businesses after being given access to credit. Both the marginal and less educated households of micro-credit participants significantly reduced their food consumption during the financial crisis between 2008 and 2009, and in comparison with the control group, reduced their spending on temptation goods for example, cigarettes and alcohol. However, it was also found that the labour supply had increased for the age cohort 16-19, while school attendance decreased.

De Silva (2012) estimated the impact of a micro-credit programme in Sri Lanka by splitting the borrowers into several income groups, showing that the per capita income of all estimated quintiles increased after being involved in the micro-credit programmes. However, the effect of per capita income on households varies depending on the income of that particular household such as poorer households or households from lower income groups which receive fewer benefits than the rich households or households from higher income quintiles.

Duvendack and Palmer-Jones (2012) replicated the impact study of micro-credit programmes in Bangladesh which was conducted by Chemin (2008). Duvendack and Palmer-Jones (2012) found that the impact of micro-credit programmes on the variation of log per capita expenditure and women's non-land assets is positive. In contrast with Chemin (2008), they claimed that there was no significant impact on male labour supply. Furthermore, they found a positive and significant impact on the female borrowing on their labour supply, for instance women tend to spend more time on income generating activities than household activities. Unlike Chemin (2008), Duvendack and Palmer-Jones (2012) confirmed that the impact of micro-credit programmes on both boys' and girls' school enrolment is positive and significant.

Therefore, in some cases, the authors did not agree with Chemin (2008), despite the fact that both studies analysed the same data set and employed the propensity score matching estimation method.

Imai *et al.* (2012) analysed cross-sectional data and a panel data over two periods: 2003 and 2007, received from Microfinance Information Exchange (MIX) in order to estimate the role of microfinance on poverty reduction at the macro level, for instance, Gross Domestic Product. They found that there is a decrease in poverty by approximately 0.33 percent due to an increase in micro-credit loans per capita by 10 per cent. Based on these findings, they suggested that the investors, who intend to make a contribution towards poverty reduction, may invest financial resources in those countries where the rates of poverty are high.

Biosca, Lenton, and Mosely (2014) evaluated the impact of "credit-plus", in which non-financial services such as health and business training were provided to those borrowers who completed at least three loan cycles successfully, on poverty reduction in Chiapas, Mexico. To do this, they conducted a cross-sectional survey of 434 clients of two Mexican MFIs, AlSol and CONSERVA, in 2009. Of the total respondents, 196 clients had an access to non-financial services and 104 clients had no access to non-financial services but shown no interest. Of the total respondents, 95 clients had shown interest but no access and 39 clients shown no interest and had no access. They evaluated the effectiveness of the credit-plus programme with reference to three poverty lines in Mexico, food poverty, capabilities and assets introduced by CONEVAL, the National Council for the Evaluation of Social Development Policy.

They applied logistic regression model for assessing the probability of households being below the poverty lines.

They found that "credit-plus" services have a significant negative effect on the likelihood of households living below all three poverty lines. However, this poverty reduction effect is only significant for the better-off borrowers. They found that the participation in business development services (BDS) is statistically significant in reducing the likelihood of households living below the asset poverty line. But this marginal effect disappears when they looked at within-group effects. However, they found that the likelihood of households living below both the food poverty line and capabilities poverty line are significantly reduced by the preventive health services (PHS) programme. They ruled out that intra-group social capital appears to be highly enhanced by trust within the groups. Also it does not seem to be a determinant factor for the impacts of such non-financial services on the participants especially for the poorest borrowers. Since they measured capabilities and asset poverty by using the households' income, the potential positive impact of three loans on the households' income could have taken away by the effect of non-financial services. It could be also argued that being included the eligible participants who did not take credit-plus services, they might have entrepreneurial skills and try not to waste their time in participating the BDS training. The literature also suggests that some borrowers do not want to take part in such training programme as they think that this is time wasting for them.

Koloma and Alia (2014) aimed at investigating the impact of micro-credit programme on poverty reduction in Mali. The primary data collected from 2,400

households (including borrowers and non-borrowers) by Malian Observatory of Sustainable Human Development in 2008. They applied Propensity Score Matching method in order to analyse the impact of micro-credit on poverty reduction. They found that the micro-credit borrowers have a significant positive impact on poverty reduction in Mali. They had a closer inspection on the effect of micro-credit by the borrowers' residence status i.e. rural and urban and the length of the membership of micro-credit programme. They found that the borrowers residing at the rural areas had a higher impact on poverty reduction than urban areas. Also found that, with regards to the length of the membership period, there is a diminishing marginal effect of the micro-credit programme on poverty reduction. In other words, the short-term borrowers had a higher impact on poverty reduction than the long-terms borrowers but the effect remains positive through the length of the membership period. The results of this study may be biased due to potential endogeneity problem which may arise from the length of membership in the micro-credit programme.

Attanasio *et al.* (2015) conducted a randomised control trial (RCT) with the help of XacBank, the second largest bank in Mongolia, to assess the impact of micro-credit. They delivered two types of credit among the rural women who are economically disadvantaged. One is group-credit with joint liability and another one is individual credit with collateral security. The size of the group loan is smaller than the individual loan and group loan maturity, 192 days on average, is shorter than the individual loans, 245 days on average. They conducted the follow-up survey 19 months after the baseline survey.

Attanasio *et al.* (2015) found that about 66 per cent of the group-borrowers and individual borrowers were invested about 70 to 80 per cent of the loan amount in order to buy livestock, tools and machineries for businesses and the rest of the loan amount was used for the households' consumption. In the case of the second loans, about half of the borrowers, both group and individual, used their loan in doing businesses. The experiment was started in 2008 and covered 40 villages across the five provinces in Northern Mongolia. They set two main criteria for selecting the potential borrowers and these are: the potential borrowers need to own assets less than $869 or receiving monthly profit must be less than $174 from the business if they have one. The baseline survey was carried out among 1,148 women and the attrition rate was about 16 per cent.

They investigated the impact of micro-credit on various household outcomes such as income, expenditure and self-employment. The findings of their study confirmed that the probability of being an entrepreneur is 8 per cent higher for the borrowers than non-borrowers. Consequently, the borrowers managed to increase ownership of their business assets such as tractor, lorry or unsold business stock. They found a strong evidence of micro-credit in order to increase in female-run businesses and therefore significantly more working hours in these businesses comparing with the control group. With regards to consumption, they found that the access to group credit increases food consumption especially spend more on milk, bread and non-alcoholic beverages. They found that the food consumption was about 14.2 per cent higher per household per month for the households in the treatment villages compared with the households in the control villages. They found evidence that the group-loans were

relatively effective in increasing the entrepreneurial activities and thus improving the households' well-being. However they did not find any evidence on increasing the households' income and children schooling.

Augsburg *et al.* (2015) carried out a randomised experiment in Bosnia and Herzegovina in order to measure the impacts of micro-credit on various households outcome such as self-employment and income, labour supply, consumption and savings, children schooling and perceived stress. They selected 1,196 marginalised loan applicants who were typically declined to be given a loan by the loan officers. Of the total applicants, 50 per cent of them assigned to the treatment group and 50 per cent of them assigned to the control group through the random number generator. Thus each applicant has a 50 per cent probability to either receiving a loan (treatment group) or no loan (control group). The follow-up survey was carried out after 14-months of the base line survey. The attrition rate was about 17 per cent. However, since the loan officers typically receive incentives for bringing good borrowers in Bosnia and Herzegovina, in this situation the loan officers were given same sort of incentive for bringing marginalised customers for reducing the risk of selection bias. Having investigated the baseline distribution of the explanatory variables such as household size and education for both groups, they showed that there are no statistically significant differences between the two groups except a little difference in the household size.

Augsburg *et al.* (2015) found that the households who received a loan are 6 percent more likely to receive income from the self-employment and also 6 per cent more likely to own a business. The ownership of inventory increases by 5 per cent as compared with the control group. They found a significant impact on increasing the

number of hours work in the business and the hours spent on other activities such as food cooking fell by 4.3 hours per week. Interestingly, the labour supply significantly increases for the age cohort 16-19 years and this is even larger for the children with low education. This might be true because those children probably dropped-out from the schools and got involved in the family business. Surprisingly they found negative impact on the households' consumption and savings. This could be the fact that because of the liquidity constrained and not having the desired level of loan, borrowers might have used their savings and also reduces their consumption in some points for running short of their business capital. They argued that the loans could encourage children schooling by mitigating liquidity constraint or it may be led to less schooling if the family prefers family labours to hiring external labour and the returns to schooling are not perceived as high. They found no impact of credit on the schooling of children below the age of 16, when schooling is compulsory. However, they found negative impact, 8.9 per cent declines, of schooling for the age cohort 16-19. Although the rate of repayment was so erratic, they did not find any significant impact of access to micro-credit on the borrowers' stress levels.

Banerjee *et al.* (2015) investigated the impact of micro-credit programme on various households' outcomes in India using a randomised control trial method in which they collected data in three waves. First wave was, baseline survey, collected in 2005 and then two follow-up surveys were carried out among the borrowers and non-borrowers in 2008 and 2010. The attrition rate was about 25.2 per cent in the control areas and 27.6 per cent the treatment areas.

Banerjee *et al.* (2015) found that the households in the treatment areas, 6.8 per cent, are more likely to open new business comparing with the control areas, 5.3 per cent. There is a significant (about 50 per cent) increase in business profits, 354 Rupees per month, for the treatment households compared with the control households. They pointed out that with this little increase in business profits, the micro-credit borrowers will not be able to change their life or living standard since the average consumption of these households is 6,500 Rupees per month. They also argued that the micro-credit programme is effective for the businesses which are already profitable. They found that the labour supply was increased by only 3.18 hours per week for the head of households and spouse. They did not find any evidence of increase in teenagers' labour supply which could be a potential downside impact of micro-credit. With regards to the households' consumption, they did not find any significant impact of micro-credit but the impact could be offset by the households in the control group in which many of them borrowed from another MFI. They find there is no increase in children's school enrolment over the period of the study. Finally they concluded that there is no discernible evidence of micro-credit on social outcomes such children schooling, health and women empowerment especially in the households' decision making.

Tarrozi, Desai and Johnson (2015) evaluated the impact of micro-credit programme in Ethiopia using randomised control trial (RCT) method. They carried out a survey in 353 villages from 133 Kebeles (Lower administrative units) in the North and West part of Ethiopia. Their study used the data that are collected from two independent cross-sectional surveys from the same villages in 2003 and 2006. The main focus of the RCT was on the fertility choices and contraception and its primary

goal was to determine whether the access to micro-credit increases in the use of contraceptive in rural Ethiopia. To do this, they interviewed four types of respondents and which includes: only micro-credit borrowers, only beneficiaries under family planning services, both micro-credit borrowers and family planning beneficiaries and neither micro-credit borrowers nor family planning beneficiaries (control group). They collected a sample size of 6,412, of which 3,216 were assigned to the treatment group in which they either received micro-credit or family planning services or both. And, the rest of the respondents (3,196) were assigned to the control group in which they did not receive any services.

Tarrozi, Desai and Johnson (2015) found that the treatment areas saw a significantly larger rise in both revenues and expenses for the self-employment activities compared with the control areas. With regards to labour supply, they showed that there is a little increase in the labour supply, 1.1 hours per week, in the treatment areas for which micro-credit was available. They concluded that access to micro-credit did not lead to significant changes in women's time spent in economic activities. They found positive impact on enrolment in school of children age 6-15 years which is statistically insignificant and no impact on the schooling of children age cohort 16-20 years. They claimed that access to credit did not lead to empower women in various aspects such as contraceptive use, savings decisions and labour force participation. One view is that they calculated business revenues and expenses for the reference year (year 2003) by using recalling method which may cause bias in the estimation.

Angelucci, Karlan and Zinman (2015) investigated the impact of micro-credit programme by using RCT with the help of Compartamos Banco, one of the biggest

MFIs in Mexico. They argued that the randomised programme placement design has both advantages and disadvantages over individual-level randomisation strategies (Karlan and Zinman, 2011 and Karlan and Zinman, 2010). For example, within-community spillover could be incorporated when measuring the treatment effect at the community level but it is difficult to capture with the individual-level randomisation. Theoretically, within the community level spillover could be either positive due to complementarities across businesses or negative due to zero-sum competition. They argued that the individual-level randomisation is less expensive and time consuming than community level randomisation.

Their randomisation settings have provided an access to the credit and the loan promotion to 238 geographic clusters in North-central Sonora, Mexico. They provided evidence on the impact of expanded access to micro-credit on various households' outcomes such as income, expenditure, labour supply and micro-entrepreneurship. Of the total geographic clusters, 120 treatment areas where Compartamos Banco introduces the micro-credit programme and 118 control areas where there is no micro-credit programme. This study interviewed 16,560 respondents, of which 14,737 borrowers and 1,823 non-borrowers between the period 2009 and 2012. They found there is an increase in business revenues and expenses at a similar rate between the periods of the study. They found a little evidence on the growth of businesses which comes from the growth in pre-existing businesses. However, there is no evidence of increase in business profits and the number of business ownerships. Also they did not find any significant impact of micro-credit on various sources of households' income such as business income, wage income and remittances. They found that there is 9 per

cent decrease in buying households' assets such as furniture, electronics and vehicles for the treatment group. They found there is no significant impact of credit on the households' expenditures such as food, medical, children schooling but the result shows 6 per cent reduction in temptation goods such as alcohol, cigarettes and sweets. Similar results found by Banerjee *et al.* (2009) which explained that the households' budget constraints required to reduce expenditure on such items to service the debt. With regards to the female empowerment, there is a little increase in financial decision making for the treatment group. Angelucci, Karlan and Zinman (2015) had a concern that the interest rate was about 110 per cent APR which may offset the business profits. However, there is evidence that returns to capital are about 200 per cent for micro-entrepreneurs in Mexico (McKenzie and Woodruff 2006, 2008).

Datta (2015) investigated the impact of JEEViKA, a large-scale livelihood programme in Bihar, India. They administered a survey to 10 households randomly in each village from 200 programme villages, where JEEViKA Self-Help Group works and 200 non-project villages. Thus the survey covers 4,000 households from 400 villages in Bihar, India. He applied propensity Score Matching method to analyse the data. His study found that access to micro-credit does not change the number of income earners in the treatment households. Given the context that, most of the households rely on the income of the head of household in South Asian countries such as India, Bangladesh and Nepal. The project, JEEViKA, mainly focuses on the marginalised farmers in Bihar in order to increase the agricultural activities such as wheat, rice and vegetable cultivation among the beneficiaries. There is no impact of the JEEViKA's credit on cultivation on own or lease land in Bihar, India. This could be explained by

the fact that the study areas in Bihar had experienced droughts in 2009 and 2010 which might have had a negative impact on the agriculture. However, there is a little impact of the JEEViKA's credit on shifting beneficiaries', only 0.5 per cent treatment households, livelihood option toward the animal husbandry.

Datta (2015) did not find any evidence on increasing in ownership of land asset but found significant effect on ownership of livestock such as cows, buffaloes. With regards to the quality of house, there is evidence that the condition of the houses in control areas is slightly improved than treatment areas. The duration of acute food shortage was reduced by only 0.09 months in the treatment households over the study period. The children school enrolment has been increased significantly in the treatment areas. About 95 per cent of the households from the treatment areas tend to save money as much as they can, as opposed to 24 per cent households from the control areas. After the intervention, the average amount of borrowing from the informal sources, such local money lender/loan sharks, have reduced significantly and is lower for the treatment households than the control. Given the context that loan sharks charges interested rate between 60 per cent and 120 per cent where as JEEViKA's borrowers pay only 2 per cent interest rate monthly. It has been concluded that the formal credit has freed up many households from the local money lenders and eventually reduced their high debt portfolio.

Ghalib, Malki, and Imai (2015) aimed at investigating the impact of micro-credit programme on various poverty indicators such household income, expenditure and the quality of the house in Pakistan. To do this, they interviewed 1,132 households comprises 463 borrowers and 669 non-borrowers from 11-districts in the rural areas of

Punjab province in Pakistan. They applied propensity score matching method and put in effort in order to control for the sample selection bias. They found that the borrowers have more transport assets and livestock than the non-borrowers but which turned out statistically insignificant. They showed that the borrowers are spending a significant percentage of their income on healthcare, clothing and children schooling than the non-borrowers. Their study also claimed that there is a significant effect of micro-credit on monthly income (income is Rs.1,300 greater) of the borrowers than the non-borrowers. Given that the borrowers invested their money in various income generating activities such setting up roadside restaurant, barber shop, buying donkey-cart and cows.

Khan and Wright (2015) aimed to evaluate the impact of micro-credit programme on various households' outcomes such as income and expenditures on food, medical treatment, clothing and education in Pakistan. Their study uses an innovative approach, quasi-experimental survey design, to control for the self-selection bias. For example, they interviewed four types of respondents which include current borrowers, pipeline borrowers, drop-outs and non-borrowers (never borrowed). The results of their study revealed that there is a very little impact of micro-credit on income and expenditure.

However, Khan and Wright (2015) did not find any evidence of micro-credit after controlling for the regional fixed-effects. They made a comment that the observed differences in households' income and expenditure are caused by the differences in the geographic areas. They argued that if someone lives in urban or relatively developed areas would have higher income than the people who live in rural areas and therefore, it does matter where someone lives. They further argued that the pipeline borrowers are

better-off than the current borrower, although the pipeline borrowers have not received a loan yet. Thus, the micro-credit institutions in Pakistan select relatively wealthy borrowers for the programme.

A summary of the above studies on the impact of micro-credit on household income, consumption and entrepreneurship presents in the following table.

Table 3.1: Studies on the impact of micro-credit on household and business outcomes:

Study	Country	Methodology	Results
Pitt and Khandker (1998)	Bangladesh	Instrumental Variable	Positive impact on the borrowers' consumption.
Khandker (2005)	Bangladesh	Instrumental variable, Village-Fixed-Effect Method	Positive impact of micro-credit on poverty reduction
Murdoch (1998)	Bangladesh	Double Difference	No impact of micro-credit on the borrower's consumption and children's school enrolment.
Zaman (2000)	Bangladesh	Borrowers and eligible non-borrowers	Positive impact on household's consumption.
Chowdhury, Ghosh and Wright (2005)	Bangladesh	New borrowers as control group	Positive impact on both the subjective and objective poverty reduction.
Mahmud *et. al.* (2007)	Bangladesh	Logit Model	Positive results on the borrower's income and household's expenditure.
Zapalska, Brozik and Rudd (2007)	Bangladesh	Growth Model	Positive results on the growth of the small enterprises.
Mahmud *et. al.* (2007)	Bangladesh	Before and After comparison	Positive impact on borrowers' income and consumption.
Chemin (2008)	Bangladesh	Propensity Score Matching	Positive impact on household consumption.
Mahjabeen (2008)	Bangladesh	Social Accounting Matrix	Positive results on the borrower's income and household's consumption
Nawaz (2010)	Bangladesh	Borrowers and Non-borrowers	Positive results on increasing borrower's income and socio-economic well-being such as health, drinking water, sanitation and children's education.
Rahman (2010)	Bangladesh	Engel Curve	Positive results on borrower's consumption behaviour, education and health.
Afrin, Islam and Ahmed (2010)	Bangladesh	Multivariate regression model	Positive results on the female borrower's financial and entrepreneurship skill.
Hossain (2012)	Bangladesh	before and after comparison	Borrower's income and expenditure have been increased after joining in micro-credit.
Shahriar (2012)	Bangladesh	Propensity Score Matching	Positive results on reduction of food poverty during the seasonal famine.
Duvendack and Palmer-Jones (2012)	Bangladesh	Propensity Score Matching	Negative impact on male labour supply.

Alam (2012)	Bangladesh	Panel Data	Positive impact on health, education and food.
Rahman and Khan (2013)	Bangladesh	Logit Model	Positive impact on borrower well-being.
Khandker and Samad (2013)	Bangladesh	Panel Data	Positive results on poverty reduction.
Mazumder and Lu (2015)	Bangladesh	Panel Data	Positive impact of micro-credit on consumption.
Study	**Country**	**Methodology**	**Results**
Coleman (1999)	Thailand	Pipeline borrowers and Treatment borrowers	Negative impact on a number of variables such as savings, production, sales, healthcare and education.
Coleman (2006)	Thailand	Pipeline borrowers and Treatment borrowers	Negative impact on men's agricultural expenses and business. However, impact was positive for the ranked borrowers.
Mosley (2001)	Bolivia	Mixed Methods	Positive impact on income and economic activities.
Afrane (2002)	South Africa and Ghana	Mix methods	Positive impact on the economic indicators such as business turnover, income and expenditure.
Montgomery (2005)	Pakistan	Pipeline borrowers as Control group	No impact of micro-credit on sales and profits of borrowers businesses.
Asian Development Bank (2007)	Various Countries	Mix Methods	Positive results on the borrower's income and expenditure and savings.
Karlan and Validivia (2007)	Peru	Randomised Experiment	Positive results of micro-credit and training programmes on increasing profits of the small businesses.
Tedeschi (2008)	Peru	Panel Data	Positive impact on business profit.
Study	Country	Methodology	Results
Kondo *et. al.* (2008)	Philippines	New clients as control group	Micro-credit had a negative impact on the relatively poorer borrowers.
Morris and Barnes (2008)	Uganda	Randomised Experiment	Positive impact on increasing the volume of the businesses.
Hartarska and nadolnyak (2008)	Bosnia-Herzegovina	Borrowers, Non-borrowers, non-eligible entrepreneurs	Positive results on increasing income of the small-businesses.
Panda (2009)	India	Treatment and Control Group	Positive and statistically significant impact on the borrower's income.

Imai, Arun and Annim (2010)	India	Tobit Model	Positive results on poverty reduction.
Banerjee *et. al.* (2010)	India	Randomised Experiment	Businesses profits were greater and statistically significant for the treatment areas.
Nudamatiya, Giroh and Shehu (2010)	Nigeria	Regression analysis	Positive impact on income of the borrowers.
Karlan and Zinman (2010)	South Africa	Randomised Experiment	Positive and significant impact on borrower's food consumptions and economic well-being
Karlan and Zinman (2011)	Philippines	Randomised Experiment	No strong evidence found on fostering the growth of the business. Also found micro-credit increases stress for the male borrowers.
Berhane and Gardebroek (2011)	Ethiopia	Fixed-Effects and Random Trend Model	Positive and significant impact on borrower consumption.
Copestake, Bhalotra and Johnson (2011)	Zambia	Treatment group and pipeline borrowers	Positive effects of second loan on the growth of borrowers' businesses and, however, initial borrowings had no significant effects on income or growth of the businesses.
Kaboski and Towsand (2011)	Thailand	Cost-benefit analysis	Positive impact on consumption.
Al-Mamun *et. al.* (2012)	Malaysia	New borrowers and Old borrowers	A large number of old borrowers e.g. four years or more, lifted out of poverty.
Adebayo, Sanni and Baiyegunhi (2012)	Nigeria	Propensity Score Matching	No impact on beneficiaries' food security.
Study	Country	Methodology	Results
Augsburg *et. al.* (2012)	Bosnia	Randomised Experiment	Micro-credit had increased the number of start-up businesses.
De Silva (2012)	Sri Lanka	Propensity Score Matching	Positive effect on household income. However, lower income group households are benefitted less.
Imai *et. al.* (2012)	48 countries	Cross-sectional Data and panel data	Positive result on poverty reduction.
Biosca, Lenton, and Mosely (2014)	Mexico	Cross-section data, Logit model	Positive impact of credit and non-financial services such as training on business development on income.
Koloma and Alia (2014)	Mali	Propensity Score Matching Method	Positive impact of micro-credit on poverty reduction.
Attanasio *et.al* (2015)	Mongolia	Randomised Control Trial	Positive impact of micro-credit on households' income, consumption and business ownership.
Augsburg et al. (2015)	Bosnia and	Randomised Control Trial	Negative impact of micro-credit on consumptions and savings.

	Herzegovina		
Banerjee *et al.* (2015)	India	Randomised Control Trial	Positive impact of micro-credit on business profits and labour supply but no impact on consumption.
Tarrozi, Desai and Johnson (2015)	Ethiopia	Randomised Control Trial	Positive impact on rise in business revenues and expenses; increases self-employment activities, children schooling and labour supply.
Angelucci, Karlan and Zinman (2015)	Mexico	Randomised Control Trial	No impact of micro-credit on business profits and households' income.
Datta (2015)	India	Randomised Control Trial	A very little impact of micro-credit on livestock and increasing in quality of living standards.
Ghalib, Malki, and Imai (2015)	Pakistan	Propensity Score Matching Method	Positive impact of micro-credit on households' income and expenditure.
Khan and Wright (2015)	Pakistan	Quasi-Experimental design	No impact of micro-credit on income and expenditure

3.5 Studies on the Poverty Status of Micro-credit Borrowers: The Role of Selection bias

Some studies argued that micro-credit programmes help to increase borrowers' income and expenditure for people who are "not so poor", or well above the poverty line. Hence it is worth looking at the literature on the borrower's selection bias and the reasons for exclusion of the poor people while estimating the impact of micro-credit programmes on poverty reduction. Woller (2002) also identified several reasons for ascertaining the poverty level of micro-credit borrowers. First, MFIs seek to reduce poverty by providing financial services to the poor. Most MFIs do not have information on the poverty level of borrowers, so it is difficult to measure the impact of micro-credit programmes on poverty reduction. Second, the impact of micro-credit programmes varies based on the poverty level and since poverty is measured by income and initial endowment which is in turn measured by assets then it is evident that key household characteristics do have an influence on the impacts. Lastly, many MFIs seek donor or international agencies or other public funding to expand micro-credit programmes based on the assumption that their programmes reduce poverty. Therefore, it is very important to investigate the poverty levels of the micro-credit borrowers in terms of assessing the impact of a micro-credit programme. This section investigates the studies focused on the poverty status of micro-credit borrowers.

Hulme (1999) studied 13 MFIs in East Africa especially Kenya, Uganda and Tanzania. It was found that East African MFIs do not lend to the very poor. However, they also showed that East African MFIs work with the poor and non-poor. They also revealed that 5 out of 13 MFIs work with wealthy people along with the poor people.

Nevertheless, their study suggests that the majority of borrowers are non-poor in East Africa meaning that the clients come from the households who can easily meet their daily needs, such as having access to education and health services and possessing some accumulated assets. Likewise, Amin *et. al.* (1999) raised a concern that MFIs have failed to reach the poorest households rather they reached people who live just below the poverty line in Bangladesh. Similarly, Montgomery (2005) found that 70 per cent of micro-credit borrowers in Pakistan live in and around the poverty line on an income just below $1 a day.

Hulme (1999) also found several reasons for the poor being excluded by the East African MFIs. First, MFIs in East Africa do not target the majority of the poor, particularly the poorest who are unemployed, elderly, orphaned, small farmers, refugees and labourers. Second, the MFIs perception towards the poor borrowers is that they are more undesirable type of client. Third, poor people are also reluctant to join the micro-credit programme because of the fear of defaulting, and of group liability. Finally, micro-credit programmes in East Africa require high transaction costs and product is not designed for the poor clients.

Navajas *et. al.* (2000) defined the micro-credit programme outreach in six aspects such as depth, worth to users, costs to users, breadth, length and scope. Navajas *et. al.* (2000) studied three Bolivian MFIs and found that Banco Sol reached the poor people in proportion to their market share but Banco FIE (*Formento Iniciativas Economicas*) and Caja Los Andes reached the non-poor people in Bolivia. They revealed that MFIs in Bolivia failed to reach the poorest of the poor. However, Bolivian MFIs reached “the richest of the poor” as well as “the poorest of the rich”.

Cohen and Sebasted (2000) found that approximately 40 per cent of the BRAC's borrowers are extremely poor in Bangladesh, whereas only a few borrowers are extremely poor in both Uganda and the Philippines. There are no extremely poor borrowers in Bolivia. They criticised the fact that micro-credit programmes in many countries such as Bangladesh, Bolivia, Uganda and the Philippines require a regular household income to become micro-credit borrowers which therefore excludes extremely poor households from the programme. In Uganda, the wealthy and non-poor are told not to join the micro-credit programme since the size of the loan is too small and weekly meetings are time consuming. Therefore, MFIs target people who are in between wealthy and non-poor for micro-credit activities.

Hashemi (2001) identified several reasons behind the exclusion of poorest poor from micro-credit activities. First, loan officers and group members do not want to include the poorest households after carefully considering their income and ability to repay. This could be explained by the fact that the group members are supposed to repay the instalments for the default borrowers because of the joint liability. Second, priority is given to those households who have multiple sources of income. Third, loan officers believe that the poorest poor will use the loan for consumption.

Woller (2002) raised a concern that most of the MFIs tend to exclude very poor people from the micro-credit programme. It appears to be a wide spread phenomenon that the very poor are being excluded by the loan officers and existing borrowers from the micro-credit programmes. This widespread exclusion of the very poor from micro-credit programmes is defined as market failure. He further criticised that micro-credit institutions for focusing on the products and services based on their institutional needs,

rather than products and services that the customer needs. He identified several reasons for the shallow depth of micro-credit programmes outreach. First, MFIs do not target the very poor explicitly and do not have clear strategies; if strategies exist they are ineffective at reaching the very poor. For example, inflexible loan products and weekly repayments, high interest rates, forced savings, group loans with joint liability and weekly meetings that exclude the very poor from micro-credit programmes. Second, MFIs staff perceives the very poor as less creditworthy and burdens for their credit programme which might have a bad impact on their performance evaluation. Third, MFIs tend to locate their operations where poverty is less intensive in order to become financially sustainable. Finally, MFIs are overwhelmingly focused on the credit discipline creating a strict repayment culture because of their operational policies and organisational values. Poor borrowers might not be able to continue with the strict terms and conditions of weekly repayment.

Datta (2004) found that the extremely poor people are being excluded because some group members think that they might not be able to repay loans, since they do not have a regular income. Datta (2004) criticised MFIs for having no vision to reach the poorest of the poor. In addition the nature of the credit was not so favourable to the extreme poor, since loan officers are very cautious about their performance and their promotions. Similarly, Fernando (2005) raised a concern that micro-credit programmes have been unable to reach the poorest households, since the borrowers' selection process is based on the perceived ability to repay. In addition, Halder and Husain (2000) identified supply and demand side factors for excluding ultra-poor people from the micro-credit programme. Supply side factors include age restrictions, vulnerability,

and a negative attitude of both NGO staff members and existing NGO members. Moreover, demand side factors include economic vulnerability of the ultra-poor, lack of knowledge about NGO services, fear of mis-use of loan money, personal conflict, and inappropriate loan size. Halder and Mosley (2004) also explained the reason for the ultra-poor being excluded by the micro-credit programmes over the fear of debt management due to irregular cash flows and unpleasant behaviour by the NGO staff towards the defaulters.

Montgomery (2005) studied the impact of Khushali Bank's micro-credit programme on poverty reduction in Pakistan. He found that only one-fifth of borrowers were core poor who had an income of less than $.50 a day. He criticised the fact that micro-credit programmes tend to operate in relatively developed areas, such as those accessible by roads or active markets. The estimation of the impact of the micro-credit programme on borrowers in such areas should consider those factors. On the other hand, if the micro-credit programme deliberately includes disadvantaged households, the impact of the micro-credit may be underestimated unless the biases are not controlled.

Coleman (2006) showed that the wealthier women are twice as likely to participate in micro-credit compared with poorer groups in Thailand. Coleman's (2006) study criticised the fact that wealthier women who usually have more influential power in villages frequently help the village bank officers to establish micro-credit programmes in a particular village, thus becoming group leaders so that they can bring potential creditworthy borrowers into the programme. He also raised a concern that some borrowers use multiple names, fake names, or other existing members' names

who had not yet received a loan in order to obtain credit from village banks in Thailand.

A recent study conducted by Rahman and Wright (2012) investigated the poverty status of micro-credit borrowers in Bangladesh. They investigated the borrowers land ownership and education in terms of measuring the level of poverty. They found that over half of the borrowers were landless and two-fifth of borrowers had no formal education. They argued that ASA's micro-credit programme in Bangladesh provided loans primarily to poor people.

MFIs in Bangladesh intend to serve both the poor and the poorest households. For the sake of bringing poor households into the micro-credit programme, MFIs, for example, ASA, Bangladesh, set up some rules and criteria to select borrowers (*see* Sharma and Zeller, 1999). Coleman (2006) criticised the fact that many MFIs do not strictly follow their set rules and criteria in order to include households in their micro-credit programme. Having reviewed the literature, most studies agree that micro-credit programmes have not reached the poorest segments of the population, but rather, it was criticised, that MFIs reach households that are well-off. Thus, MFIs are shifting away from their mission of serving the poorest segments of the population. The various reasons for exclusion of the poorest households were also described, reasons such as unsmooth income, loan officers and group member's negative perceptions towards the poorest households, joint liability and loan officers' behaviour upon collection of weekly repayment. Therefore, micro-credit programmes failed to fulfil their vision of serving the poorest households. Hence, the level of poverty of micro-credit borrowers

has become a big concern for estimating the impact of the micro-credit programme on poverty reduction.

3.6 Studies on the Branch Placement and Outreach:

There are only a couple of studies which have investigated the branch placement decision of MFIs and outreach. Also Policy makers hardly discuss the expansion of micro-credit coverage in the poorest or disadvantaged regions for making a balanced growth of the economy or increasing credit facilities for the poor people who live in remote areas. Up until now, researchers have paid very little attention to the factors affecting the branch placement decision but it appears increasingly important due to increased coverage for the poor people living in the remoter areas of the country.

A study conducted by Khandker, Khalily and Khan (1995) looked at the Grameen Bank's branch placement decision on the measured accessibility of credit, flooding and agro-climatic conditions such as moisture contents of the soil. They could not make inference whether Grameen Bank branch placement favours the locations specific characteristics such as schools as well as the agro-climatic conditions or not, since both of them turned out statistically insignificant. However, these explanatory variables had negligible power to explain the reason for placing a branch in a particular location (Ravallion and Wodon, 1997).

Binswanger and Rosenzweig (1986) described that branch placement is an important aspect of financial development which is being decided by the management of the MFIs. They suggest that financial institutions like Grameen Bank should not place their branches where there is a high risk of natural disaster such as flooding, areas that are

far from urban areas and lack of both public and private infrastructures and poor transportations system, if they want to remain financially viable. On the other hand, Khandker, Khalily and Khan (1995) advise that Grameen should place their branches and expand their operation in response to the material risks if this is associated with the source of poverty. A less risk prone area is considered as less risky for the agricultural productions and consequently a favourable place for the financial intermediaries. It is quite important for the policy makers or programme managers to know whether certain types of areas are favoured or not for assessing the impact of a particular project, for example the impact of group-based micro-credit programme (Pitt, Rosenzweig and Gibbons, 1995).

Another study carried out by Sharma and Zeller (1999) aimed at investigating the factors affecting the branch placement decision of MFIs such as ASA, BRAC and PROSHIKA in Bangladesh. To do this, they used poverty related variables such as the percentage of firms in the Thana which are less than 0.5 acres in size and literacy rate and infrastructures related variables, for example availability of electricity, markets, roads, hospitals, doctors, post office and population density. They also used a risk variable called *distress index* which is a composite variable that includes various types of risks such as number of floods happened in the past, calculated by the Helen Keller International (HKI) in 1994 for each Thana in Bangladesh.

Sharma and Zeller (1999) found that the MFIs branch placement decision is statistically significant with the literacy rate, access to roads, distress index and availability of post offices. They concluded that MFIs are more likely to establish their branches where the literacy rate is low. However, it is also highly unlikely that MFIs

tend to place a branch in the high risk regions. Particularly, ASA's branch placement decision responds to the poverty related variable such as the percentage of firms in the Thana which are less than 0.5 acres in size. They also revealed that MFIs such as ASA, BRAC and PROSHIKA, are more likely to place their branches in the relatively developed areas where better transport facilities are available and other facilities such as hospital, doctors, electricity and post office. They also concluded that both ASA and BRAC are less likely to place their branch in an area where there is already a branch of one of their competitors. However, it appears that they used data from the branches which are at Thana level and subsequently used Thana level characteristics such as electricity, post office, roads, doctors and hospitals. Thus the results of this study might be biased due to excluding the branches that are located at a rural level or UNION level.

Ravallion and Wodon (1997) suggest that geographic characteristics include two sets of variables. The first set of variables includes availability and distances of schools and colleges and the second set of variables includes distances to the Thana, district and capital, distances and access to the local health and bank facilities, incidence of natural disaster such as flooding, cyclone, drought and population size of the places. These geographic characteristics including a poverty profile of a Thana are the key indicators to place a programme. Ravallion and Wodon (1997) confirmed that the branch placement of Grameen Bank is non-random.

There is one view that any financial institutions, regardless of the objectives of the organisations, would not put their branch randomly in a location where it appears investment is potentially at risk. For example, Grameen Bank does the feasibility study

on location specific characteristics such as private and public infrastructures before making any decision about the branch placement in a particular location. Although the field level management is responsible for finding a potential place to set up a new branch, they have to get approval from the head office. This process of selecting a new location for opening up a branch is being followed by the MFIs in Bangladesh. We should keep in mind that Grameen Bank is a financial institution and it needs to disclose their financial performances to their donors, borrowers and shareholders at the end of each year. The borrowers of Grameen Bank have to buy shares of the bank by default. Thus almost 75 per cent of the Grameen Bank's shares are owned by its borrowers (Grameen, 2014).

Sharma and Zeller (1999) described that MFIs such as ASA, BRAC and PROSHIKA stated their objective is to deliver social services for the poor and marginalised women in rural areas. These organisations would not receive funds, if they would failed to show a minimum level of performance such as caps on delinquency rates and administrative costs and evidence of positive impact of the programme on the poor. Therefore, it is important to keep shareholders and donors happy by providing a healthy financial achievement.

Meknassi (2007) asserted that in Morocco, the poor people who live in rural areas are being deprived of a higher income because the majority of the people who live in rural areas are unbanked. Only 20 per cent of the rural population uses banking services and only a few villages have bank branches in Morocco. Meknassi suggested that MFIs should establish their branches in the poorest regions of the country and develop new financial products that suit poor people. MFIs may increase their client

base as well as the scale of operation over the years depending on having sufficient resources to meet the demand for the credit. Since many MFIs receiving funds from donors, they are very careful about establishing branches in the region where credit recovery is potentially at risk. In Eastern Europe and Central Asia, transaction and size of the loan are much higher than elsewhere in the world. In these regions outreach and growth of the MFIs is very slow because MFIs are not allowed to collect deposit from their borrowers. Also MFIs are serving only rich clients and there is no subsidy for reaching the poor people. MFIs are more likely to diversify their portfolio by including better-off clients, since it was perceived that poor clients are more costly to serve. Poytkowska (2007) confirmed that the depth of poverty outreach is shallow by the small MFIs but able to reach the poorer borrowers if they are donor funded. Balkenhol (2007) argued that there are two goals of MFIs one is outreach and other one is achieving financial stability. Thus, MFIs are placing their goal somewhere in the middle of the social welfare and commercial banking.

It appears that most of the MFIs have achieved financial stability but are yet to reach the poorer people in the poorest regions. Ravallion and Wodon (1997) criticise that commercial banks do not deal with the constraints such as giving access to credit to poor people on rural enterprise development because of persistent poverty in Bangladesh. Sharma and Zeller (1999) expressed concern whether MFIs are serving poor people who live at the disadvantaged regions or remoter areas in Bangladesh. Sharma and Zeller (1999) argued that MFIs may be clustered in particular locations since pre-existing branches of MFIs in any particular location signals the successful

operation of the group-based micro-credit programme. However, this becomes evident that MFIs are clustered in the developed regions in Bangladesh.

Sharma and Zeller (1999) investigated the factors affecting the expansion of micro-credit operations after placing a branch in a certain location. They found that outreach of ASA, BRAC and PROSHIKA micro-credit programmes in Bangladesh have increased over the years. They also confirmed that MFIs have expanded their micro-credit activities in risky *Thanas (Lower Administrative Units)*, although branch placement disfavoured high distress areas. They revealed that outreach is significantly low in *Thanas* where there is a high proportion of marginal farmers. Although branch placement favoured locations where communication and transportation is relatively better, they did not find any evidence on the MFIs outreach where access to roads is good. They criticised that since the MFIs depend on both the national and international donor agencies which is conditional upon maintaining a high repayment rate, it might have an impact on the branch placement decision. Therefore, MFIs are more likely to avoid regions that are highly susceptible to natural disasters such as flooding, cyclone, river erosion and drought and marginal returns from micro-enterprises are relatively low. Therefore financial stability of one branch in a Thana is more likely to encourage opening another branch somewhere within the Thana where the field level management thinks it is viable to place a branch in a particular location.

Many MFIs state that one of their goals is to bring poor people into the traditional credit systems. For example, BRAC clearly state that it aims to reduce poverty, illiteracy and ensure better health through giving micro-credit to poor people who own less than 0.5 acre of land as well as those people who work at least one

hundred days as a labourer in a year. ASA has also clearly and explicitly defined three eligibility criteria for their potential borrowers for example, ASA targets those people who own less than 0.5 acres of land and additionally who work 200 days in year as labourer and whose monthly income is not more than 1,200 Taka (Sharma and Zeller 1999). Grameen Bank aims to disburse loan to disadvantaged women who come from the poorest households. It is also aims to reduce unemployment figures in the rural Bangladesh. Having discussed these selection criteria, it can be argued that many MFIs are aimed at serving poor people in Bangladesh, although some studies believe that micro-credit programmes are not reaching the 'poorest' in Bangladesh (Rahman and Wright, 2012 and Amin, Rai, and Topa, 1999).

According to Hulme and Mosely (1996), the following table shows the population per bank office in various countries in the Asia.

Table 3.2: Shows the Population Per Bank Office

Country	Population per Bank Office	
	URBAN	RURAL
Indonesia	18,287	40,220
Philippines	5,900	18,100
Thailand	9,826	20,278
India	16,910	23,449
Pakistan	6,910	22,497

Source: World Bank (1988), cited in Hulme and Mosely (1996).

Hulme and Mosely (1996) argued that even with the profusion of micro-credit provision and the openness of the market, the branch density of the banking services is almost half in Indonesia compared with some poorer countries in Asia. Population per bank office is at least two times higher for the rural bank branches compared with the

urban bank branches in both Indonesia and Thailand. Population per bank office is almost three times higher in the rural areas than urban areas in the Philippines and Pakistan. In Indonesia, population per bank office is almost double for the urban areas compared with the Philippines, Thailand, India and Pakistan. Hulme and Mosely (1996) argued that the opening of a new bank branch at village level would facilitate the tighter supervision of loans and bring in savings, since closeness to home of the bank branch is the most important factor which is cited by the rural Indonesian.

Montgomery, Bhattacharya, and Hulme (1996) stated that micro-credit programmes of MFIs claimed that they had reached about 2.5 million people in 1991. According to MRA (2011), there were about 34.5 million borrowers in Bangladesh in 2011. Therefore the number of borrowers has increased by 32 million over the last twenty years. Thus, on average, every year about 1.5 million people became a member of micro-credit. It should be admitted that there is overlapping in membership and MFIs also encourage several members to join from any single household if the household has a good record of credit history. However, the micro-credit programmes in Bangladesh are expanding and are indicative of the extent to which targeted credit has become a prominent feature of the rural economy.

Montgomery, Bhattacharya, and Hulme (1996) suggested that since frequent floods and other natural disasters are prevalent in Bangladesh, additional credit insurance may help micro-credit institutions to cope with the high risks of lending to the poor and vulnerable. This may help in increasing outreach at the deeper level of poverty. They also argued that it is difficult to define and assess the market demand of credit and its constraints, since it differs based on the regional economic conditions. It

is expected to increase the demand for market goods and services, if the rural economy were rapidly growing through increasing production and generating income. However, it is realistic to argue that the growth of the economy in Bangladesh has been concentrated within a limited number of regions. Thus the credit-assisted small enterprises will do better in the high growth areas but are more likely to experience demand constraints in many other areas. This raises concerns about clustering the MFIs services in the comparatively high growth areas and on the other hand, depriving the poor people from the MFIs services who are living in remote or low growth areas.

According to Sharma and Zeller (1999), there are several reasons why MFIs are more likely to establish their branches in the fairly developed areas where health, education and markets are available within the proximity of the branch area. First, since MFIs depend on the commercial banks for their daily banking, then proximity to a commercial bank becomes an important issue in deciding a branch placement. On the other hand, research has been found that commercial banks tend to place their branches in the areas that are urbanised or benefit from private and government infrastructures (Binswanger, Khandker, and Rosenzweig 1993). Therefore, MFIs may be more likely to establish their branches in or near these locations.

Second, since loan officers or managers of MFIs in Bangladesh do not receive any reward to work in the remote areas, they might prefer to have branches in the relatively developed areas. If this is the case, then the developed Thana might have more branches. This may be true for reaching the borrowers who live in the remote areas. As we know that the loan officers go to the field to carry out daily micro-credit activities, they may be discouraged to go to the remote villages and set up a loan centre

for these people. Implicitly, loan officers have a target to serve a minimum number of borrowers in a week, thus if they manage to find enough number of borrowers within the proximity of branch villages to meet the organisation's target then they would not go further to remote villages. Lastly, profit maximising institutions may be looking to place branches where they can, possibly, generate enough revenues to cover their total cost. MFIs are not profit maximising but they do get fund from the donor agencies on the basis of maintaining a certain level of financial performance such as repayment rate. Therefore, this may encourage MFIs to place branches in the fairly developed regions and serve better-off clients.

The results could be biased if the control groups are selected from the villages where there is no micro-credit programme. If the management of MFIs prefer to place their branches in relatively wealthier villages (treatment villages) and then comparison of the control group (if the control groups belong to the poorer villages) and treatment group will produce biased estimates. Moreover, if the micro-credit programmes are placed in such villages where there are dynamic leaders and which are close to the proximity to the district headquarters and better organised, again the outcomes will be biased since the treatment group may be relatively richer. On the other hand, if the programmes are placed in the relatively poorer regions, then comparison of treatment and control group (relatively richer villages) will also produce biased results (Pitt and Khandker, 1998; Coleman, 1999). Therefore, it is becoming increasingly important to examine the factors affecting the branch placement decision of MFIs.

3.7 Summary and Anticipated Contribution:

To sum up, many studies claim that micro-credit is an effective tool for poverty reduction (see Pitt and Khandker, 1998; Khandker, 2005, Chowdhury, Ghosh and Wright, 2005; Rahman and Khan, 2013; Khandker and Samad, 2013). On the other hand, some studies argue that micro-credit does not work for the poorest segment of the population (see Coleman, 2006; Mosley 2001; Montgomery, 2005, Kondo *et al.*, 2008). Some studies raise concerns and suggest there is no impact on poverty reduction at all (See Morduch, 1998; Coleman, 1999; Khan and Wright, 2015). Some studies claim that there is a positive effect of micro-credit on poverty reduction, but failed to evaluate how much contribution is attributable to micro-credit (see Rahman, 2010). Therefore, there is no clear indication whether micro-credit is an effective tool for poverty reduction or not.

Many studies that found positive results on poverty reduction have been criticised by economists such as Murdoch, Roodman, Coleman, Palmer-Jones, and Duvendack. They raised many concerns that the outcomes of the empirical studies may be biased due to self-selection bias and non-random programme placement bias. Hence this study attempts to control for both the non-random programme placement bias and self-selection bias while assessing the impact of micro-credit. The details of the self-selection bias in the context of micro-credit and how this problem could be tackled are discussed in chapter 5.

This thesis contains two distinct empirical chapters. In the first empirical chapter (chapter 4), this thesis aims to understand the determinants of the branch placement and branch density of MFIs in Bangladesh. There is no research which

empirically estimates the factors affecting the branch placement decision and branch density of MFIs. Therefore this study will make a great contribution to the literature on micro-finance, banking and branch placement.

In the second empirical chapter (chapter 5), this study mainly focuses on estimating the impact of micro-credit on the two dimensions, incidence of poverty and average deprivation, of poverty as proposed by Sen (1976). Up until today, the existing literature mainly focuses on the impact of micro-credit on the incidence of poverty or various households' outcomes such as income and expenditure. Therefore, this study will make a significant contribution to the literature by providing new empirical evidence on poverty.

Chapter 4: The Determinants of Branch Placement of MFIs in Bangladesh.

4.1 Introduction:

Micro-financial institutions (MFIs) have been working in Bangladesh for more than three decades. Gradually they have been spreading out their micro-credit activities across the country. It is also widely known that the micro-credit programme has received many rewards including the Nobel Peace Prize in 2006 and appreciated by many economists for its contributions to poverty reduction. However, it has also received much criticism from economists because of its mission drifts. For example, many empirical studies criticised that micro-credit programmes fail to reach the poorest of the poor (see Coleman, 2006; Mosley 2001; Montgomery, 2005; Kondo *et al.*, 2008; Halder and Mosley 2004; Datta, 2004). Nevertheless, there has been very little research that investigates the factors influencing the branch placement decision of MFIs. Many studies expressed a concern that the literature suffers from a lack of evidence on how micro-credit institutions such as Grameen Bank select a location to place a branch and what are the determinants driving the management of the MFIs to make decision in order to place a new branch in a particular location (Ravallion and Wodon, 1997; Sharma and Zeller, 1999).

In recent years, the issue of micro-credit programme placement has been received significant attention due to the fact that the programme placement may be a source of bias towards the impact evaluation (Morduch, 1998; Pitt and Khandker, 1998; Coleman, 2006; Tedeschi 2008; Angelucci, Karlan, and Zinman, 2015; Khan and Wright, 2015). Some studies argued that both the commercial MFIs and for profit

NGOs are deviating from their poverty reduction mission in order to attract socially responsible investors and profit-oriented investors respectively (Cull, Demirgüç-Kunt and Morduch 2008; Ghosh and Van Tassel, 2008). MFIs are deviating from their original mission of reducing poverty in order to attract more capital to fund MFIs operation (Armendariz and Szafarz, 2009). Thus, MFIs might be discouraged to either place a branch in the poorest regions or reaching poorest segment of the population due to the fear of losing donor-funds in case of poor financial performance (Sharma and Zeller, 1999). There are many studies which argued that MFIs established their branches in the comparatively developed areas and thus poor people who live in the remote areas are remained out of reach by the MFIs (Meknassi, 2007; Pytkowska, 2007; Sharma and Zeller, 1999). With respect to the programme placement bias, Pitt and Khandker (1998) explained that a comparison of treatment villages (rich village) with the control villages (poor villages) may overestimate the impact of micro-credit on household income and wealth. On the other hand, if the programme is placed in the poor villages, then comparison of poor villages (treatment) with the rich villages (control village) may lead to negative impact. Hence, the programme placement bias could be a problem either way. Up until today, as mentioned, there is no empirical evidence on how the branches of MFIs are placed or how they distribute their branches in a particular location. Therefore, it is also becoming increasingly important to investigate how MFIs are responding to placing their branches or increasing the depth of the micro-credit activities in a particular location.

In the general banking literature, several studies argued that the distance (the distance from the headquarter to the branch) is a big constraint for both the lending and

the bank's performance (Petersen and Rajan, 2002; Alessandrini, Croci and Zazzaro, 2005; Mian, 2006; Udell, 2009; Alessandrini, Presbitero, and Zazzaro, 2010). Hence it may be the case that MFIs may not select a village in which to place their branch if the distance from the headquarter or the decision centre is too far. Alessandrini and Zazzaro (2008) argued that the distance between the headquarter/decision centre and the branch might increase the economic, social and cultural disparities and thus, the loan applications are less likely to be approved. On the other hand, with respect to the loan application, the decision centre for the MFIs is the branch. The loan officer starts processing the application during a group meeting and then it is approved by the branch manager. Studies also argued that the customers value the proximity or the distance of the branch and move their accounts to the bank which has a branch nearby (Kutler 1996; Cheng, Chaudhuri, and Jayaratne 1997). In contrast, MFIs deliver the services, such as collecting loan instalments and deposits, from the doorsteps of their borrowers, therefore, the distance between the customers and the branch may not be a big constraint. As Felici and Pagnini (2008) explained, transportation costs, information asymmetries and monitoring costs are the major costs that incurred with branch placement. If the branch monitoring costs are too high, then the distance might have a negative impact on the branch placement decision and vice versa. MFIs in Bangladesh require strong branch monitoring as well as loan monitoring and thus, it may have an impact on deciding where a branch should be placed. Khandker, Khalily and Khan (1995) explained that MFIs prefer to establish their branches near the headquarters to minimise the supervision cost and thus, the distance could be negatively related with branch placement decision. Unlike the commercial banks, MFIs in Bangladesh have not introduced any technological innovation such as ATMs, or mobile banking in order to

reduce the distance. So far, MFIs are trying to reduce the distance only by increasing their branch network across the country.

This chapter investigates two important issues relating to the branch placement of MFIs in Bangladesh. These are: investigating the determinants of branch placement at a village level and branch density in the Thana (Lower Administrative Unit) level. This study considers ASA Bangladesh as a case study. ASA Bangladesh is one of the world's largest MFIs in terms of both the branch network (2,936 branches) and the number of borrowers (about 5 million borrowers). However, this study hypothesises that the branch placement and branch density are associated with the distance and the direct competitors (such as Grameen bank and BRAC) and other village level characteristics such as population and village market centre. In addition, this study also hypothesises that both branch placement and branch density could be associated with the rate of poverty because one of the main aims of the MFIs is to reduce poverty. To achieve the objectives, this study has conducted a survey among all branches, 2,936 branches, of ASA Bangladesh to collect location specific characteristics, such as the presence of Grameen Bank, BRAC and village market centre, of the branch area. This study has also collected the data on 2,936 non-ASA villages (where there is no ASA branch). With respect to the collection of the non-ASA village data, each branch manager randomly selected one of their nearby villages. The secondary data such as population and the rate of poverty has been collected from the Bangladesh Bureau of Statistics (BBS). The distance between the ASA headquarter and the village was measured using Google Maps.

Since micro-credit programmes in Bangladesh have reached the development stage now, thus it seems that it is quite interesting to investigate how the branches are allocated at each Thana level. In other words, investigates the factors that affecting the depth of the micro-credit activities in a particular location. It has been observed that there is a huge variation in the number of branches of MFIs from one region to another region in Bangladesh. Since it was argued that MFIs branch placement is non-random process, it could also be argued that the number of branch allocation at a particular Thana is also non-random. Up until now, there has not been any research carried out on how the branches of MFIs are allocated at each Thana in Bangladesh. This study covered almost all *Thanas* and all the branches of ASA in Bangladesh. The details of the data and variables used in this study are discussed in the methodology section.

The rest of the chapter is structured as follows. Section 2.1 briefly explains the difference between the microfinance institutions and commercial banks. The motivation for the research objectives is discussed in section 2.2 to 2.6. The methodology, econometric specifications and summary statistics are discussed in section 3. The empirical results and the discussion of the results are presented in section 4 and section 5 respectively. Finally, conclusion of the chapter is provided in section 6.

4.2 Micro-finance Institutions versus Commercial Banks:

This section first explains briefly how a branch of MFI works and then draws a clear distinction between MFIs and high street banks based on some important phenomena relating to branch operations. Suppose a branch of an MFI is established in village A (which is developed) where there are schools, hospital and bank and other

government and private infrastructures. Imagine, there are many villages (less developed) surrounding the branch. There are several reasons for choosing village A and some of them are: to ensure facilities are available for branch members of staff and their families, to ensure better security and to ensure safe banking with the commercial bank. There are usually 3 to 7 Loan Officers in a branch and their main duty is to go out to the villages surrounding the branch every morning in order to form groups. Once the groups are formed, the loan officers go out to the borrowers in order to collect weekly instalments or savings and recruit new members as the time goes by. There are about 15-35 members in a group and usually only one person (women) from each eligible household is allowed to become member. The group meeting takes place once a week at a certain time and location, typically in one of the group member's house. The decision on loan applications is primarily accepted by the loan officer in the group meeting and then formally approved by the branch manager. Then, the accepted borrowers need to travel to the branch for signing the loan agreement papers and receive the money.

Usually the loan officers in a branch cover the villages located within, on average, 100 square kilometres around the branch. Therefore, people who live within this range (sometimes outside) and if they wish to become member of that branch can do so upon satisfying the criteria, such as low-income, unemployed, set by the MFIs. Borrowers need to visit the branch office once a year (typically a loan cycle is 52 weeks) if they wish to receive the loan. The methodology of MFIs branches activities (field based) and high street banks (office based), for example, Barclays or HSBC is

not similar. Now, the differences between commercial banks and micro-finance institutions are noted below:

Table 4.1: Difference between Commercial Banks and MFIs in Bangladesh

	Commercial Bank	Micro-finance Institution
Target Population	Middle income and above. People who have established businesses and or are able to pledge collateral.	Low or very low income group population. People who are unemployed, underemployed and or unable to pledge collateral.
Loan Size and Transaction Costs	Loan size is big (smallest loan size is at least ten times bigger than micro-finance bank). Since transaction costs are high, commercial banks do not deliver small loans. Transaction costs are offset by the size of the loans.	Loan size is very small (as small as £50). Transaction costs are offset by the number of customers.
Collateral Requirement	It requires physical collateral such as land (fixed asset).	It does not require collateral but it requires joint liability. Borrowers are too poor to provide collateral.
Loan Application	It decides on loan applications based on potential borrowers' hard information such as credit score, financial statements.	Micro-banking is solely based on soft information and relationship lending.
Decision Centre	Loan applications are mostly approved by its senior management (headquarter/decision centre) based on the size of the loans. So the commercial banks are hierarchically complex.	Loans applications are approved by the branch manager. So the decision centre is mainly the branches but they require frequent branch monitoring.
Interest Rate	Interest rate could be varied based on the customers' hard information and distance between the bank and firm.	Interest rate remains the same regardless of the distance between the branch and customers.
Distance Banking	Banking operation is branch based. So customers are required to go the branch.	Banking operations such as collection of deposits and instalments are collected outside of the branch. So customers do not need to go to the branch unless someone wants to receive a loan or take out their savings.

Transport Costs	Transport costs are faced by the customers.	Transports costs are faced by the institutions.
Loan Monitoring	Loan monitoring is not mandatory unless someone fails to repay.	Micro-banking requires strong loan monitoring since it is based on the soft information. This is due to prevent potential fraudulent transactions.

4.3 Does Distance Matter for the Branch Placement of MFIs?

In recent years, several studies have examined the relationship between the geographical proximity of the bank branches and the borrowers (Petersen and Rajan, 2002; Alessandrini, Croci and Zazzaro, 2005; Mian, 2006; Udell, 2009; Alessandrini, Presbitero, and Zazzaro, 2010). In particular, the studies focused on the distance between the banks' branch offices and the borrowers as well as the technological innovations of banks and firms in order to reduce operational distance through various ways of banking such as internet banking and off-shore banking. As mentioned earlier, MFIs in Bangladesh operate field based banking; delivering financial services to doorsteps of the poor people. With respect to lending, MFIs use soft information rather than hard information such as credit scoring. Therefore, there is certainly an increasing interest in the literature in how MFIs are spreading their branches across the country over time and whether MFIs are reducing or increasing both operational distance (between banks and customers) and functional distance (between the banks decision centres and local economies) (Alessandrini, Croci and Zazzaro, 2005).

Empirical studies also confirmed that the customers are more likely to choose nearby financial institutions (Grzelonska, 2005; Ishii, 2005). Alessandrini and Zazzaro (2008) argued that economic, social and cultural disparities between bank branches and

local economies could increase the liability of functional distance. Therefore, both the operational and functional distance could be an important issue for a country like Bangladesh because over 80 per cent of the population live in remote areas where transportation and communication systems are poor. Interestingly, the World Bank (2005) revealed that there is a high correlation between travel time (distance) to Dhaka (Capital City) and the incidence of poverty. This indicates that the further the distance (travel time) from the capital city the higher the incidence of poverty. For example, the incidence of poverty is higher in the districts (peripheries) that are located in the far north; north-west and southern part of the country. Alessandrini, Presbitero, and Zazzaro (2010) suggested that the geographical proximity of banks and location of their headquarters are the key determinants for local development. Up until now, the literature focuses on the effect of distance between banks and borrowers on loan pricing, collateral, firms' technological innovations and small business lending (Peterson and Rajan, 2002; Grzelonska, 2005; Udell, 2009; Alessandrini, Presbitero, and Zazzaro, 2010).This is the first study which investigates whether the distance from the headquarter to branch matters for branch placement of MFIs in Bangladesh.

Alessandrini and Zazzaro (2008) stated that banking geography, in particular the notion of distance banking, is becoming an increasingly important phenomenon because both the operational and functional distance has resulted in two distance-contrasting effects. On the one hand, operational distance has been reduced through the wide geographical spread of bank branches and online banking such as internet banking. On the other hand, there has been an increase in functional distance due to the wave of mergers and acquisitions which result in reduced number of banks or branches.

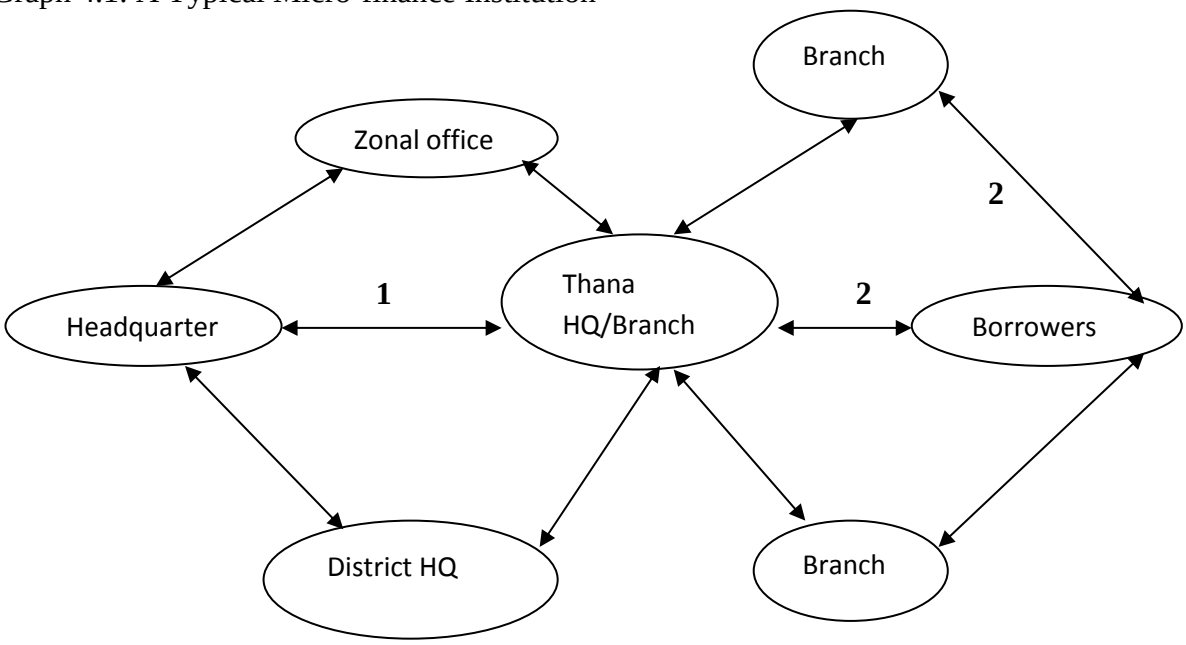
Therefore, the geography of banking is also changing because of the increase in functional distance. Both operational and functional distances are having an impact on changing not only the market structure and banking regulations but also the lending behaviours, organisational structures and relationships between banks and firms.

Alessandrini, Presbitero, and Zazzaro (2010) argued that the functional distance may also raise socio-cultural distance between geographic areas where loan application reviewers are located and branch location where loan officers live and work. And, it may have an adverse impact not only on loan monitoring costs but also on reliability of communication and trust between managers and loan officers. Liberti (2003) stressed that empowered loan officers can improve the performances of banks by increasing effort to screen and monitor borrowers. Loan officers of MFIs in Bangladesh put in extra effort to screen borrowers such as visiting potential borrowers at home and having personal contact with their family members which helps to increase the rate of recovery. Alessandrini, Croci, and Zazzaro (2005) investigated the impact of functional distance on banks performance and lending practices in Italian Banking industry. They found that the functional proximity slightly increases the performance of banks to the less developed region (which is the Southern region of Italy), whereas the functional distance does not affect the performance of banks located at the developed regions. In addition, functional proximity to the less developed regions increases the ability of screening borrowers and consequently experience a lower share of non-performing loans and higher credit allocation.

In a later study, Alessandrini, Presbitero, and Zazzaro (2010) found that functional distance and cultural distance (which is measured by voter turnout rate in

Italy) reduces the product innovation of firms in Italy. Firms that are having a good relationship with bank increase their product innovation. Mian (2006) investigated whether distance matters for foreign banks in poor economies. In this study, he found that the distance is a big constraint which prevents them lending to clients live far from the local branch in Pakistan. He also argued that the foreign banks are more likely to litigate rather than bilaterally re-negotiate and consequently, foreign banks are less successful at recovering defaults.

Graph 4.1: A Typical Micro-finance Institution



(Source: Mian, 2006)

Mian (2006) explained that the three metrics of distance such as geographical, cultural, institutional or hierarchical distance are considered as a constraint for financial institutions. These three metrics of distance imply that the institutions will have higher informational, enforcement or agency costs when expanding operations in a remote location. Geographical distance is the distance between the headquarter and the branch office. Cultural distance, such as the rate of voter turnout was used by Alessandrini,

Presbitero, and Zazzaro (2010), may vary one region to another region. Since headquarter is placed in one location and branches are located all over, therefore, cultural distance could be another constraint which may arise due to the geographical distance. According to Mian (2006), hierarchical distance is mainly due to the bank size. It measures the number of hierarchies or institutional layers between the headquarter and branch office. Hierarchical distance is higher for large banks or multinational institutions. Institutional distance measures the distance between home and host countries legal and regulatory frameworks. Mian (2006) used the overall size of banks as a proxy for capturing banks hierarchical distance.

In graph 4.1, the distance between the headquarter and branch office is labelled as 1 and the distance between branch office and borrowers or loan centre is labelled as 2. Thus the definition of distance 1 is different from distance 2 which measures the distance between local branch office and borrowers. Papers for example, Petersen and Rajan (2002) measured the impact of distance between branch office/decision centre where loan officers are based and borrowers on lending behaviour and Alessandrini, Presbitero, and Zazzaro (2010) investigated the impact of distance 2 on technological innovation in firms. Mian (2006) analysed the impact of distance 1 (in graph 4.1) on capital mobilisation and argued that this distance 1 is an important source of variation. These papers concluded that distance is a matter for firm's technological innovation and financial development.

In recent years, the distance between financial institutions and customers has increased indicating that the importance of geographical proximity has been less advantageous in supplying credit to its potential borrowers (Amel, Kennickell, and

Moore 2008). However, geographical proximity of financial institutions may have a greater advantage in customer credit markets because MFIs in Bangladesh have been operating branch based banking rather than adopting any technological methods such as mobile banking. Udell (2009) argued that lenders may face lower costs as a result of geographical proximity to potential borrowers if they heavily rely on soft information in order to lend money. Thus, lenders that are more in proximity to potential borrowers may collect superior information about the borrowers and be able to monitor the loan performance more easily than distant lenders (Berger and Udell, 2002). Large banks are able to reduce operational distance because they mostly rely on hard information such as credit-scoring to lend money while small banks mostly require soft information (Udell, 2009). One view is that MFIs in Bangladesh merely rely on the soft information and strongly require having a personal relationship with the borrowers. Loan officers of MFIs are strongly advised to build up or maintain good contact with their borrowers as a result they have been able to keep up their high repayment rate. According to Alessandrini, Presbitero, and Zazzaro (2009), the collection of soft information which is very crucial because the soft information is non-codified and can be recovered by the loan officers only because they are familiar with the local environment within which they operate their banking. In addition, they have personal contact with the borrowers and live in the same area and share a common set of cultural values and social norms. Consequently, the loan officers are able to pass superior soft information as well as hard information to their managers who are responsible for approval of loan applications.

As explained earlier MFIs in Bangladesh use soft information, therefore placing a branch in a remote location or the distance between headquarter and branch office could be a constraint. It is worthwhile to explain that MFIs such as ASA Bangladesh maintain 5 layers of branch monitoring cell (as showed in Figure 1). These are: area manager, district manager, zonal manager, mid-level management staff based in the head office and a dedicated online monitoring team who keeps eye on the branches activities. The bigger the distance of branch offices from headquarter or zonal office or district/area office, the larger the transportation costs for MFIs. There is one view is that the functional distance of micro-banking appears to have decreased in Bangladesh. Particularly, branches of MFIs in Bangladesh use their branch as a decision centre which in a quick turnaround time for the loan applications. Therefore, it may be interesting to examine how the functional and operational distances affect the branch placement decision.

4.4 New Geography of Banking, Technological Progress and Transaction Costs:

Cerqueiro, Degryse, and Ongena (2009) argued that in recent years organisational structure of banks is becoming more complex for many reasons and in particular, two of them are visible. *First,* financial institutions are expanding in their geographical span and as a result financial institutions are able to lend at a greater distance. *Second,* financial institutions are becoming bigger and hierarchically more complex. Economic theory has recognised physical or functional and operational distance as a source of inefficiency and the distance creates imbalance in the competitive environment in the financial markets. Thus, the distance shifts market

power to those banks that are closely located to the customers. Consequently, banks that are far away from the customers are at a competitive disadvantage and they require extra efforts to tie with the customers.

In recent years, the geography of banking has been dramatically changed due to technological progress, deregulation and consolidation. The decentralisation of banking geography is being progressed because of easing geographical restrictions on banking activity, expansion of new branches and improvement of the methods of impersonal banking (Alessandrini, Fratianni, and Zazzaro, 2009). Elliehausen and Wolken (1990) described the roles of geographical proximity in the provision of financial services are attributed to its effects on the transaction costs, which comprise of transportation costs and information costs, incurred by banks or their customers. Breevoort and Wolken (2009) stated that the transportation costs could vary directly with the number of transactions a consumer has with the bank as well as the distance. If the consumers need to do the banking in person rather than by other means such as telephone banking, internet banking, then the customers may think about nearby banks in order to save on the transaction costs. On the other hand, banks may also incur transportation costs if the loan officers need to evaluate the loan application or monitor the loan performance in person by visiting the customers. In this circumstance, lending may be costlier due to any travel cost incurred by a lender because banks cannot charge transportation costs to its borrowers through higher interest rate or fees which results in a decrease of the willingness of lenders to extend credit to more distant borrowers (Almazan, 2002). The smaller (larger) the transportation costs, the more likely (less likely) the banks (customers) are to extend (receive) credit to distant borrowers (from banks) (Breevoort

and Wolken, 2009). Degryse and Ongena (2005) documented that Belgian banks charge lower interest rates to distant borrowers but raise the interest rates when the distance from the banks rivals increases. This supports the theory of spatial competition with price differentiation and gives relevance to the transportation costs.

Similar to the transportation costs, information costs may also incur by either banks or their customers (Breevoort and Wolken, 2009). Information costs for customers may be related to search costs associated with collecting information about alternative suppliers of financial services. Again, this information cost may vary either with the distance of financial institutions or the degree of heterogeneity in financial services or both. On the other hand, for financial institutions, information costs such as advertising costs or costs associated with maintaining relationships with brokers or the agents may vary with the degree of competition in the financial markets. Financial institutions may have to bear other information costs such as collecting soft information about potential borrowers which could be varied with the distance. Felici and Pagnini (2008) argued that transaction costs and transportation costs are the additional source of market segmentation for financial institutions.

It is worthwhile to mention, in the context of micro-banking in Bangladesh, MFIs usually face a larger amount of transaction costs such as transportation costs because loan officers need to go to doorsteps of the borrowers in order to collect weekly instalments and deposits. Unlike commercial banks, transportation costs for MFIs in Bangladesh are associated with giving interest free loan for buying a bike/motorbike to its all members of staff. In addition, MFIs such as ASA Bangladesh pay transport costs and subsistence to its members of staff who are recruited to monitor

the branches performance. This is a mandatory rule that all field level staff, such as loan officers and branch managers, must have a bike or motorbike for reaching out to the borrowers by means of private transport and lowering MFIs transaction costs. To put it differently, micro-credit operations are designed in the most cost- effective way since poor borrowers cannot afford the high cost of credit. The greater the number of borrowers served by a loan officer per week, the lower the transaction costs (transportation costs) for MFIs. However, the borrowers may face a petty amount of transportation costs which is once a year, a loan cycle is typically 52 weeks in Bangladesh, because borrowers need to visit the branch when they need to receive the credit or if they wish to take out their deposits. Although customers face a petty amount of transportation costs, distance could be a key factor in order to decide on a membership of a greater distant branch because women (micro-credit borrowers are usually women) are less likely to visit the branch if the distance is too far. From the perspective of the MFIs loan officers, distance between the branch and loan centre (loan centre is located at one of the borrowers' house where the loan officer meets with the borrowers in order to collect instalments and deposits) plays an important role in selecting borrowers because in order to monitor the loan performance loan officers must visit the borrowers' house in person.

In practice, potential borrowers who live in proximity of a local branch or within 10-12 kilometres have a comparative advantage in becoming a member of that branch than those who live at far away from the branch. Therefore, it is interesting to investigate how MFIs are maintaining the operational distance in order to reduce the

transaction costs or the distribution of branches (or branch density) within a Thana in order to cover almost all the targeted population in that Thana.

The empirical results on the technological advancement of financial services and the distance are mixed. With respect to online banking, some studies suggest that online banking may reduce transaction costs faced by the customers but online banking is a supplement to personal banking or enhancement of financial services rather than a substitute for in-person interaction (Khan, 2004; Amel and Breevoort, 2005; de Blasio, 2009). Similarly, automated teller machines (ATMs) may be another service enhancement for customers but they still need to visit the bank branch in order to apply for a loan (Breevoort and Wolken, 2009). Therefore, online banking or ATMs may not be helpful for reducing distance between banks and customers in order to deliver some specific financial services such as loans.

Felici and Pagnini (2008) argued that information asymmetry increases as the distance between the lenders and customers increased, thereby lenders might have adverse selection problem. In this situation, borrowers screening and loan monitoring costs may also be increased. Theoretically, soft information becomes less important for hierarchical banks because loan application decision centres are far away from the branch where an application is submitted. Therefore, the officer who is responsible for approval can only rely on the visible information for considering the loan application. Empirical evidence also suggests that when a loan application needs to go up the hierarchical ladder, soft information loses its importance while hard information gains its importance (Liberti and Mian, 2009). With respect to small business lending, banks decide loan applications largely on the basis of the soft information about a firm and its

owner, collected through a multiplicity of contacts over time by the loan officers. Thus, the institutions can decide on the loan applications beyond the hard information (for example, financial statements) and will have a comparative advantage over those banks which particularly rely on the hard information, although the soft information is very difficult to verify (Cerqueiro, Degryse, and Ongena, 2009).

The bigger and hierarchically complex organisations have less comparative advantage in relationship lending (Cerqueiro, Degryse, and Ongena, 2009). In the context of Bangladesh, MFIs are less hierarchically complex than commercial banks. One view is that large MFIs may have a comparative advantage than small MFIs because they are considered as more trustworthy financial institutions to the potential borrowers. And, MFIs have a greater comparative advantage in terms of small business lending because there is limited financial documents which can be provided by small businesses in Bangladesh. This could be explained by the fact that the business owners are mostly illiterate or generally do not have formal education or training on how to maintain proper business statements. Therefore, MFIs mostly rely on soft information provided by the loan officers and verified by the relevant branch manager before taking any decision. For MFIs in Bangladesh, loan officers and branch managers are usually responsible for approving the loans unless there is an exceptional circumstance. However, technological innovations such as mobile banking may allow banks to lend at a greater distance if there is no need of direct customer contact (Udell, 2009). Therefore, it would be interesting to look at whether MFIs in Bangladesh reduce the operational distance or not because they have not yet adopted any technological processes such as internet banking or mobile banking. This could be explained by the

fact that micro-credit borrowers are very poor and have very little education. Anecdotal evidence suggests that Grameen Bank in Kenya started mobile banking in order to reduce operational distance or to reach out to poor people who live miles away from the branches. But months later, they found that the rate of repayment had dropped because there was no direct customer contact, and as a result the customers had tried to escape paying in time (De Aghion and Morduch, 2005).

4.5 The Decision of Bank Branch Location:

Cheng, Chaudhuri, and Jayaratne (1997) pointed out that banks use a fine geographic grid when selecting a location for branch placement because locating a bank branch anywhere in a city or town will not serve the goals of the branch placement. There are some reasons for carefully looking at the branch placement decision. First, customers seem to value proximity to a branch because a study carried out by Kutler (1996) suggests that the majority of the customers move their bank accounts to another bank's due to the distance and it reveals that the average bank customer visited a branch three times a year. Therefore, when customers value proximity, distance of the bank branches matters, banks cannot locate anywhere. Second, another reason for locating branches carefully is the branch profitability and branch setting up costs. However, Cerqueiro, Degryse, and Ongena (2009) documented that the decision of the geographical expansion of each bank is determined by not only its own choices but also by the choices made by the rival banks.

Entry costs such as the evaluation of business opportunities or opening an outlet in a remote region may be less costly for large institutions because they are more

efficient and capable which are the two important elements for entering into a new market. (Felici and Pagnini, 2008). Cerasi, Chizzolini, and Ivaldi (2000) argued that the larger banks have lower branching costs because they have greater bargaining power in all local markets. The distance to the headquarters positively affects the branching costs and branch network. Felici and Pagnini (2008) investigated the determinants of entry into local banking markets in Italy between the period of 1991 and 2002. They found that the banks are more likely to select locations that are close to their pre-entry locations. Small banks are less able to cope with distant-related entry costs than large banks. Finally, banks are becoming geographically diversified and are able to open their branches in remote locations due to the advancement of communication and information technologies over time. Felici and Pagnini (2008) explained three factors; transportation costs, asymmetries of information and monitoring of branch activities, that are associated with the entry costs and the entry costs usually increase with distance. These three factors may be associated with entry costs for MFIs in Bangladesh as well because the MFIs use soft information for lending and the interest rate does not vary with distance. Therefore, it requires strong and frequent monitoring of the performance of the branches.

A very recent study carried out by Brown, Guin, and Kirschenmann (2015) explained that the decision of opening a new branch in a region is mainly driven by the expected number of borrowers and the fixed costs that are associated with the branch opening. They explained four types of households based on the level of wealth and their preferences of opening a bank account. These are: households with *very low* level of wealth (Type 1), *low level* (Type 2), *moderate level* (Type 3) and *high level* (Type

4). Type 1 households will not open an account, even if there is a branch of a commercial bank in their region. Type 2 households will open an account, only if there is a branch of a micro-finance bank. Type 3 households will open an account if either of the bank has a branch, but the households prefer to open account with a microfinance bank. Type 4 households will open an account, if either of the banks has a branch, but the households prefer a commercial bank.

Brown, Guin, and Kirschenmann (2015) examined the branch placement decision of ProCredit, a micro-finance bank and the relationship between household proximity to a micro-finance bank and the use of financial services such as deposit in four countries (Albania, Bulgaria, Macedonia and Serbia) between 2006 and 2010. They found that ProCredit tends to open a new branch in regions where there is a large share of low-income households. Also, Procredit prefers to locate a branch in highly densely populated areas where a large share of the population is involved in non-agricultural activity rather than agricultural activity. Finally, they found that branch network of ProCredit increases financial inclusion among low-income households, older households and households which receive transfer income. Similarly, Allen et al. (2014) also examined whether the branch network of micro-finance banks increases financial inclusion in Kenya. They analysed data from a large micro-finance bank (Equity Bank) in Kenya during 2006 and 2009 and found that the micro-finance bank is more likely to open branches in regions where population density is low. After comparing with the new branches of other banks, the opening of new branches of micro-finance banks is positively associated with financial inclusion. However, Cheng, Chaudhuri, and Jayaratne (1997) found that banks appear to place their branches in the

commercial locations and the locations that attract many commuters, and heavily populated regions. On the other hand, it appears that the residential areas and poorer areas appear to be unattractive for banks.

The main objective of micro-finance institutions is to alleviate poverty through increasing financial inclusion among poor, typically unbanked, households. MFIs in Bangladesh are non-profit organisations, whereas commercial banks are solely guided by the objective of making profit. Therefore, commercial banks would place their outlets based on standard invest theory. According to the theory, commercial banks put an extra outlet in a location from which it can cover fixed costs that are associated with the branch opening and branch operations costs. If the revenue from the additional outlet is less than their variable costs, then they will not be able to sustain.

4.6 Competitor and Market Structure: A Theoretical Discussion

Several studies empirically examined the role of competitors and market structures in the context of general banking. As there are some fundamental distinctions such as operational strategies between high street banks and MFIs, therefore, marketing strategy, competition, and the expansion of branch networks of MFIs would, reasonably, be different than high street banks. However, there is a very little empirical evidence as well as theoretical discussion in the context of micro-banking. Therefore, it is yet to be confirmed how MFIs respond to their rivals in order to place a branch nearby. There is only one study, Sharma and Zeller (1999), which has investigated how MFIs respond to pre-existing branches of other MFIs in a location. Sharma and Zeller (1999) found that the MFIs such as ASA Bangladesh and BRAC are less likely to place

their branches in locations that already have a competitor's branch. However, Sharma and Zeller (1999) explained that the clustering of MFIs branches may be observed due to the fact that the pre-existing branches of other MFIs in a particular region may signal a community's positive social capital which contributes to social receptivity and successful operation of small and group based credit programmes in that community. If this is the case, MFIs may be encouraged to enter into a market where its rivals already have their branches. As explained elsewhere, there are three large MFIs, ASA, BRAC and Grameen Bank, in Bangladesh. They have branch networks across the country. Now this section will look at the theoretical underpinnings of the expansion of large institutions and how they enter into a market where rivals have already branches.

With respect to the expansion of branch networks, the modelling of banks' behaviour is based on two assumptions (Barros, 1995). First, banks have branches in a location if it is profitable to do so. Second, the number of branches in a location is chosen so that it maximises local market profits. Barros (1995) investigated the effect of deregulation of the Portuguese Banking sector on the branch growth patterns. He found that the incumbent banks and new entrants appeared to follow different signals in branch network growth. For example, incumbent banks are more likely to expand their networks in more populated markets. On the other hand, new entrants have expanded their branch networks in locations where the density of firms are higher. However, the incumbent bank's growth appears to be unrelated to the presence of new entrants. The growth of a bank's branches or the density of branches is more likely to increase due to supply-side effect or less covered markets are usually more attractive for expansion.

Cheng, Chaudhuri, and Jayaratne (1997) empirically estimated the reasons for clustering of bank branches in New York City. They found that bank branches in New York City appear to be spatially clustered. For example, 221 branches opened in the City between 1990 and 1995 and of which, 82 per cent were opened in locations that already had at least one other branch. Therefore, banks are more likely to open branches in locations where there are already other branches. They concluded that branch openings follow others; existing branches even after controlling for the expected profitability of operating a branch in a region. This behaviour seems to reduce branch profits and thus, such bandwagon behaviour could be a factor in deciding a location for branch placement. The choice of a bank's branch location is binary whether to enter or not enter a neighbourhood. Banks usually expand their networks of branches over time meaning that banks have an opportunity to carefully look at their competitors in deciding where to locate their branches.

Cerasi, Chizzolini, and Ivaldi (2000) investigated the degree of competitiveness of Italian banks and branching costs. They argued that the banks tend not to decide their branching network merely on potential profitability but marginal benefits and marginal costs of opening branches play an important role in determining branching network. With respect to the costs of opening a branch, ASA Bangladesh has a comparative advantage because the structure of their branch is very simple. For example, they require only a couple of employees in the beginning and few chairs and only one table in a branch for all colleagues to sit around including the branch manager. It could be one of the many reasons that ASA Bangladesh is known as a cost effective and sustainable institution throughout the world. Therefore, it could be advantageous

for having a larger branch network of ASA Bangladesh rather than other two large competitors (BRAC and Grameen Bank), although it has started the expansion of group based micro-credit programmes (early 90s) about a decade after the Grameen bank and BRAC.

Fuentelsaz and Gomez (2006) investigated both the multimarket contact and strategic similarity in the analysis of entry decision into new geographic locations of Spanish savings banks. They found that the entry rates of the Spanish savings banks are influenced by the firms' size, and the intensity of competition in the origin and target markets. In other words, the entry rates or expansion of bank branching was dominated by the big firms. And these firms were experiencing high levels of competition in their original markets and then moving towards new geographical locations where there are fewer competitors. They further argued that the Spanish savings banks branching decision reflects a U-inverted influence of multimarket contact on entry rates.

Haveman and Nonnemaker (2000) argued that multimarket banks with large asset bases are more likely to expand into new markets and more likely to grow their operation in the regions where they already have operations. Haveman and Nonnemaker (2000) found that multimarket banks are more likely to enter markets where their level of contact with multipoint rivals is high. Multimarket contact strongly influences firms' market entry and growth behaviour. However, Fuentelsaz and Gomez (2006) claimed that the interaction of multimarket contact and strategic dissimilarity has a negative impact, indicating that the impact of multimarket contact on mutual forbearance appears to be more intense, for example lower entry rates, as multimarket competitors are strategically dissimilar. Actually, MFIs in Bangladesh are strategically

similar and their main objective is to reduce poverty by bringing the poor people into the financial system. In this circumstance, the MFIs may be clustered.

The market share of micro-credit in Bangladesh is dominated by the three large institutions in Bangladesh. These three institutions have been serving over two-thirds of the total micro-credit borrowers in the country. In this situation, Haveman and Nonnemaker (2000) predicted that the effect of multimarket contact on mutual forbearance to be strongest when markets are dominated by a few multimarket firms. In multimarket settings, rivals are likely to have developed a sphere of influence which may be relevant at analysing firms' entry behaviour. For example, new entrants could abstain from entering into the multimarket in which a few firms are dominated in the expectation of high competitions. Similarly, Baum and Korn (1996) pointed out that the effect of multimarket contact may depend on the intensity of competitions in which few firms dominate the markets. Thus, the mutual forbearance would be higher, given that potentials returns are also higher from the multimarket competition.

4.7 The Density of Bank Branches:

According to Hannan and Hanweck (2008), in the United States, the number of bank branches has been increased by 27 per cent between the period of 1994 and 2006. They explained that the number of bank branches was increased due to an increase in population (21 per cent increase in that period) and people's disposable income (which increased by 66 per cent) in the same period. Furthermore, they found that the average size of bank branches, measured by the number of employees, decreased from 20 in 1988 to 13 in 2004. The size of bank branch could be reduced due to technological

innovations such as ATMs and recent proliferation of bank branches as well as changes in the nature of the bank operations. Avery *et al.* (1999) examined the relationship between consolidation and the number of bank offices per capita in the United States and found that consolidation has a negative impact on reducing the number of branches per capita. They also found that the number of bank branches is less for low-income neighbourhoods. Likewise, Damar (2007) found that the number of branches reduced in small and uncompetitive markets and in contrast, the number of bank branches increased in concentrated markets in Turkey. Alessandrini, Croci, and Zazzaro (2005) reported that as a consequence of the unprecedented merging and acquisitions operations, the number of banks fell by 29 per cent between 1990 and 2002 in Italy. And, the number of bank branches increased by almost 70 per cent during the same period due to consolidation processes in the Italian banking industry. They also reported that the number of employees increased by only 2.45 per cent in the same period indicating that the size of the bank branches became smaller. In a later study, Alessandrini, Presbitero, and Zazzaro (2009) found that in Italy, the number of bank branches doubled between 1990 and 2007 and on the other hand, the number of banks reduced to 808 in 2007 from 1,156 in 1990. This contrasting trend emerges because of the consolidation and merging and thus forming a large banking group in Italian credit markets but increased the functional distance. Alessandrini, Presbitero, and Zazzaro (2009) found that branch density slightly increased between the period of 1990 and 2007 in Italy.

Hannan and Hanweck (2008) found that the number of branches in a market has a negative relationship with the size of banks and this is due to saving on labour costs.

Given technological changes, fewer employees are required to handle the operations of a branch and a larger number of branches become desirable in order to increase the market shares. They expressed a concern that the potential determinants that affect the size of a bank branch are difficult to measure because any change in the size of bank branch over time is likely to stem from technological changes. Technological changes such as ATMs may help reducing the size of a branch because the establishment of ATMs is much cheaper than hiring a cashier. The substitution effect of ATMs might have changed the economies of a bank's operation in such a way that the larger number of smaller branches becomes optimal in order to reduce costs and expand the geographical span. Even if there is no change in the number of branches, the potential for substituting cashiers by ATMs should decrease the size of branch. Broadly speaking, as a result of adoption of such technological changes, banks open a small branch in a market in order to attract large number of customers and this phenomenon might be significant in relation to the observed change in the size of a branch over time (Hannan and Hanweck, 2008). However, MFIs in Bangladesh are yet to introduce such technological innovation in their branches in order to replace loan officers or cashiers. In particular, ASA Bangladesh does not have any dedicated cashier at branch level rather they train every loan officer to enable them to maintain their daily branch accounting and cash. Therefore, this type of technological change might have little or no impact on reducing or increasing the size of branches.

In conclusion, it appears that the distance is an important issue in the general banking literature for many reasons such as interest rate, loan monitoring costs, transportation costs and approval of loan applications. Hypothesis between the distance

and branch placement of MFIs has never been tested in the micro-finance banking and the branch placement literature. Therefore, this study will fill the gap in the literature and provide empirical evidence on the factors that affect both the branch placement decision and branch density of MFIs.

4.8 Methodology

4.8.1 The Data:

This study collected data from all branches (2,936) of ASA Bangladesh, across the country over the period of November and December 2013 in order to achieve the objectives of the study. A survey questionnaire was circulated to all the branches of ASA, Bangladesh (see questionnaire in appendix 2). It is worth pointing out that an official approval was taken from the President of ASA before conducting the survey. Then, the head of IT sent out the survey questionnaire to 2,936 branches of ASA, Bangladesh. There were some closed ended questions (YES/NO) that helped to get information on the branch location specific characteristics such as the presence of Grameen Bank, BRAC, commercial banks, and any other NGOs. All the branch managers were also asked questions about measuring the distances of the ASA branches from each stage of the administrative units such as from the branch/village to the ASA headquarter in Dhaka. The response rate of the survey was 100 percent. This became possible because of circulating a letter describing the importance of the survey and signed by the head of operation and then sent out to all the branch managers.

Since it was voluntary for each branch manager to give the data on non-ASA villages, this study had only 80 non-ASA villages. Therefore, this might be a concern

for estimating the probability of branch placement or might be led to a potential methodological weakness because of having the data on 2,936 ASA villages but only 80 non-ASA villages. Hence, this study decided to carry out another survey using the same questionnaire in order to overcome this potential problem. The second survey, which focused on the collection of data from non-ASA villages only, was carried out in March-April 2016. All the managers were requested to randomly select one of the nearby villages and provide the information as required. Finally, this study has a total of 5,872 villages, comprising of 2,936 ASA villages and 2,936 non-ASA villages, for analysing the factors which affecting the branch decision of MFIs in Bangladesh.

Secondary data such as population and the rate of poverty were collected from the Bangladesh Bureau of Statistics. The distances (both road distance (km) and travel time distances) from the ASA headquarter to the villages were measured using Google Maps although the distances were collected through interviewing the managers. The distances were measured using Google Maps are much more reliable and widely acceptable. Hence this study will use the Google distances.

4.8.2 Econometric Model Specification: Branch Placement

In the light of general banking theory, the distance between the branch and the decision centre(s) or headquarter(s) is important in order to determine the rate of interest, the degree of riskiness of the project and the monitoring cost. The literature also argued that the functional distance, the distance between the branch and headquarter, is important for accepting the loan application. Because this functional distance may raise a concern about the socio-cultural distance between the loan officer

and loan application reviewer, it may have an adverse impact on loan monitoring, interest rate and the reliability of communication and trust between the managers and the loan officers. The functional distance may also have an impact on the bank's performance. Therefore, the distance is a big constraint which prevents lending to the customers living at a larger distance. Keeping the constraints in mind, this study will investigate the following specifications in order to establish the relationship between the distance and the decision of branch placement of MFIs in Bangladesh for the first time in the literature.

Branch placement decision (P_i) = ∱(D_i) .....(4.1)

And, Branch placement decision (P_i) = ∱(D_i, $D_{i(square)}$) .....(4.2)

B_i is the binary dependent variable i.e. places where there is a branch is considered one, otherwise zero. D_i is the distance between the headquarter and the village. $D_{i(square)}$ is simply the square of the distance.

In addition, this study hypothesised that the decision of branch placement of MFIs in a particular location could be associated with the branches of other micro-finance institutions. It is argued in the literature that the pre-existing branches of the MFIs in a particular village may signal to new entrant a community's positive social capital which contributes to social receptivity and successful operation of small and group based credit programmes in that community. If this is the case, MFIs may be encouraged to enter into a market where its rivals already have their branches.

The literature suggests that the commercial bank is more likely to place in the fairly developed areas or urbanised areas. In practice, the branches of commercial

banks are located at places where public and private infrastructures such as post office, hospital and local market centre are available. MFIs may not prefer to locate their branches where there is a branch of commercial banks due to the fact that most of the poor people live at rural areas and they are believed to be credit constrained, therefore the demand for the micro-credit would be higher in the rural areas.

This study also hypothesised that the village level characteristics, such as village market centre and population, could be the important factors in order to select a village for the branch placement. In addition, most importantly, this study attempted to test the hypothesis whether there is a relationship between the branch placement and the rate of poverty due to the fact that the main objective of the MFIs is to reduce poverty by delivering the collateral free micro-credit to the poor people. Note that the rate of poverty is only available at the Thana level. Hence this study assumes that the rate of poverty would be the same across the Thana.

Therefore, this study will investigate the following specification:

Branch placement decision (P_i) = $f(D_i, C_i, B_i, V_i)$.....(4.3)

Where, D_i is the distance; C_i is the competitors that include Grameen Bank, BRAC and branch of any other local NGO in the village. B_i is the branch of commercial bank in the village. And, V_i is the vector of village level characteristics such as village market centre, population.

In a later specification, this study added the rate of poverty (POV_i) in the following equation due to the fact that, as explained, one of the main aims is to reduce poverty by delivering collateral free micro-credit among the poor. Equation (4.4) may

be suffered from the reverse causality or simultaneity problem in terms of the relationship between the branch placement and the rate of poverty. MFIs may tend to target poorer regions while commercial banks favour opening branches in relatively richer regions (Burgess and Pande, 2005). Note that there is no policy constraint on the branch placement of MFIs in Bangladesh. Therefore, according to the standard investment theory, we may expect relatively greater branch expansion of MFIs in richer regions to become financially sustainable. If richer regions are more effective at alleviating poverty, then the branch placement of MFIs might have less impact on poverty or it may overstate the impact of branch placement on poverty. On the other hand, since one of the main objectives of MFIs is to reduce poverty by giving collateral free credit to the poor people, then we may expect relatively greater branch expansion in poorer regions. In this circumstance, the impact of the branch placement on poverty may be understated. Namely, if the micro-credit programme has a positive impact on poverty reduction, then it may promote the opening of new branches of the MFIs in poverty-stricken areas. King and Levine (1993) explained that the expansion of bank branches and economic growth are positively correlated. However, it could be the fact that regions with greater growth potential attract more MFIs makes causal inference problematic (Burgess and Pande, 2005). Nevertheless, the rate of poverty is not available at the village level. Hence, using this Thana level variable, the rate of poverty, at the village level may cause less severe endogeneity problem.

Branch placement decision (P_i) = $\int(D_i, C_i, B_i, V_i, POV_i)$.....(4.4)

Since the branch placement decision is a binary choice that is influenced by some factors whether a branch to be placed in a particular location or not, therefore a

linear specification of the branch placement equations can be written as its exponential form of the linear regression (Sharma and Zeller 1999):

$$ln(\frac{p}{1-p}) = \beta_0 + \beta_i X_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.5)$$

To control for the bias which may arise from the Thana level characteristics or unobservable characteristics of Thana, this study will run the following fixed-effect binary logistic model (Greene, 2003).

$$P(\frac{Y_{ij}=1}{X_{it}}) = \frac{e^{\beta_0 + \beta_i X_i + \mu_d + \varepsilon_i}}{1 + e^{\beta_0 + \beta_i X_i + \mu_d + \varepsilon_i}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.6)$$

The above equation (5) can be simplified as below:

$$ln(\frac{p}{1-p}) = \beta_0 + \beta_i X_i + \mu_d + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.7)$$

Where, P is the probability of a branch being placed in a particular location and β_0 is the intercept. β_i's are the parameters to be estimated and X_i's are the explanatory variables such as distance, presence of the competitors and other village level characteristics. And, μ_d is included in the model to control for the unobserved heterogeneity at the Thana level such as the quality of cultivable land and ε_i is the usual error term. Sharma and Zeller (1999) applied fixed-effects logit model in order to investigate the factors affecting the branch placement decision.

4.8.2.1 Dependent and Independent Variables:

Dependent Variable: The dependent variable for the branch placement decision is a binary variable. If there is a branch in a village is considered as 1 (one), otherwise 0 (zero). The branch managers were asked to provide location characteristics or

infrastructure related information about the places where the branches are exactly located and also made a request to provide infrastructure related information about the places where there is no branch of ASA. The non-ASA villages were selected randomly by the branch managers.

Independent Variables: Distance: Distance between the ASA headquarter and the branch/village. This study measured two types of distance: one is road distance (km) and another one is called travel time distance (in hours) using Google Maps.

Grameen: The presence of Grameen Bank branch in the village.

BRAC: The presence of BRAC branch in the village

Any other NGO: The presence of any other NGO in the village.

Commercial Bank: The presence of branch of commercial bank in the village.

Market: The presence of a market centre in the village.

Population: Total number of population in the village.

The Rate of Poverty: The rate of poverty in the Thana.

4.8.3 Fixed-Effects Regression: Branch Density

This study also aimed at investigating the factors affecting the number of branches of ASA at the Thana level in Bangladesh. This study is going to run the same specifications as the branch placement that is discussed above. In addition, this study will run an additional specification in order to investigate the relationship between the rate of poverty and the number of branches (branch density) at the Thana level. As

mentioned elsewhere, this study hypothesised that the number of branches could be increased as the rate of poverty increased due to the fact that the main objective of MFIs is to reduce poverty by giving micro-credit to the poor people. This study is aimed at controlling for the district-level unobserved heterogeneity and potential bias arises from the exclusion of any relevant variables to investigate the branch density at the Thana level in Bangladesh.

The following two regression models are estimated (Woolridge, 2002):

$$\ln(Y)_i = \alpha_i + \beta_i * \ln(X_i) + \varepsilon_i \text{.....(4.8)}$$

$$\ln(Y)_i = \alpha_i + \beta_i * \ln(X_i) + \mu_d + \varepsilon_i \text{.....(4.9)}$$

Where Y_i = No of ASA branches at each Thana, α_i is the intercept and $\boldsymbol{\beta_i}$is the parameters to be estimated and $\boldsymbol{X_i}$is the vector of explanatory variables such as the number of Grameen Bank branch, BRAC branch, all other NGOs, population, and Thana poverty rate. Both the outcome variable and the explanatory variables have been transformed in natural logarithms. In order to control for the district level unobserved heterogeneity, a district level effect $\boldsymbol{\mu_d}$ is included in equation 4.9. And $\boldsymbol{\varepsilon_i}$is the usual error term that holds the various assumptions such as mean is zero, uncorrelated with $\boldsymbol{X_i}$, uncorrelated with $\boldsymbol{\mu_d}$ and homoscedastic**.** Sharma and Zeller (1999) applied fixed-effects regression to investigate the factors affecting the number of participants of micro-credit programme at the Thana level in Bangladesh. The equation contains the following explanatory variables:

Dependent Variable:

***NOBRANCH*:** The number of ASA branch in a Thana.

Independent Variables:

Grameen: The number of Grameen Brank's Branches in the Thana.

BRAC: The number of BRAC branches in the Thana.

All other NGOs: The number of all other NGOs working in the Thana

Commercial Bank: The number of private and public commercial banks' branches in the Thana.

***MARKET*:** The total number of market centres is available in the Thana.

POPULATION: The number of Population in the Thana.

The Rate of Poverty: The rate of poverty at the Thana level.

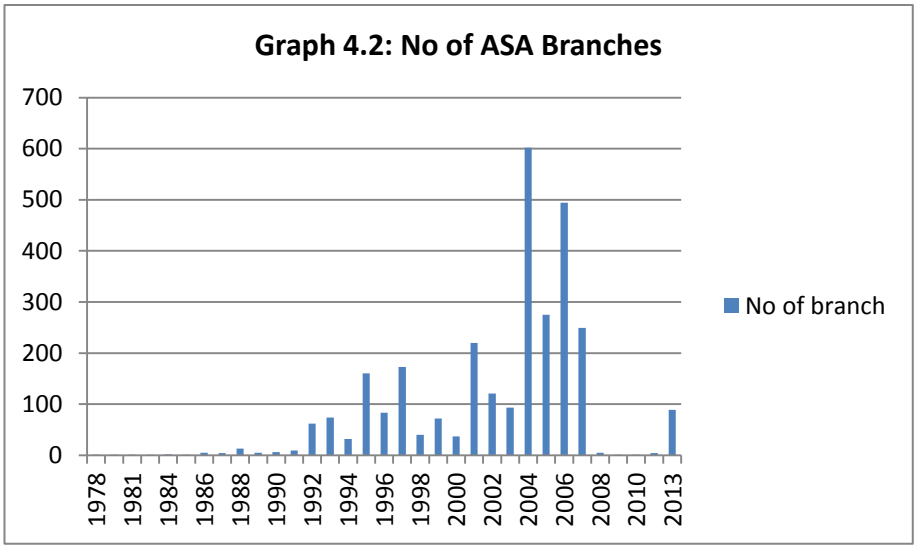
4.8.4 Descriptive Statistics:

This section discusses the summary statistics such as the number of ASA branch by year, distance covered by ASA and how ASA rolled out their branches across the country. This section also describes the summary statistics of the dependent variables and independent variables that are used in this study.

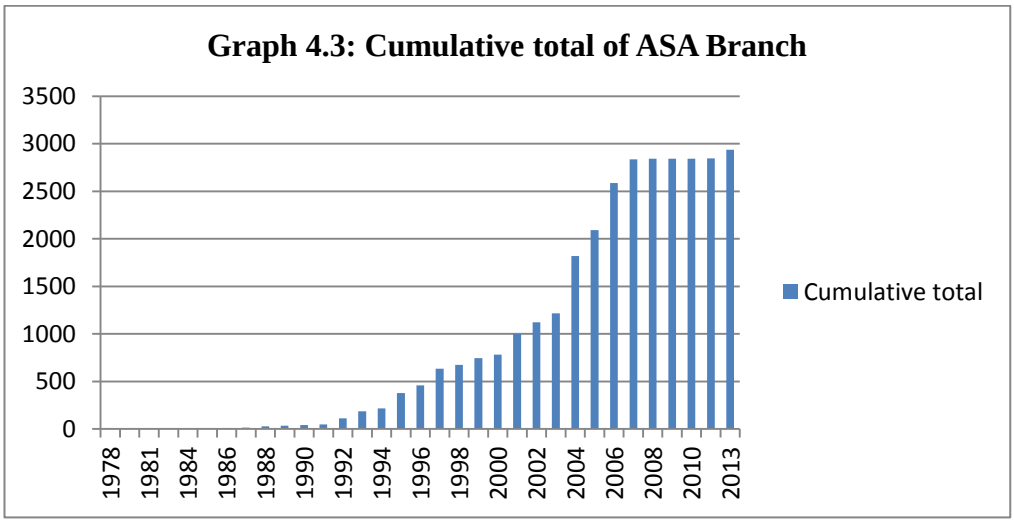
4.8.4.1 Number of ASA Branches:

The following graph shows the number of ASA branches open in each year since it was established in 1978. ASA had only a few branches until 1990. ASA has opened 711 branches over the period from 1990 to 1999. Then, it has opened another 2,091

branches over the period from 2000 to 2007. In 2004, it opened 600 new branches which is the highest number of branch openings in a single year.



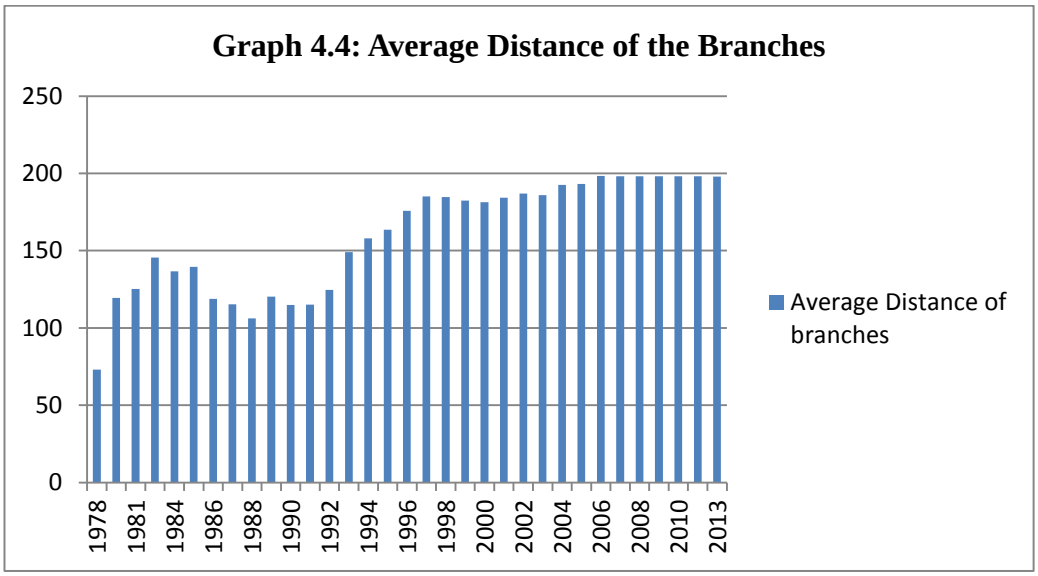
The following graph shows the cumulative total of ASA branches since its inception in 1978. The number of ASA branches was growing steadily up until 1990s. The branch network of ASA dramatically increased up until 2007 and then, it levelled-off. In 2013, it had a total of 2,936 branches across the country which is the highest number of branches for any micro-finance institution in the country.



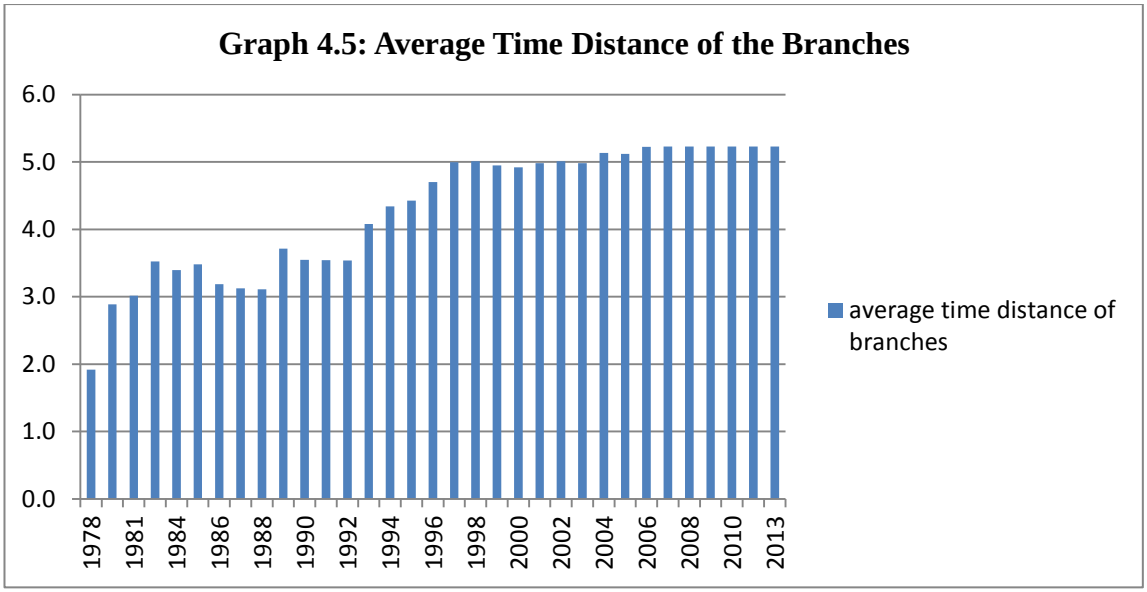
4.8.4.2 Average Distance of the Branches:

The following graph shows the average distance (kilometre) of the branches from the ASA headquarter in Dhaka. The first branch opened in 1978 which was about 73 km away from Dhaka. The average distance of the branches increased stunningly until 1985 and then started to decrease in distance gradually until 1988. Again, the average distance of the branches started to grow dramatically from 1990 to 1997. There was a little fluctuation in the distance before it levelled-off at 200 km in 2006.

Graph 4.4: Average Distance of the Branches

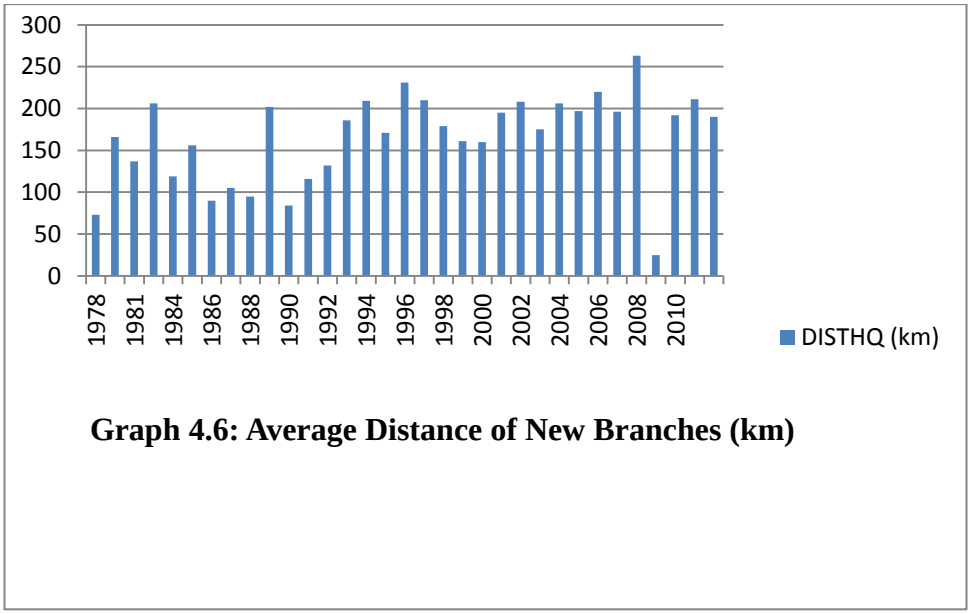


The following graph shows the average travel time distance (hours) from the ASA headquarter in Dhaka to the branch. The travel time distance follows the same pattern as the road distance which is plotted in the previous graph. The average travel time distance levelled-off at over 5 hours in 2004.



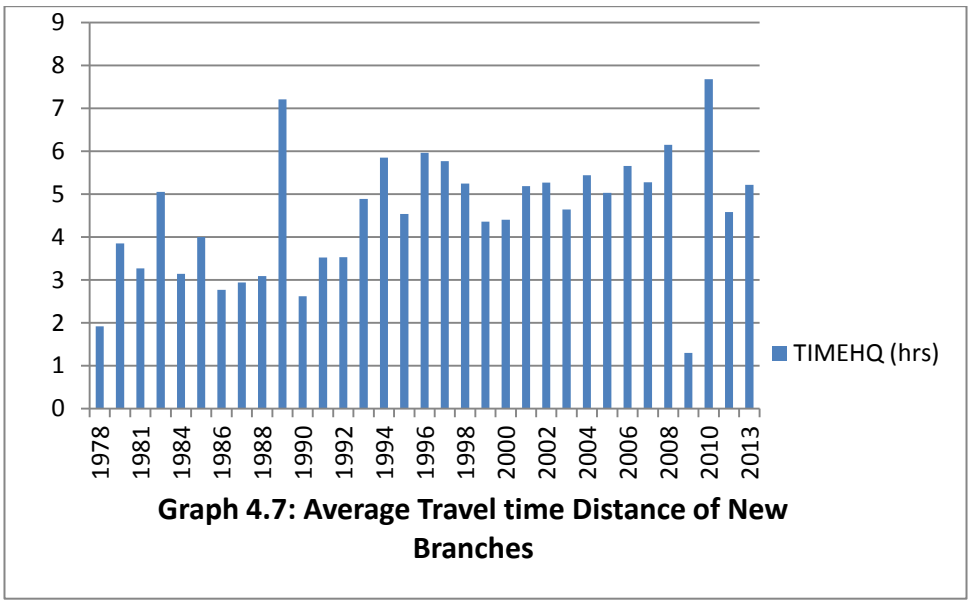
4.8.4.3 Average Distance of the New Branches:

The following graph shows the average distance (km) of the new branches from the ASA headquarter in Dhaka. There is a fluctuation in the average distance of the new branches over the period from 1978 to 2013. The highest average distance is 263 km in 2008 and the lowest average distance is 25 km in 2009.



Graph 4.6: Average Distance of New Branches (km)

The following graph shows the average travel time distance (hours) from the ASA headquarter to the branch. As similar to the road distance graph, average travel time distance was so erratic over the period from 1978 to 2013. The average travel time distance of the new branches peaked at 7.7 hours in 2010.



Graph 4.7: Average Travel time Distance of New Branches

4.8.5 Summary Statistics of the Village Level Characteristics:

The following table shows the summary statistics of village level characteristics such as distances, competitors, and population. The average distance (km) of the total samples is 200 km. The average distance for villages where ASA has branches is 198 km and non-ASA villages (where ASA has no branches) is 202 km. The difference is not statistically significant. However, the travel time between the ASA-villages (5.2 hours) and the non-ASA villages (5.4 hours) is statistically significant. Grameen Bank and BRAC are the two main competitors of ASA. It appears that 73 per cent of villages where ASA are based, Grameen are also based and 71 per cent of villages where ASA

are based and BRAC are also there. The majority of the ASA branches are established where there is at least one NGO in the village. Of the total villages, 66 per cent of the villages have a branch of commercial bank. The majority of ASA branches are located where there is a market centre in the village. Average village level population for all the samples is 5,188. Average village level populations are 6,431 and 3,945 for the ASA village and non-ASA village respectively. The results of t-tests show that the mean difference of village level characteristics between ASA-villages and non-ASA villages are statistically significant except the road distance.

Table 4.2: Summary Statistics of the Village level Characteristics

	All Samples				ASA Villages				Non-ASA Villages				Mean Difference
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	t-stat [p-value]
DISTHQ (km)	200	97	1	482	198	97	1	462	202	98	1.1	482	1.6 [0.11]
TIMEHQ (hrs)	5.3	2.3	0.03	15.5	5.2	2.3	0.03	15	5.4	2.3	0.08	15.5	2.5 [0.01]
Grameen (%)	52		0	1	73		0	1	30		0	1	36.4 [0.00]
BRAC (%)	49		0	1	71		0	1	26		0	1	38.5 [0.00]
Any NGO (%)	72		0	1	93		0	1	52		0	1	39.7 [0.00]
Commercial Bank (%)	49		0	1	66		0	1	32		0	1	27.6 [0.00]
Market (%)	86		0	1	96		0	1	76		0	1	23.9 [0.00]
Population	5,188	6,229	406	72,793	6,431	7,244	454	72,793	3,945	4,696	406	62,312	15.6 [0.00]

Sources: Author's survey, 2013 and 2016 and Bangladesh Bureau of Statistics, 2011.

4.8.6 Summary Statistics of Thana level Variables:

The following table shows the descriptive statistics of Thana level variables. ASA has, on average, about 6 branches in each Thana with a maximum of 26 branches in one Thana. Grameen Bank and BRAC have about 5 branches in each Thana. In some Thanas, neither Grameen nor BRAC have any branches. On average 19 NGOs and 13 branches of private and public banks are operating in each Thana in Bangladesh. The average number of market centres is about 33 in Thana. The population size is, on average, 272,000 in Thana and the minimum is 28,000 and the maximum is 1.8 million people. The rate of poverty is about 41 per cent (BBS, 2005). The rate of poverty lies between 3.1 (minimum) per cent and 78.4 (maximum) per cent.

Table 4.3: Summary Statistics at Thana Level.

Variables	Mean	Std. Dev.	Min	Max
Dependent Variable				
ASA Branches	5.7	3.5	1	26
Independent Variables				
Grameen Branches	4.7	3.1	0	19
BRAC Branches	4.6	2.9	0	20
ALL Other NGOs	19.2	15.0	1	113
BANK Branches	13.2	11.2	2	91
MARKET	33.3	28.2	2	150
Population (‘000)	272	163	28	1820
Poverty Rate	40.9	16.7	3.1	78.4

Source: Bangladesh Bureau of Statistics, 2005 and 2011

4.9 Empirical Results:

This section critically analyses the results obtained from the econometric models.

4.9.1 Fixed-Effect Logistic Regression: Factors affecting the Branch Placement decision

4.9.1.1 Branch Placement and Distance:

Since the dependent variable, branch placement decision, is a dichotomous variable, this study applied binary logistic regression to investigate the factors affecting branch placement decision of ASA. This study considered the distance (distance from the ASA headquarter to the village and the distance square) as predictor variable in the first instance in order to investigate the relationship between the distance and the decision of branch placement. Two types of the distances, one is the road distance (km) and another one is the travel time distance (in hour), are included in the following specifications separately. The results of the binary logistic regressions and fixed-effect binary logistic regressions, table 4.4, are discussed below:

Table 4.4: Branch placement and the Distances

VARIABLES	(1) LOGIT	(2) FE-LOGIT	(3) LOGIT	(4) FE-LOGIT	(5) LOGIT	(6) FE-LOGIT	(7) LOGIT	(8) FE-LOGIT
DISTHQ (km)	-0.000425	-0.0210***	0.000428	-0.0113*				
	(-1.6)	(-10.4)	(0.4)	(-1.9)				
DISTHQsq			-2.11e-06	-2.21e-05*				
			(-0.9)	(-1.8)				
TIMEHQ (hrs)					-0.0284**	-0.794***	-0.0144	-1.653***
					(-2.5)	(-11.6)	(-0.4)	(-9.5)
TIMEHQsq							-0.00134	0.0679***
							(-0.3)	(5.7)
Constant	0.0850		0.0187		0.151**		0.121	
	(1.4)		(0.2)		(2.3)		(1.1)	
Observations	5,872	5,872	5,872	5,872	5,872	5,872	5,872	5,872
Number of THANA		512		512		512		512
Hypothesis Test [H_0: β_i=0], Chi-square test	2.5		3.4		6.1**		6.2**	

z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

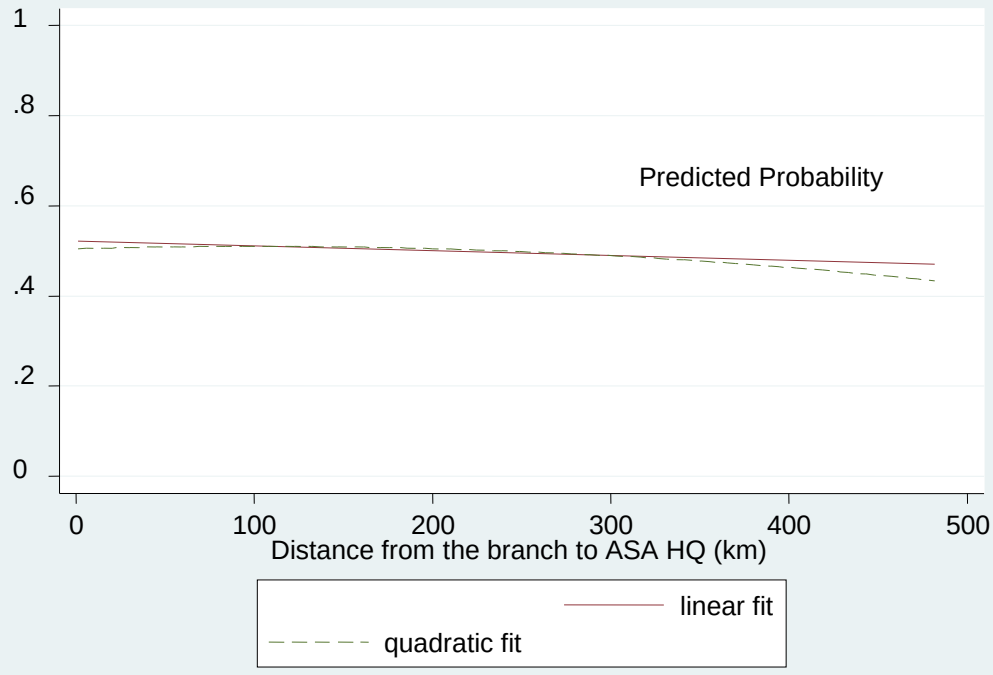
The result of the logistic regression, column 1 in table 4.4, indicates that branch placement has a negative relationship with the distance. As the distance from the headquarter increases, the probability of placing a branch in a particular village decreases but the result is not statistically significant. The magnitude of the effect of the distance is too small. The hypothesis test (H_o: $\beta_i = 0$) indicates that there is almost no effect of the distance. However, the distance, column 2, is statistically significant at 1 per cent and branch placement has a negative relationship after controlling for the Thana level fixed-effect. In addition to the distance, this study included the distance square in specification 3 in order to estimate the presence, if there is any, of some sort of quadratic relationship rather than assuming the effect is linear for all the distances. The results of the logistic regression, column 3, indicate that the distance has a positive and the quadratic form of the distance has a negative relationship but none of them are statistically significant. The hypothesis test (H_o: $\beta_i = 0$) indicates that there is almost zero effect of the distance even after including the distance squared. However, the results of the fixed-effect logistic regression, column 4, reveal that both the distance and the distance squared are statistically significant at 10 per cent and branch placement decision has a negative relationship with the distance.

As mentioned, this study has also measured travel time from the Headquarter to the village using Google Maps. This study estimates the same specifications as the road distance. It appears that the travel time distance has a negative and statistically significant relationship with branch placement. In column 5, both the travel time and the travel time squared have a negative impact on branch placement but they are not statistically significant. Unlike the road distance, the results of the hypothesis test (H_o:

β_i = 0) indicate that there is an effect of the travel time distance on branch placement. The results of the fixed-effect logistic regression, column 8, reveal that the travel time is negatively related with branch placement but the travel time distance squared is positively associated and both of them are statistically significant at 1 per cent level.

The distance and distance squared are plotted on the following graph to diagnose the difference between the linear and the quadratic specification of the distance. The graph shows that the predicted probabilities of both the distance and distance squared are almost similar. Thus, the distance squared could be removed from the regression estimates.

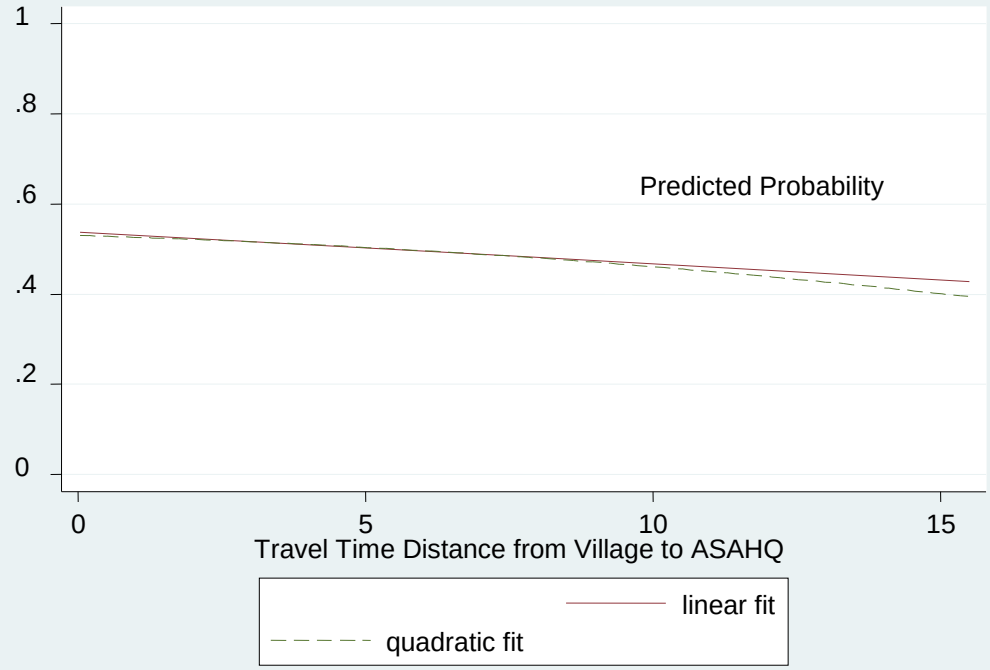
Graph 4.8: Distance and the Probability of Branch placement



In the following graph, as similar to the previous one, the travel time and the travel time squared are plotted to see the difference in the predicted probabilities for both the

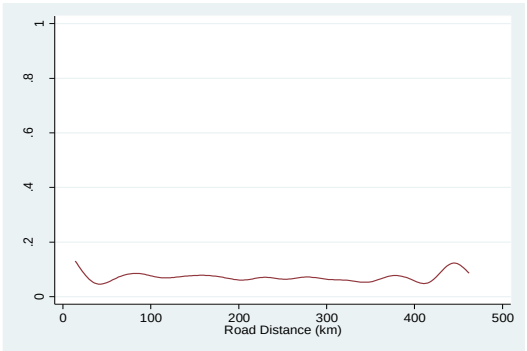
linear and the quadratic specifications. The graph shows that both the linear time and quadratic form of the travel time follow the same pattern and the travel time squared can be removed from the later estimations.

Graph 4.9: Travel Time and the Probability of Branch Placement

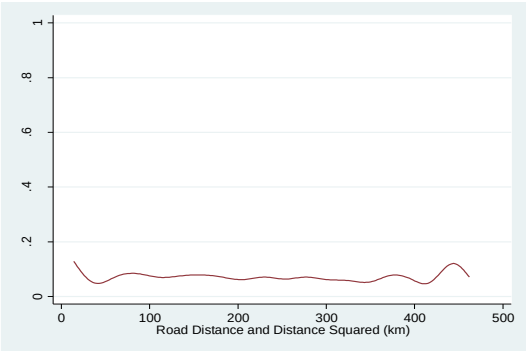


The following graphs, 4.10-4.13, show the fitted lines after the fixed-effect estimation for the specifications 2, 4, 6 and 8 in table 4.4. It could be argued that there is no systematic relationship between branch placement and the distance after visualising the fitted lines.

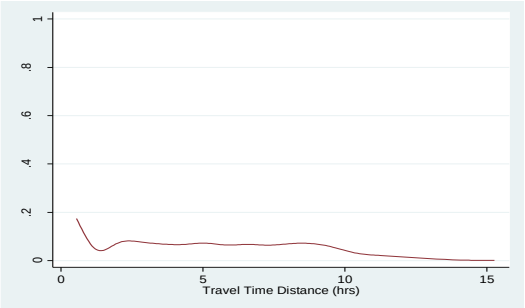
Graph 4.10: Fitted line for specification (2)



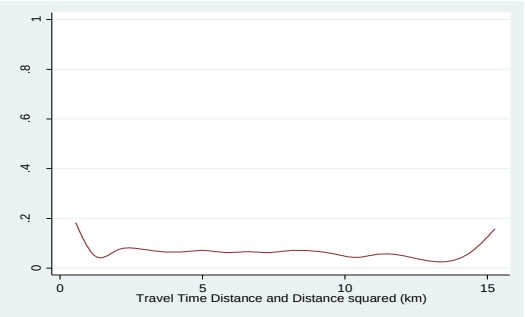
Graph 4.11: Fitted line for specification (4)



Graph 4.12: Fitted line for specification (6)



Graph 4.13: Fitted line for specification (8)



4.9.1.2 Branch Placement: The Distance and Competitors and Other Village level Characteristics:

The results of the earlier estimations show that the decision of branch placement is negatively associated with the distance. However, it appears that the effect of the distance is too little on branch placement decision. It could be due to the fact that the decision centre for loan applications of the MFIs is the branch whereas the decision centre for commercial banks is based in the headquarters or regional office which is far from the branch. Now this study is going to estimate some other explanatory variables such as the presence of Grameen Bank, BRAC and commercial banks in the village along with the distance of the village from the headquarters in order to investigate the factors affecting branch placement. Again this study plugged-in the travel time distance and estimates the same specification as the road distance and the results show the same pattern as the road distance and the results are presented in table 4.5 (column 5 and 6). Therefore, this study discusses the results that are presented in column 2 and 3 only. However, this study applied the probit model in order to check the robustness of the results. The probit model produced almost the same results as the logit model. This can be found in appendix 3.

In table 4.5, Column 2 shows the results of the logistic regression in which the regional heterogeneity is not taken into consideration. Column 3 shows the results after controlling for regional fixed effects. This study found expected results and the co-efficient estimates of the dependent variable shows expected signs. The results, column 2, show that all the variables are statistically significant except the distance. However, all the explanatory variables including the distance are statistically significant after controlling for the regional fixed-effect.

The results show, column 2 (table 4.5), that the competition variable, for example the presence of Grameen Bank, BRAC and at least one branch of any other NGO, is positively associated with branch placement decision and it is statistically significant at 1 per cent. The results did not change much even after controlling for the regional fixed effects. These results indicate that ASA is highly likely to place a branch in a village where there is a branch of Grameen Bank, BRAC and at least one branch of any other NGO. This result could be explained by the fact that the activities of a micro-credit institution in a particular village signal the potential demand for micro-credit and therefore, the branches of MFIs are clustered.

It is argued in the literature that commercial banks prefer to establish their branches in relatively developed areas. As expected, this study found that the presence of a branch of a commercial bank in a village is statistically significant at 5 per cent and negatively associated with the branch placement decision of MFIs. Unlike the branches of MFIs, it is found to have a 20.3 per cent ($e^{-0.227}$-1) lower chance of placing a branch in a particular location although there is a branch of a commercial bank. It may be the fact that since MFIs are promised to serve the poor in the rural areas, therefore they are

more likely to establish their branches in rural areas or in less developed regions in order to increase financial inclusion.

In the context of Bangladesh, a village market is one of the main centres for buying and selling locally produced agricultural products such as rice and vegetables in which a village economy is centred. It may be argued that the economy of rural villages is also centred at this place since the villagers, in particularly the farmers, have the opportunity to sell their products in the village market centre. Entry of this market centre is free and open to all the villagers. One can define this market as a centre for rural economic activities in the context of the country. Thus, the village market centre could be one of the most important factors for MFIs to be considered a village for placing a branch there. As expected, the results of the market variable is found to have statistically significant at 1 per cent and positively associated with branch placement decision. The result indicates that it is highly likely to place a branch of MFIs in a village where there is a village market centre.

In addition to the distance and competitors, the other village level characteristics such as village population and the rate of poverty could be important factors to be considered for placing a branch. The village level population is added to the specification in order to capture the demand for micro-credit. As expected this study found that the total population in a village is statistically significant at 1 per cent indicating that ASA is more likely to establish a branch in a village where there is a large number of people residing. However, the demand for micro-credit could also be well captured by the rate of poverty since the target population for micro-credit is low-income people who are typically credit constrained. As expected this study found that

branch placement decision is positively associated with the rate of poverty indicating that it is highly likely to place a branch where there is a high poverty rate. The rate of poverty appears to be statistically insignificant after controlling for the Thana level fixed effects.

To sum up, it appears that the distance variable is statistically significant and negatively associated with branch placement decision after including the competition variables such as the presence of Grameen Bank, commercial banks and village market centres in the model. But the signs of the distance variable show inconsistent across the models. Thus it could be argued that the distance might not have any systematic relationship with branch placement. This study found that the branches of ASA's competitors such as the branches of Grameen Bank, branches of BRAC and branches of any other NGOs are important for making a decision on branch placement. ASA is less likely to place a branch in a village where there is a branch of a commercial bank. The village level characteristics, such as village market centre, village population and the rate of poverty, appear to be the important factors for having a branch of the MFIs in a village.

Table 4.5: Branch Placement: Distance, Competitors and Other Village level Characteristics:

VARIABLES	(1) LOGIT	(2) FE-LOGIT	(3) LOGIT	(4) FE-LOGIT	(5) LOGIT	(6) FE-LOGIT	(7) LOGIT	(8) FE-LOGIT
DISTHQ	0.000756**	-0.0199***	0.000296	-0.0199***				
	(2.0)	(-7.1)	(0.7)	(-7.1)				
GRAMEEN (yes=1)	1.872***	1.928***	1.857***	1.929***	1.872***	1.934***	1.857***	1.936***
	(22.6)	(19.9)	(22.4)	(19.9)	(22.6)	(19.9)	(22.4)	(19.9)
BRAC (yes=1)	1.713***	1.937***	1.722***	1.936***	1.719***	1.895***	1.724***	1.894***
	(21.0)	(20.2)	(21.1)	(20.2)	(21.0)	(19.9)	(21.1)	(19.8)
Any Local NGO (yes=1)	0.752***	0.996***	0.757***	0.995***	0.747***	1.012***	0.755***	1.012***
	(6.9)	(8.2)	(7.0)	(8.2)	(6.9)	(8.4)	(6.9)	(8.3)
Commercial Bank (yes=1)	-0.254***	-0.227**	-0.241***	-0.227**	-0.247***	-0.200**	-0.238***	-0.200**
	(-3.1)	(-2.4)	(-2.9)	(-2.4)	(-2.9)	(-2.1)	(-2.9)	(-2.1)
Market (yes= 1)	0.721***	0.762***	0.722***	0.761***	0.717***	0.766***	0.720***	0.764***
	(5.2)	(5.1)	(5.2)	(5.1)	(5.1)	(5.1)	(5.2)	(5.1)
Village Population	7.67e-05***	0.000152***	7.89e-05***	0.000152***	7.75e-05***	0.000151***	7.92e-05***	0.000151***
	(10.9)	(12.8)	(11.0)	(12.8)	(10.9)	(12.8)	(11.1)	(12.8)
Poverty Rate			0.00658**	0.0165			0.00612**	0.0214
			(2.5)	(0.4)			(2.3)	(0.5)
TIMEHQ (hrs)					0.0381**	-0.595***	0.0181	-0.596***
					(2.4)	(-7.1)	(1.0)	(-7.1)
Constant	-3.784***		-3.992***		-3.839***		-4.010***	
	(-22.6)		(-21.2)		(-22.2)		(-21.1)	
Observations	5,872	5,872	5,872	5,872	5,872	5,872	5,872	5,872
Number of THANA		512		512		512		512

z-statistics in parentheses; Significance Level *** p<0.01, ** p<0.05, * p<0.1

4.9.2 Empirical Results: Branch Density:

This section discusses the empirical results on the branch density (the number of branches of ASA in the Thana) of ASA. This study includes all the Thanas where ASA has its branches (2,936 branches rollout in 512 Thanas) and all 64-districts in Bangladesh.

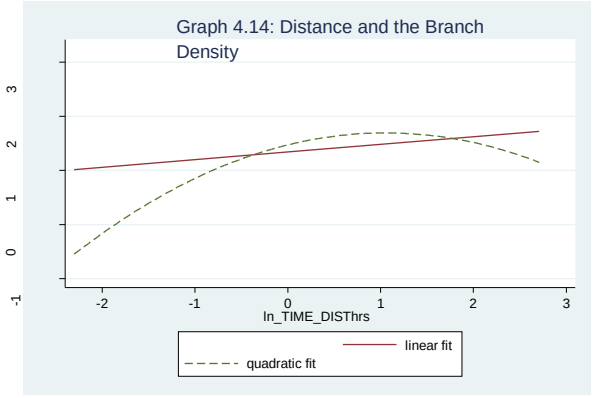
4.9.2.1 Branch Density and the Distance:

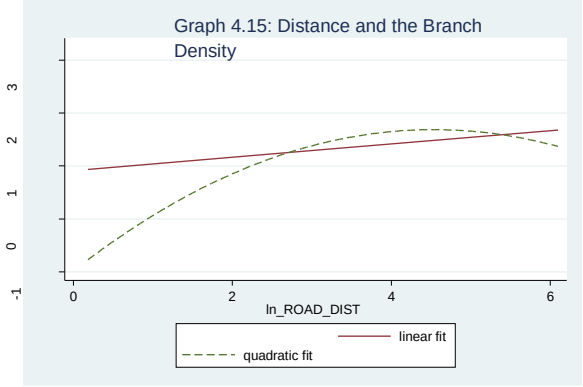
In the following table (table 4.6), column 1, 3, 5 and 7 are the estimates that do not include fixed effect and are estimated by ordinary least square (OLS). Column 2, 4, 6 and 8 are estimates that included district level fixed-effect and are estimated by the standard grouped-means approach. With respect to branch density, this study estimates the similar specifications as the branch placement in the earlier section. This study investigates whether there is a relationship between the distance (distance from the ASA headquarter to the Thana Administrative Centre) and the branch density. As similar to branch placement, this section also includes travel time distance for estimating the branch density and the results are presented in column (5) to (8).

The result, column 1, shows that the distance has a positive and statistically significant impact on increasing the number of branches of ASA. For example, 1.3 per cent increase in the number of branches when the distance increased by 10 per cent. However, the result, column 2, is not statistically significant after controlling for the district level fixed effects. With respect to branch density, this study includes the quadratic form of the distance rather than assuming the distance has a linear relationship across Thanas that are located at the peripheral areas of the country.

Interestingly, the results, column 4, reveal that the distance has a linear relationship with the branch density but the distance squared has a negative relationship and both of them are statistically significant at 1 per cent. Thus, the results indicate that the relationship is not linear across all the distances. This study includes the travel time distance (in hour) and estimates the same specifications as the road distance (km). The results, column (5) – (8), are almost the same as the road distance. The hypothesis tests, (F-test, H_o: $\beta_i = 0$) indicate that the co-efficient estimate of the distances is significantly differently from zero.

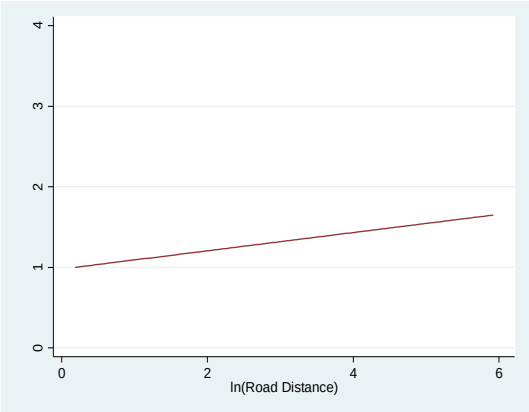
The road distance and the distance squared are also plotted on the following graphs and the graphs show that there is a much difference between the linear and quadratic specification. The distance squared could be kept in the specification. However, both the road distance and travel time distance graphs are showing similar pattern.



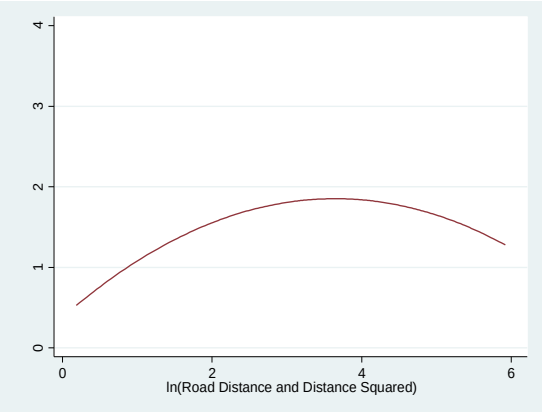


The following graphs, 4.16-4.19, show the fitted lines after the estimations of specifications 2, 4, 6 and 8 in table 4.6. Road distance and travel time distance show slightly different pattern. Graph 15 shows that there is a linear relationship between the branch density and the road distance. However, graph 16 shows that the relationship between the branch density and travel time distance is almost flat or horizontally straight. However, after including the squared terms in the specifications, the fitted lines of both the road distance and travel time distance are almost concave.

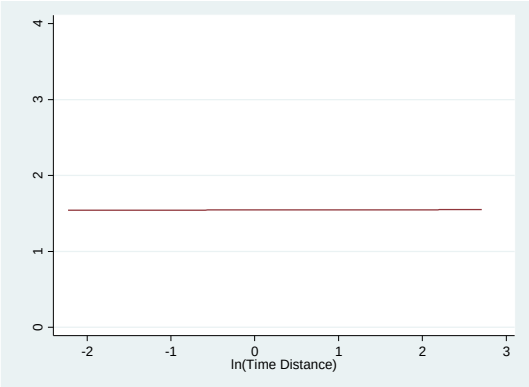
Graph 4.16: Fitted line for specification (2)



Graph 4.17: Fitted line for specification (4)



Graph 4.18: Fitted line for specification (6)



Graph 4.19: Fitted line for specification (8)

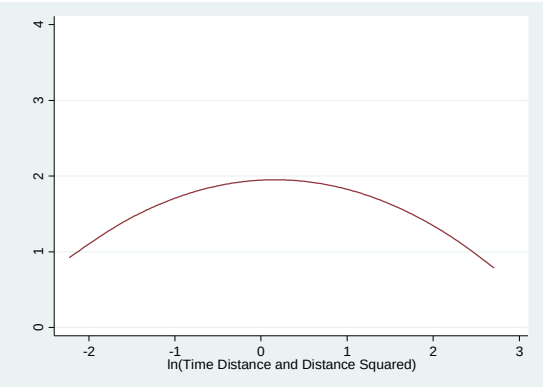


Table 4.6: Branch Density and Distance

VARIABLES	(1) OLS	(2) FE-OLS	(3) OLS	(4) FE-OLS	(5) OLS	(6) FE-OLS	(7) OLS	(8) FE-OLS
ln(ROAD DIST)	0.126***	0.113	1.176***	0.807***				
	(3.9)	(1.1)	(6.6)	(3.2)				
ln(ROAD DIST SQ)			-0.130***	-0.111***				
			(-6.0)	(-3.1)				
ln(TIME DIST)					0.141***	0.002	0.420***	0.0591
					(3.6)	(0.01)	(7.2)	(0.5)
ln(TIME DIST SQ)							-0.199***	-0.180***
							(-6.3)	(-3.7)
Constant	0.915***	0.978*	-0.979***	0.383	1.342***	1.545***	1.472***	1.946***
	(5.6)	(1.9)	(-2.8)	(0.7)	(21.1)	(8.5)	(22.8)	(9.3)
Observations	512	512	512	512	512	512	512	512
R-squared (%)	2.9		9.4		2.5	.	9.5	
Number of DISTRICTS		64		64		64		64
Hypothesis Test [H_0: β_i=0], F- test	15.5***		26.3***		13.3***		26.3***	

t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.9.2.2 Branch Density: The Distance and Competitors:

After confirming the relationship between branch density and the distance, this study examines the role of the competitors such as the number of Grameen Bank branches, BRAC branches and all other NGOs working in the Thana. With respect to the branch density, the graphs show that there is a much difference between the linear distance and quadratic distance. Therefore, as robustness test, the distance squared also added along with the other explanatory variables but did not find any significant changes in the results. The results of this robustness test can be found in appendix-4. Thus, the distance squared removed from the specification and estimated similar specifications as the branch placement. The results are presented in 4.7. This study found all the explanatory variables are statistically significant except the distance and show the expected signs. The results did not change much after controlling for the district level fixed-effect. Again the travel time distance is included and estimates the same specifications as the road distance. The results, column (5)-(8), are almost the same as the road distance. It is worth noting that about 83 per cent of the total variations in branch density are explained by the independent variables. The estimates also indicate that the independent variables are important.

As confirmed earlier, the distance is significant and positively associated with branch density. However, after including the competition variable in the models, the distance appears to be less important. The distance variable remains insignificant even after controlling for the district level fixed effects across the models. The results of branch density are almost the same as branch placement. For example, this study found that ASA is highly likely to place a branch in a village where there is a branch of its

competitors. Similarly, this study found that the branch density of ASA increases as the number of branches of its competitors increase. The results, column 2, show that there is about a 3.4 per cent and 2.9 per cent increase in the number of branches of ASA when the number of branches of Grameen and BRAC increased by 10 per cent respectively and the results are statistically significant at 1 per cent. But the magnitude of the effect is much less for all the other NGOs working in the Thana indicating that about a 0.4 per cent increase in the branch density of ASA for a 10 per cent increase and the result is accepted at 10 per cent. As expected, the number of branches of commercial banks (including private and public) and the number of market centres in the Thana appear to be statistically insignificant. As expected the branch density of ASA increases as the total population increases in the Thana in order to meet the higher demand in the Thana.

In addition, the Thana poverty rate could be one of the most interesting variables to test due to the fact that the main objective of the MFIs is to reduce poverty by delivering micro-credit to poor people. If this is the case, then the intensity of the micro-credit activities would be higher in the Thana where the rate of poverty is high. As expected, the results reveal that the rate of poverty is positively associated with the branch density at the Thana level and it is statistically significant at 10 per cent. This result indicates that the number of branches of ASA increases as the rate of poverty increases in the Thana. The results of the rest of the variables did not change much after including the rate of poverty in the model.

To sum up, it appears that the competition variables, such as the number of branches of Grameen and BRAC, are important for increasing the branch density of ASA at a Thana level in Bangladesh while the distances are less important. The

distance does not appear to be statistically significant after controlling for the competition variables and other Thana level characteristics such as population and poverty rate. However, this study confirms that the competition variables, Thana population, and the rate of poverty are important and statistically significant for increasing the branch density at a Thana level in Bangladesh.

Table 4.7: Branch Density: Distance, Competitors and Other Thana Level Characteristics

Variables	(1) OLS	(2) FE-OLS	(3) OLS	(4) FE-OLS	(5) OLS	(6) FE-OLS	(7) OLS	(8) FE-OLS
ln(DISTANCE) (km)	0.0281*	0.0687	0.0159	0.0425				
	(1.8)	(1.4)	(0.9)	(0.8)				
ln(GRAMEEN)	0.413***	0.337***	0.401***	0.329***	0.407***	0.342***	0.397***	0.332***
	(9.5)	(7.2)	(9.1)	(7.1)	(9.4)	(7.3)	(9.0)	(7.1)
ln(BRAC)	0.304***	0.292***	0.306***	0.292***	0.306***	0.290***	0.308***	0.290***
	(6.8)	(6.4)	(7.0)	(6.4)	(6.9)	(6.3)	(7.0)	(6.3)
ln(ALLOTHER NGOs)	0.0321*	0.0358*	0.0305*	0.0376*	0.0314*	0.0348*	0.0305*	0.0373*
	(1.9)	(1.9)	(1.8)	(2.0)	(1.8)	(1.8)	(1.8)	(1.9)
ln(COM BANK)	0.0103	0.0302	0.0198	0.0394*	0.0135	0.0294	0.0214	0.0391*
	(0.5)	(1.4)	(1.0)	(1.8)	(0.7)	(1.3)	(1.0)	(1.8)
ln(MARKET)	0.0417**	0.0294	0.0400**	0.0255	0.0400**	0.0312	0.0391**	0.0267
	(2.2)	(1.3)	(2.1)	(1.1)	(2.1)	(1.4)	(2.0)	(1.2)
ln(POPULATION)	0.236***	0.295***	0.234***	0.291***	0.242***	0.292***	0.239***	0.289***
	(6.8)	(7.5)	(6.8)	(7.5)	(6.9)	(7.5)	(6.8)	(7.4)
ln(Poverty Rate)			0.0502*	0.0876*			0.0433	0.101**
			(1.7)	(1.8)			(1.4)	(2.1)
ln(TIME_DIST) (hrs)					0.0436**	0.0238	0.0306	-0.0103
					(2.3)	(0.4)	(1.4)	(-0.2)
Constant	-1.079***	-1.501***	-1.187***	-1.670***	-1.029***	-1.183***	-1.152***	-1.478***
	(-5.9)	(-4.9)	(-6.1)	(-5.2)	(-6.4)	(-6.2)	(-6.4)	(-6.2)
Observations	512	512	512	512	512	512	512	512
R- squared (%)	83.0		83.1		83.0		83.1	
Number of DISTRICTS		64		64		64		64

t-statistics in parentheses; Significance Level *** p<0.01, ** p<0.05, * p<0.1

4.10 Discussion of the Results:

ASA has been gradually rolled out its branch network across the country since its inception in 1978. The graphs show that both the average distance of the branch and the average distance of the new branch have been increased over the years. The summary statistics show that the difference in the distance, in particular road distance, between the ASA-villages and non-ASA villages is not statistically significant. However, ASA-village level characteristics such as the branch of the competitors and village population are statistically significantly different from the non-ASA villages. The objective of this study is to investigate the factors affecting the branch placement of MFIs in Bangladesh. In the context of general banking literature, this study attempted to establish a relationship between the distance and the decision of branch placement of MFIs for the first time in the literature.

This study investigates the role of the distance (the distance between the village and the headquarter) on branch placement decision of MFIs in Bangladesh. This study uses two types of the distance and these are: road distance (km) and travel time distance (in hour). The distances are measured using Google Maps. This study found that the distance has a negative relationship with branch placement decision but it is not statistically significant. However, it appears that the distance has a negative and statistically significant effect on branch placement decision after controlling for the Thana level fixed effects. This study also included the distance squared in the model rather than assuming the distance has a linear relationship across all the distances. This study found that the distance has a positive and the distance squared has a negative relationship but none of them are statistically significant. Again, both the distance and

the distance squared become statistically significant at 10 per cent after controlling for the Thana level fixed effects. The distance variable shows inconsistent results across the various models in this study and therefore, it could be argued that the distance might not be as important as it is in the general banking. The hypothesis tests (H_o: β_i = 0) indicate that the magnitude of the effect of the road distance is almost zero. This study found that the competition variable such as the presence of Grameen, BRAC and any other NGOs are highly statistically significant and positively associated with branch placement decision. This result may not be surprising because Sharma and Zeller (1999) explained that the clustering of MFIs branches may be observed due to the fact that the pre-existing branches of other MFIs in a particular region may signal to new entrant a community's positive social capital which contributes to social receptivity and successful operation of small and group based credit programmes in that community. Thus, MFIs in Bangladesh may be encouraged to enter into a market where its rivals already have their branches. Cheng, Chaudhuri, and Jayaratne (1997) also found that the bank branches in New York City are spatially clustered. They argued that the banks are more likely to open branches in locations where there are already other branches, *ceteris paribus.*

This study found that ASA is less likely to place a branch where there is a branch of a commercial bank. There are a few possible reasons. First, commercial banks are favoured the relatively developed areas where government and private infrastructures are established (Binswanger, Khandker, and Rosenzweig 1993) and thus, the majority of the people are relatively rich. Second, main aim of the commercial banks is to make profit and thus they serve relatively wealthy borrowers because the

poor borrowers are believed to be risky and not profitable and therefore, they decide to put their branches in a location in which relatively wealthy households can easily access to the branch. As opposed to commercial banks, the main objective is to serve the poor people and thus, reducing poverty by bringing the poor people into a traditional financial system. Fourth, with respect to the banking operation strategy, commercial banks are branch based and the MFIs are field based. Finally, it argues that residential areas and poorer areas appear to be unattractive for commercial banks (Cheng, Chaudhuri, and Jayaratne 1997). This study found that the village level characteristics such as village population, poverty rate are positively associated with branch placement decision of the MFIs. A recent study carried out by Brown, Guin, and Kirschenmann (2015) found that the MFIs, such as ProCredit, tend to locate their branches in regions where there is a large share of low-income households.

This study also investigated the factors affecting branch density in a Thana level in Bangladesh. As similar to branch placement, this study attempts to establish a relationship between branch density and the distance. This study found that the distance has a positive but statistically insignificant relationship with branch density. After including the distance squared in the specifications, it appears that the distance squared has a negative and statistically significant relationship with branch density. The results did not change much even after controlling for the unobserved heterogeneity at district level. However, it is evident here that the distance does not seem to be important when this study includes the competition variables and other Thana level characteristics in the model. This study confirms that the competition variables such as the number of

Grameen Bank branches, BRAC branches increase branch density of ASA in a Thana level.

This study found that Thana level characteristics such as population and the rate of poverty are also statistically significant and positively associated with branch density of MFIs. Hannan and Hanweck (2008) also found that the branch density increases due to the increase in population and household's income in the USA. Alessandrini, Presbitero, and Zazzaro (2009) found that the branch density has been slightly increased between the period of 1990 and 2007 in Italy. Most importantly, this study found that the rate of poverty has a positive and statistically significant relationship with branch density indicating that the branch density increases in a Thana where the rate of poverty is high. In contrast, Avery et al. (1999) argued that the branch density is less for low-income neighbourhoods. The results of this study on the branch density and the rate of poverty is not surprising as the management of MFIs aim to reduce poverty by delivering collateral free credit among the poor people. There was only anecdotal evidence that MFIs target poverty stricken regions. This is the first study which provided empirical evidence on branch density and the rate of poverty at a Thana level in Bangladesh. This study claimed that MFIs put more focus on regions where the rate of poverty is high and therefore, the micro-credit programmes placement bias could be a potential problem in the impact evaluation. This study expresses a concern that the impact of micro-credit programme on poverty reduction may be underestimated due to the programme placement bias.

Chapter 5: Impact of Micro-credit on Poverty in Bangladesh

5.1 Introduction:

This chapter focuses on evaluating the impact of micro-credit on poverty in Bangladesh. There are two major problems in the impact assessment of micro-credit programmes. One is non-random programme placement bias and another one is self-selection bias. The earlier empirical chapter was focused on the issue of micro-credit programme placement and the findings suggested that the depth of micro-credit activities is higher in regions where the rate of poverty is high. Therefore, the micro-credit programme placement bias may be a problem in assessing the impact of micro-credit unless it is properly dealt with. To the best of my knowledge, this is the first empirical study which investigated the relationship between the branch placement of MFIs and poverty. However, selection bias is another major problem in estimating the impact of micro-credit. The following section provides a brief introduction to selection bias and discussed selection bias in the context of the impact assessment of micro-credit programmes. This study put in effort in order to control for both the selection bias and the programme placement bias while assessing the impact of micro-credit programme of ASA Bangladesh.

There are three dimensions of poverty as explained by Sen (1976). First, the incidence of poverty represents the percentage of people who are deprived in relation to the poverty line. Second, the average deprivation of poverty reflects the proportionate amount of absolute income deprivation or the depth of poverty. Finally, the relative deprivation of poverty reflects the income inequality among the poor. This thesis aims

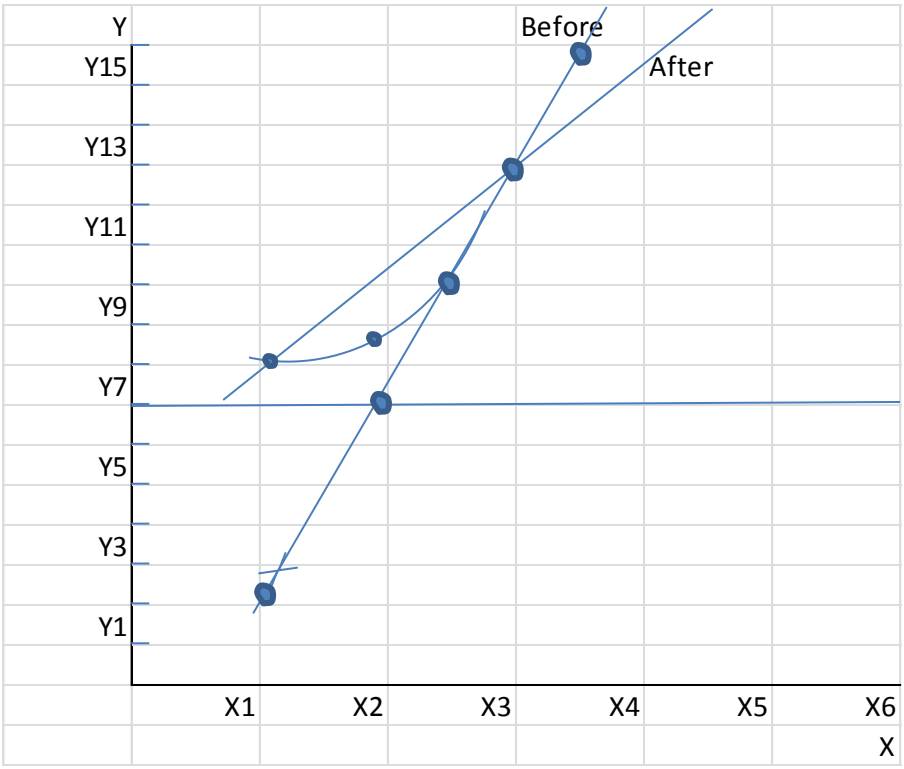
to investigate the impact of micro-credit on the first two dimensions of poverty. These are: incidence of poverty and average deprivation of poverty or poverty gap. This thesis adopts Foster-Greer-Thorbecke (1984) family of poverty measures in order to estimate these two dimensions of poverty, although this measure gives us three dimensions of poverty. This study will not empirically estimate the impact of micro-credit on the relative deprivation of poverty due to some mathematical issues that are involved in measuring this. For example, the relative deprivation for each individual is captured by squaring up the average deprivation of poverty of the individuals and thus the results of the relative deprivation may follow the same pattern as the average deprivation. Therefore, this study contributes to the literature by providing new empirical evidence of the impact of micro-credit on the incidence of poverty and the average deprivation of poverty.

Section 5.2 presents an introduction to selection bias with some hypothetical examples and relates it to micro-credit programmes. Section 5.3 discusses how to control for potential self-selection biases using a quasi-experimental design. Section 5.4 discusses the per capita income and the poverty line for this study. Section 5.5 describes the survey and collection of the primary data. Descriptive statistics, such as age, education, households' income and expenditure of the respondents, are provided in section 5.6. Then section 5.7 explains the econometric models that are applied to the study. Section 5.8 presents the results obtained from the FGT class of poverty measures as well as the empirical results. Finally, the discussions of the results are provided in 5.9.

5.2 An Introduction to Selection Bias:

Selection bias occurs when researchers observe a non-random sample of a population of interest. Selection bias is a major problem in programme and policy evaluation. It has long been central in discussions of economics research methods (Goldberger, 1972; Heckman, 1976; Vella, 1998). Particularly, it appears to be a major problem in estimating the impact of micro-credit on poverty (Pitt and Khandker, 1998; Coleman, 1999; Morduch, 1999; Tedeschi, 2008). There is a growing concern in the literature that micro-credit borrowers are non-randomly selected and thus the selection of existing borrowers for measuring the impact of micro-credit may lead to a serious selection bias problem.

Berk (1983) explained that the selection bias could be better understood through a bivariate scatter plot interpreted within the framework of a general linear model as discussed below. According to Pindyck and Rubinfeld (1981), given a fixed regressor,(1) one assumes that there is a linear relationship between endogenous and exogenous variables and (2) one also assumes that for each observation, the expectation of the error term is zero which implies that the expectation for each value of the exogenous variable is zero. Once these two assumptions are met, the error term is uncorrelated with the exogenous variable, which guarantees unbiased least square estimates of the slope and intercept.



Graph 5.1: Shows regression lines before and after selection bias (source: Berk, 1983)

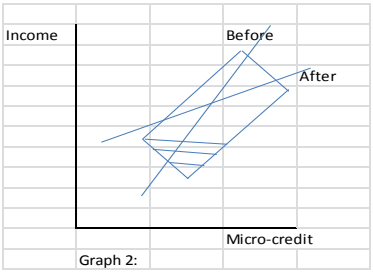
The above graph is a scatter plot for an exogenous variable 'X' and an endogenous variable Y. Suppose data taken from some population of interest through simple random sampling. The linear form is correct for this population. And the mean error terms is zero for each value of X which implies that the regression line passes through the expected value of Y for each value of X. In this graph, the expected values are represented by big dots and the regression line is labelled as 'before' and the second regression line is labelled as 'after'.

Now suppose that Y is households' income and X is the number of times borrowed or length of participation in the micro-credit programme. Assume there is a linear relationship between households' income (Y) and the number of times borrowed (X). Suppose that the households who are relatively wealthy, (say) where income is above the Y7 have only managed to retain themselves into the micro-credit programme

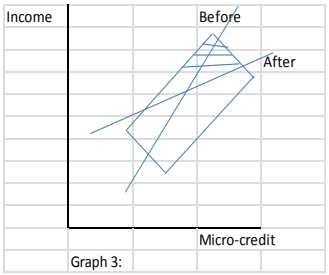
and the households' income below or at Y7 dropped-out after a while. Now, if the data is taken exclusively from the existing borrowers who are successfully retained in the programme for over a period of time, then highly serious incidence of poverty or borrowers who dropped-out will be systematically underrepresented. In the graph observations below Y7 are missing.

In graph 5.1, the new expected values are represented by small dots for each value of X. As X increases, the difference between new and old expected values of Y reduce until X2 and then both expected values become identical. The original regression line (labelled as before) no longer fits the data. The relationship between X and Y is no longer linear, implying that X is positively correlated with the error term.

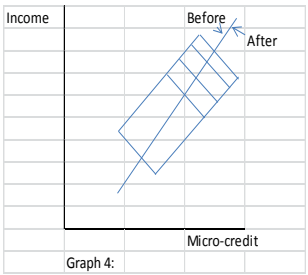
The effects of sample selection bias are shown in a schematic fashion in graph 3 and 4 below. Graph 2 is a new representation of graph 5.1 and served as a benchmark.



Graph 2:



Graph 3:



Graph 4:

Suppose that Y is income and X is the number of times micro-credit has been received, as in graph 3 and the sample only includes the households whose income is

below the poverty line. Thus, the estimated regression line will be biased. In this circumstance, one cannot generalise the estimated causal relationship between the micro-credit and income of all individuals including individuals below the poverty line.

Graph 4 shows a particular pattern in which the thresholds for exclusion are defined for the exogenous variable but one can generalise the estimated effect. Looking at graph 4, suppose that households of all incomes are included (or eligible to join the micro-credit) but the borrowers who already borrowed more than 6 times (say) are not allowed to have further loans. Now if there is a linear relationship between income and the cumulative borrowing, then one can generalise and estimate the effect of further cumulative borrowing on income in an unbiased manner.

Therefore, if certain observations from some population of interest are excluded non-randomly, then there is a risk of having selection bias. Similarly, if the micro-credit institutions exclusively target the relatively wealthy borrowers to achieve financial sustainability and thus the poor segment of population are not able to join the micro-credit programme. Then there is a risk of selection bias. In this circumstance, considering non-random selection of micro-credit borrowers, one cannot truly estimate the impact of micro-credit programmes on poverty. The details of the selection bias in the context of micro-credit programmes are discussed in the next paragraph.

5.2.1 Self-selection Bias and Micro-credit:

The selection bias has long been a major problem in micro-credit programmes. Morduch (1999) expressed a concern that the selection of micro-credit borrowers is not a random process and thus, the screening procedures address the issue of selection bias. For example, micro-credit programmes are most likely to ensure that the borrowers are more enterprising, better connected, less risky and more dedicated than non-borrowers. Would borrowers have improved their households' income or poverty status if they had not participated?

Morduch (1999) argued that the impact of selection bias can be large and the findings of the studies might be concluded that the impact of micro-credit on business profits is as much as 100 per cent if they fail to control for the selection bias. This may indicate that micro-finance institutions became successful in targeting good and rich clients. He also argued that the selection bias may go in the opposite direction because micro-credit institutions are perceived to serve the financially excluded or underserved segment of the population. In this situation, studies may find negative impact of micro-credit programmes.

Self-selection bias occurs when the individuals select themselves in the micro-credit programme. These self-selected borrowers might have some unobservable characteristics such as entrepreneurial skills which motivate them to join the programme and correlate with the outcome of interest. Coleman (1999) argued that unobserved entrepreneurial skills and unmeasured female empowerment of the self-selected would influence both borrowing decision and impact measures on households'

income and assets. The problem of self-selection can be avoided by applying randomised control trials (RCTs) in which the individuals are randomly assigned into treatment and control groups, which balances the heterogeneity of the borrowers' and non-borrowers' characteristics (Karlan and Validivia, 2011). A number of recent studies were carried out to measure the impact of micro-credit by using RCTs where borrowers and control groups were randomly assigned (Karlan and Zinman, 2010 and Karlan and Zinman, 2011) as well as where the micro-credit programme was randomly placed (Angelucci, Karlan and Zinman, 2015; Tarrozi, Desai and Johnson, 2015; Banerjee *et al.*, 2015).

However, Biosca, Lenton and Mosley (2015) argued that RCTs might have problems related to internal validity, such as spillover effects and attrition bias, and external validity which requires fixed investment and generates evidence at the end of a discrete time period rather than continuously. This external validity accentuates the problem of selecting which few should be studied among many possible treatments, as well as where and when.

There are only a few studies which applied quasi-experimental survey design in order to control for the self-selection bias (Pitt and Khandker, 1998; Coleman, 1999; Tedeschi, 2008; Khan and Wright, 2015). Pitt and Khandker (1998) identified three sources of bias inherent in evaluating the impact of micro-credit. *The first*, non-random programme placement bias since it seems that the micro-credit programme established their branches across the villages of Bangladesh in a non-random fashion. Management of the MFIs confirmed that they often place branches in relatively poor areas and natural disaster prone areas. Thus it is unlikely to place branches in richer villages than

in poorer ones. However, on the one hand, a comparison of treatment villages (poor village) with the control villages (rich villages) may lead to negative impact of micro-credit on household income and wealth. On the other hand, micro-credit programmes may be placed in relatively developed villages (Sharma and Zeller 1999), thus we may find positive impact of micro-credit.

The second, village level characteristics such as local markets, schools, and NGO offices may influence the demand for credit and the household outcomes of interest such as income and expenditure. For example, villages' proximity to urban areas may have high demand for credit to undertake small and medium scale activities as opposed to less developed villages or the villages' propensity to natural disaster. Finally, unmeasured household characteristics such as gender equality, family member health, and entrepreneurial ability may also influence both demand for credit and household outcomes of interest. In their quasi-experimental settings, they attempted to control for the potential biases and considered households with and without micro-credit as well as households in the villages (control villages) where there is no micro-credit programme.

Coleman (1999) carefully constructed control and treatment groups to tackle self-selection bias, while assessing the impact of group-lending in Thailand. He used both current borrowers and non-borrowers where there are micro-credit programmes and an additional control group consisting of households in villages where micro-credit will be given in one year among those interested. Thus, Coleman is able to control for self-selection bias into the programme by interviewing current borrowers and future (pipeline) borrowers.

Tedeschi (2008) put in extra effort in order to control for the self-selection bias while investigating the impact of micro-credit programme in Peru. Tedeschi randomly assigned current borrowers to the treatment group and compared with three control groups. The control groups are drop-outs, new borrower and never borrowed. She argued that the impact of micro-credit might be overestimated if one fails to include drop-outs, and new borrowers are also better served to control for self-selection bias. Karlan (2001) expressed a concern that the studies based on cross-sectional data may lead to bias results because they include only current borrowers but inadvertently exclude drop-outs who may be negatively affected by the micro-credit. Tedeschi and Karlan (2010) found that exclusion of drop-out borrowers from the treatment group overestimates the impact of micro-credit.

A recent study conducted by Khan and Wright (2015), designed a quasi-experimental survey while investigating the impact of micro-credit programme on household outcomes such as income and expenditure in Pakistan. In this survey design, they assigned existing borrowers to the treatment group and on the other hand, they included three control groups (never borrowed, pipeline borrowers and drop-out borrowers). These three groups were included in order to control for the potential self-selection biases.

In recent years, there have been a number of studies which have employed propensity score matching method to assess the impact of micro-credit (Chemin, 2008; De Silva, 2012; Duvendack and Palmer-Jones, 2012 and Ghalib, Malik, and Imai, 2015). In the propensity score matching, treatment and control groups are matched on the basis of some observable characteristics such as age, education, and household size.

There are some difficulties and practical issues involved in finding a control group which is exactly similar to the treatment group. This matching score method might not be appropriate when programme participation is driven by some unobservable characteristics such as enterprising skills. Therefore this method fails to control for the self-selection bias which is a major problem in the impact assessment of micro-credit.

5.3 Overcoming Self-selection and Programme Placement Bias: A Quasi-experimental Design

The main aim of this thesis is to investigate the impact of micro-credit on poverty in Bangladesh. The thesis employs a quasi-experimental survey design in which the current borrowers and control groups are selected on the basis of a criterion which is the quality of the house or living condition. The thesis also includes four control groups: non-borrowers, pipeline borrowers, refused borrowers and drop-outs. The further details of the survey design and both the controls and treatment groups are discussed later in this chapter. This section explains how a quasi-experimental design became instrumental for this study in order to control for potential self-selection biases.

Meyer (1995) stressed that multiple control groups can be helpful to reduce the importance of biases or random variation which may not be possible by using a single comparison group. Up until now, almost all empirical studies on the impact assessment of micro-credit have been focused on a comparison of current borrowers with non-borrowers except Tedeschi (2008) and Khan and Wright (2015). In order to control for the self-selection bias, Khan and Wright (2015) introduced a quasi-experimental design in which current borrowers of micro-credit were considered in the treatment group and three control groups: non-borrowers, drop-outs and pipeline borrowers, were included.

Following Khan and Wright (2015), this study also assigned existing borrowers to the treatment group and comparing with the four control groups (non–borrowers, drop-out borrowers, refused borrowers and pipeline borrowers), each group is aimed at attempting to control for some aspects of self-selection bias. As mentioned earlier, the treatment group consists of existing borrowers who are currently borrowing, have spent (or spending) the loan and are making weekly repayments and at the same time saving a certain amount of money on both their voluntary and compulsory savings account. So in this respect, this study is similar to most other empirical studies which have aimed at investigating the impact of micro-credit on households' outcomes. However, this study significantly differs from most other empirical studies in relation to the control groups. It is worthwhile to discuss how each control group is going to be controlled for the aspects of self-selection bias.

The first control group consists of non-borrowers who never received a loan. Hence they are neither making any repayment nor saving money with any financial institution. In other words, these respondents do not have any affiliation with the financial institutions or formal banking. Therefore, it is obvious that there is no effect of micro-credit on those households' outcomes. If the self-selection was not an issue, then a comparison of the borrowers with non-borrowers would give us meaningful estimates of the impact of micro-credit. One view is that these households did not apply for a loan because they might be lacking of some characteristics such as entrepreneurial skills or risk-taking abilities. It could also be a fact that gender discrimination might be an issue for these households because loan officers are usually male, so the head of households (generally male) may not allow their spouse to join a micro-credit

programme. Hence keeping this in mind, it is worth looking to find a control group which is more or less similar to the treatment group in order to overcome the self-selection bias.

The second control group consists of refused borrowers. The households previously applied for a loan but did not receive one for some reason. The households belonging to this group might have some unobservable skills such entrepreneurial skills which motivate them to apply for micro-credit. This group may be better than the non-borrowers in this respect. Therefore, a comparison of borrowers with refused borrowers would give us meaningful estimates of the impact of micro-credit.

The third control group consists of drop-out borrowers. The drop-out borrowers had a micro-credit loan in the past but at the time of the survey they no longer had a loan nor were making repayments. There are several reasons for drop-out of the micro-credit programme. *First*, some households defaulted on an earlier loan and hence are forced out of the programme. *Second,* some households did not re-apply despite being eligible for further loans. *Third*, some households might be better off and hence no longer meet the criteria to apply for the loan. However, if the current borrowers are self-selected, then drop-out borrowers are also self-selected. Therefore, a comparison of drop-out borrowers and current borrowers is another way of controlling for the self-selection bias related to the programme participation. Studies used drop-out borrowers as an additional control group and aimed to mitigate self-selection bias (*see* Tedeschi, 2008; Khan and Wright, 2015).

The fourth control group consists of pipeline borrowers. The households who applied for a loan and became successful in getting MFI membership but they had not

yet received the loan. Typically, pipeline borrowers wait about two weeks to four weeks for the loan. During this period, the loan officers monitor them to see whether they come to the group meetings on time or save money into the voluntary savings account as agreed until they receive the loan. Since they had not received the loan at the time of the survey, there cannot be any impact of micro-credit. Now if the current borrowers are self-selected, then the pipeline borrowers are also self-selected because some time ago current borrowers were pipeline borrowers. Hence these two groups have some unobservable characteristics such as enterprising skills, gender equality and risk tolerance which might not be found among the non-borrowers. In this circumstance, a comparison of pipeline borrowers with the current borrowers would give meaningful estimates of the impact of micro-credit programmes. Hence the pipeline borrowers would play an important role in order to control for the self-selection bias. Studies used pipeline borrowers or new borrowers or those who intend to borrow as an additional control group in order to control for the self-selection bias (*see* Coleman, 1999; Tedeschi, 2008; Khan and Wright, 2015).

The results of the impact of micro-credit programmes have also been criticised because of the non-random programme placement bias. It is argued that the micro-credit programmes could be placed, in a non-random manner, in the relatively wealthy villages to ensure financial sustainability. The literature casts a doubt about the possible selection bias which might arise from the non-random programme placement bias. However, this thesis meticulously investigated the factors affecting micro-credit programme placement and branch density on the earlier chapter. In doing so, this study collected data from 2,936 branches of ASA Bangladesh and also collected data

randomly from 2,936 non-ASA villages. The data on branch location characteristics such as government and private infrastructures (competitors, local markets and banks) and the poverty indicator, the rate of poverty, were collected. After analysing the data, this study confirmed that the MFIs such as ASA Bangladesh tend to focus on the poverty stricken areas. Therefore, the non-random programme placement bias could pose a problem for estimating the impact. This study has taken a couple of steps in order to control for the non-random programme placement bias. *First*, the literature suggests that the impact assessment survey should interview the treatment group and control group from the same neighbourhood where both the groups have access to micro-credit and share the similar demographics in order to eliminate the potential non-random programme placement bias (Karlan and Goldberg, 2011). Thus, this study interviewed treatment group and control groups from the same neighbourhood and hence, both the groups have access to micro-credit. Second, Tedeschi (2008) claimed that the non-random programme placement does not appear to be a problem after controlling for the branch fixed-effect. However, in this study fixed-effect at branch level would yield the same results as Thana level because one branch is selected from each Thana.

5.4 Poverty Measures:

This thesis focuses on "absolute poverty" which is measured by using households' income and a predetermined poverty line. This section explains the methodology that is used to measure poverty for this study.

5.4.1 Per Capita Income:

This thesis focuses on measuring absolute poverty using household's income and a predetermined poverty line. Household's per capita income is calculated as the total household income is divided by the household size. Households are considered as poor whose households' per capita income below the poverty line and otherwise non-poor. There are some issues concerning with the calculation of per capita income, for example whether we should consider children in households costs as much as adults. On the one hand, some studies argued that it will be overestimated if we consider children costs as much as adults within the households. On the other hand, if we consider children costs less than adults within the households then it may cause underestimation because it takes away the well-being of children within the households. However, Deaton and Zaidi (2002) suggested that one should put more weight on children particularly in low-income countries such as Bangladesh because there is rarely any social safety net programmes such as cash or cash in-kind support for the children. It can be confirmed that there is no social safety net programmes for children in Bangladesh and thus the children may costs more than the adults. Given the context of Bangladesh, this study decided to use Household Per Capita Income.

5.4.2 Poverty Lines:

Poverty is measured by using the Cost of Basic Needs (CBN) method in which the quantities of a basket of basic food items are scaled according to the nutritional requirement of 2,122 calories/day/person and then the estimated costs of the foods are considered as food poverty line (BBS, 2010).

According to the World Bank (2007) household's per capita income should be $1.25 per day to meet the nutritional requirement of about 2,100 calories and hence, the households are considered to be extremely poor if their income is less than $1.25 per day per person based on 2005 purchasing power parities (PPPs). The extreme poverty line, $1.25 per day per person income, continues to be widely used across low-income countries including Bangladesh (ADB, 2014).

With reference to the World Bank extremely poverty line, $1.25/day/person, recently the ADB (2014) updated a poverty line by using 2010 PPPs which is $1.51/day/person for low-income countries in Asia including Bangladesh. ADB (2014) argued that the World Bank extreme poverty line is questionable especially for Asia for several reasons. First, it represents the average value of national poverty lines of the 15 poorest countries in the world and most of which are from Africa and only two countries from Asia (Tajikistan and Nepal). In fact, after studying 28-countries in Asia, ADB (2014) found that the extreme poverty line for the low-income countries, for example Bangladesh ($1.48) in Asia is above except Afghanistan ($1.24) by using 2005 PPPs. Therefore the $1.25 poverty line does not represent the Asian countries correctly. Second, the choices of basic food items differ between region to region and even change within the same region, particularly for rapid growing Asia, over time. Hence it might not be representative for all Asian countries. Third, since $1.25 poverty line was updated by using 2005 PPPs, so the Asia's updated consumption data would likely lead to a higher poverty line. Finally, with reference to consumer preferences and technological progress, the relative prices of goods and services are significantly changing over time. Thus, there will be a substitution effect because typically

consumers tend to substitute for those goods and services whose relative prices grow faster than others. Therefore, the food items and quantities that were used to calculate $1.25 poverty line may no longer represent what poor actually consume.

To sum up, the ADB extreme poverty line $1.51/day/person is more updated version of the World Bank $1.25 poverty line. Moreover, the ADB used recent data on the price of the foods and also used the consumption data from Bangladesh and hence it is better representative. Therefore it is more convincing to use the ADB poverty line.

5.5 Data:

This thesis administers a field survey in 24-districts in Bangladesh, during June'14 and September'14, using a structured questionnaire. Keeping self-selection and programme placement bias in mind, this thesis uses a quasi-experimental survey design. This thesis collects the data from the current borrowers of ASA Bangladesh and assigned them to the treatment group. This thesis also collects the data from four different types of control groups and these are: pipeline borrowers, refused borrowers, drop-outs and non-borrowers. It is noteworthy that all respondents for this study are from ASA Bangladesh except the non-borrowers who are yet untapped by the MFIs. This section discusses the details of the data collection process for this study.

5.5.1 Questionnaire Design and Pilot Survey:

The questionnaire was designed in order to investigate the aims of this study. A number of questionnaires used in the previous impact assessment studies, such as the World Bank's questionnaire, of micro-credit on poverty reduction were consulted

during the process of designing the questionnaire. A pilot survey was conducted in two districts, Gazipur and Shariatpur, during February and March in 2014. Initially, 50 current borrowers and 30 non-borrowers were interviewed by the R&D (Research and Development) staff members of ASA, Bangladesh. After completing the pilot survey, the questionnaire was carefully tested and necessary changes were made before the final survey. Since this study was looking to interview five different categories of respondents, five different sets of questionnaires were developed. The five categories are; current borrowers of ASA, non-borrowers who never applied for micro-credit, refused borrowers who applied for a loan but were refused, drop-out borrowers who previously borrowed but dropped-out for some reason and pipeline borrowers who currently have a membership but have not received the loan yet. All sections of the questionnaires are the same for all five categories except one section which is related to credit and ASA membership. The questionnaires are included in the Appendix-5.

5.5.2 Data Collection:

Data was collected through face-to-face interviews over the period from June 2014 to September 2014. The survey aimed at collecting the respondents' demographics, household income and expenditure and credit related information through a structured questionnaire. This study elicited information about the age, gender composition and level of education of the respondents' family members. The survey also collected information on household income and expenditure. It is important to note that the author was joined by two staff members from the R&D division of ASA Bangladesh. Before the survey, staff members from the R&D division received training on technical terms and coding of the questionnaires and how to carry out interview and

complete the information correctly. The objectives of the study were also clearly explained to them. This study aimed at collecting data from 24 districts (out of 64-districts) covering all seven divisions (highest administrative units) of the country. A list of branches is provided in the Appendix-6**.**

A three stage sampling design was used to collect the data for this study. In the first stage, 54 Thanas (lowest administrative unit called Thana) were selected from 24-districts based on the poverty indicators such as the literacy rate and poverty head count ratio of the Thanas. Thus, the author selected Thanas where literacy rate is low and the ratio of poverty is high. In addition, some Thanas were also selected where there is a relatively high literacy rate and low poverty head count ratio. This study also selected five Thanas which are known as *marshland* (locally known as *Haor Areas*). During the rainy seasons, from May to October every year, people have very limited options of income sources and limited opportunity of movement to and from the home. These places also have a low literacy rate and high poverty head count ratio.

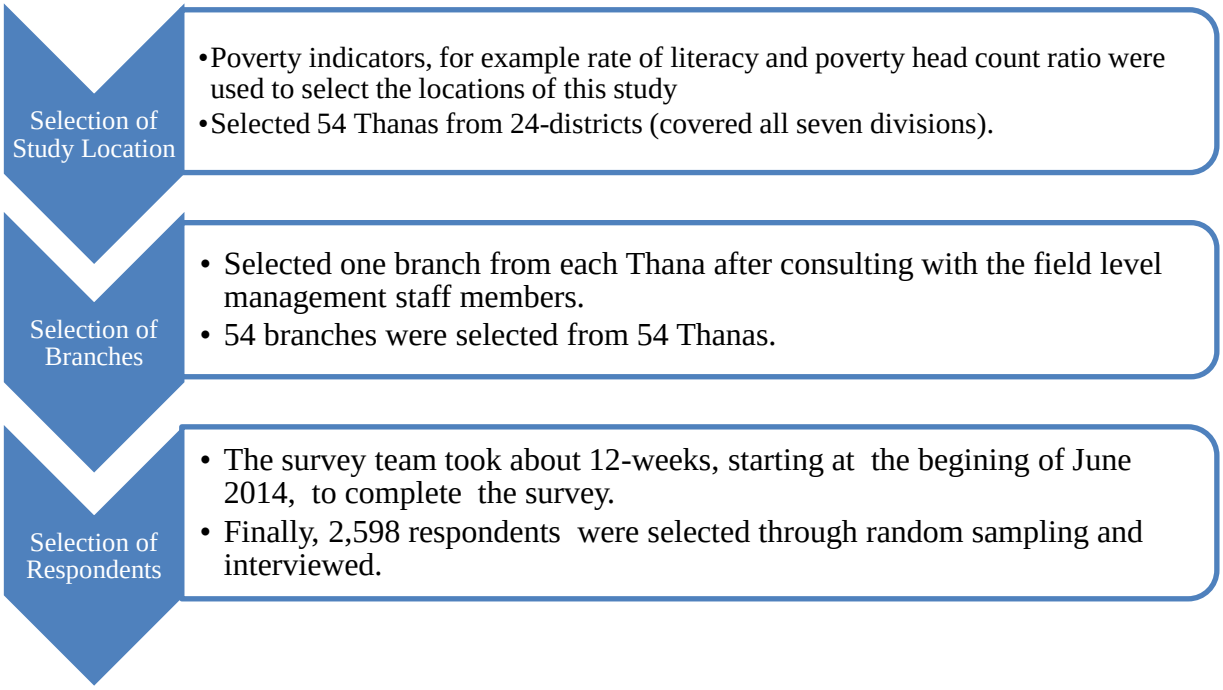
In the second stage, since there are, on average, 5 branches in each Thana, the author selected one branch from each Thana and thus, 54 branches from the 54 Thanas were selected after having a consultation with the R&D staff members and field level management staff such as Regional Managers. Then, all the 54 Branch Managers and the relevant Regional Mangers and District Managers were being informed about the survey.

The survey team members visited the 54 branches and provided training to the loan officers and Branch Managers as they were directly involved in conducting face-to-face interviews. The main purpose of the visit was to give hands on training on how

to carry out face-to-face interviews and how to create a friendly environment with the interviewees and thus, get the information to complete the questionnaires. The survey team carried out 3 to 4 interviews at each selected branch in order to teach them properly and thus, improving the quality of the data. The field level management staff members (Regional Managers/District Managers) were involved along with the Branch Managers for monitoring purposes and follow-up the survey. After the training session, each branch was given four to five weeks in order to complete at least 50 interviews among borrowers and control groups.

In the final stage, respondents, both micro-credit borrowers and control groups, for this study were randomly selected. Control groups consist of four types of respondents. These are pipeline borrowers, refused borrowers and drop-out borrowers. And the non-borrowers were selected from the villages where micro-credit operation is available. However, the loan officers were told that they should select those non-borrowers who are eligible for micro-credit but did not apply for credit yet. In this case, one of the criteria used to select non-borrowers was the quality of the house. The quality of the house tells us about the socio-economic status of a household. It is observed in low-income countries that poor people have a relatively low quality house, for example houses made of bamboo and mud. After completion of the survey by the each branch, they were asked to send the questionnaires back to the head office.

The process of sample selection of the survey is described below using a flow chart:



5.5.3 Monitoring and Quality Control of the Survey:

Monitoring was important in order to complete the survey within the estimated time and maintain its quality. Since the survey was conducted across the country (54 Thanas from 24-districts), the author formed a three tiers of monitoring team. In the first tier, all the branch managers were told to look after the survey and provide feedback and assistance to the interviewers at the first instance, as needed. The second tier consisted of the Regional Managers and the District Managers of the selected branches to monitor the progress of the survey. In the last tier, the author closely monitored all 24 District Managers/Regional Managers. As part of the quality control of the survey, the Regional Managers had re-surveyed 5 per cent of the questionnaires randomly for each branch for which they were being assigned to.

Besides monitoring the survey, this study has taken a number of steps in order to improve the quality of the survey data. *First*, the loan officers and managers were requested to carry out the face-to-face interviews because they are very well known to the people of the locality. Therefore, the respondents would feel comfortable giving their households information to them and thus improving the quality and reliability of the survey data. *Second*, since each interview was about an hour long, this study gave incentives to the respondents, $1.25 per respondent, for their time and effort. *Third*, as the target respondents of this study are from the poorest segment of the population and hence less educated, the study put a lot of effort into the wording of the questionnaires. Especially, when the interviewees were asked about their educational qualification then they replied they do not have any qualification. But when they were questioned had you been to school then they replied the number of year(s) of schooling. Interestingly, the study found out that with the local dialect, interviewers were able to get close to the interviewees thus helping to create a friendly environment for the interviewees.

5.5.4 Sample Size Justification:

Hamburg (1979) argued that objectives of a study may not be achieved if the sample size is smaller than required and however, resources are wasted if the sample is larger than required. Certainly, the greater the degree of desired precision, the larger will be the sample size.

As explained earlier, a three-stage sampling method was used to collect the data for this study. This study was intended to interview about 500 respondents for each category of the respondents to make a total sample size of 2,500. The population of this

study is fairly large, about 26 million borrowers in Bangladesh (MRA, 2013). In particular, ASA Bangladesh has over 4.3 million borrowers in Bangladesh. Therefore it is worth looking at whether the size of the sub-samples or the intended total sample size is fairly big enough to make an inference about the population. To answer this question, this study used the following formula, which is appropriate for infinite population in order to determine the required sample size (Hamburg, 1979).

Sample Size (n) = $[p\ (1\text{-}p)Z^2]/e^2$

Where e = sampling error (say 0.05) and Z is multiple of standard errors corresponding to the specified probability (say Z = 1.96 at 95% confidence interval). Most conservative estimate for the sample size (n) is given by assuming p= 0.50 and q = 0.50. This follows the fact that the product, p*q, is larger for p= 0.50 and q =0.50 than for any other two possible p and q values (where p+q =1). Thus the largest or most conservative value for "n" is determined by substituting p = q= 0.50. Therefore, by using the above formula, the minimum sample size is about 384 for infinitely large population**.** Gay, Mills and Airasian (2009) also confirmed that if the population size is 5,000 or over or regardless of the population size, a sample size of 400 will be adequate. However, this study collected a sample size of 2, 598 (minimum sub-sample size is 500) which is fairly large.

5.5.5 Distribution of the Sample:

The following table shows the distribution of the sample by five categories of the respondents. This study collected a sample size of 2,598 people. About 21 percent of the sample consists of current micro-credit borrowers of ASA and this group is

known as treatment group. On the other hand, about 79 per cent of the respondents consist of the control groups. Of the total respondents, almost 21 percent consist of non-borrowers while refused borrowers, drop-outs and pipeline borrowers are approximately equal, at just over 19 percent.

Table 5.1: Distribution of the Sample

Borrowing Status	No of Households	Percentage
Borrowers	555	21
Non-Borrowers	536	21
Refused	500	19
Drop-out Borrowers	500	19
Pipeline Borrowers	507	20
Total	2,598	100

5.5.6 Distribution of the Sample by Location:

There are seven divisions (highest administrative unit) in Bangladesh. Data was collected from all seven divisions. Of the total sample, 885 respondents were from Dhaka Division which is the largest division in terms of size. The second highest number of respondents (406) was from Rangpur Division which is followed by Chittagong (350) and Sylhet (350). Rajshahi division has the lowest number of respondents (100) while Khulna division and Barisal division has double and threefold the number of respondents respectively compared with Rajshahi.

Table 5.2: Distribution of the Sample by Location

Borrowing Status	Dhaka	Chittagong	Rajshahi	Rangpur	Khulna	Barisal	Sylhet	Total
Borrower	215	70	20	80	40	60	70	555
Non-Borrowers	190	70	20	86	40	60	70	536
Refused	160	70	20	80	40	60	70	500
Drop-out Borrowers	160	70	20	80	40	60	70	500
Pipeline Borrower	160	70	20	80	47	60	70	507
Total	885	350	100	406	207	300	350	2,598

5.6 Descriptive Statistics:

This section presents the socio-economic characteristics such as age, education and gender composition of the sample households.

5.6.1 Age of the Respondents:

The following table shows the mean age, standard deviation (std. Dev.), minimum and maximum age of the five categories of respondents. The average age of the borrowers, pipeline borrowers, non-borrowers and drop-outs are almost similar, at about 36 years of age. Only non-borrowers who were refused a micro-loan have the highest mean age, 41 years of age. Also there is no significant difference in the minimum age of the five categories but the maximum age ranges from 64 to 77 years. However, the result of the mean equality F-tests indicates that mean age of the respondents are statistically significantly different across the five groups.

Table 5.3: Age of the Respondents

Borrowing Status	Obs.	Mean	Std. Dev.	Min	Max
Borrowers	555	36	8.5	20	64
Non-Borrowers	536	36	11.0	18	65
Refused Borrowers	500	41	13.4	18	77
Drop-Outs	500	36	10.7	18	70
Pipeline Borrowers	507	36	9.7	18	65
Mean Equality F-test		19.6***			

***Significant at 1% level

5.6.2 Age of the Household Head:

The following table shows the mean age, standard deviation and minimum and maximum age of the head of sample households. It appears that the average age of the head of households for all the categories are similar except the refused category. The minimum age is highest for the borrowers, 23 years and the maximum age is highest for the refused category, 85 years. Moreover, there is no significant difference in the minimum ages of the control groups but the maximum ages vary from 75 to 85 years. However, the result of the F-test indicates that the mean age of the head of households is statistically significantly different across the five groups.

Table 5.4: Age of the of Households Head

Borrowing Status	Obs.	Mean	Std. Dev.	Min	Max
Borrowers	519	43	9.6	23	76
Non-Borrowers	517	43	11.2	20	75
Refused Borrowers	485	47	13.8	21	85
Drop-Outs	489	43	11.8	20	80
Pipeline Borrowers	496	43	10.8	19	75
Mean Equality F-test		10.8***			

***Significant at 1% level

5.6.3 Education of the Respondents:

The following table shows the average years of schooling of respondents and the percentage of respondents with no education. The pipeline borrowers have the highest average years of schooling, 4.4, followed by non-borrowers and current borrowers. The refused category of respondents has the lowest mean years of schooling and highest percentage of respondents, 42 percent, with no education. Current borrowers have the lowest percentage, 28 percent, of respondents with no education while about 30 percent of the pipeline borrowers have no formal education. However, F-test indicates that there is a statistically significantly difference of the mean years of schooling of the respondents across the five groups.

Table 5.5: Education of the Respondents

Borrowing Status	Obs.	Mean Years of Schooling	Std. Dev.	No Education (%)
Borrowers	555	4.1	3.3	28
Non-Borrowers	535	4.2	4.0	37
Refused Borrowers	500	3.0	3.2	42
Drop-Outs	500	3.5	3.5	40
Pipeline Borrowers	507	4.4	3.7	30
Mean Equality F-test		13.8***		

***Significant at 1% level

5.6.4 Head of Household Education:

The following table shows the mean years of schooling of the head of households and the percentage of the head of households who have no formal education. With regards to the head of households' education, the pipeline borrowers

have the highest mean years of schooling (4.9 years), followed by the non-borrowers (4.6 years). Average education of the head of households is the lowest for the refused category (3.6 years). Also the refused category has the highest percentage (43 per cent) of head of households with no formal education. The percentages of head of households, 33 percent, with no formal education are similar for the borrowers and pipeline borrowers. The percentages of head of households with no formal education are almost equal for the non-borrowers and drop-out borrowers. The mean equality F-test indicates that there is a statistically significantly different of the mean years of schooling across the five groups.

Table 5.6: Head of Household's Education

Borrowing Status	Obs.	Mean Schooling	Std. Dev.	No Education (%)
Borrowers	554	4.4	3.8	33
Non-Borrowers	527	4.6	4.5	39
Refused Borrowers	500	3.6	3.9	43
Drop-Outs	500	4.2	4.1	38
Pipeline Borrowers	507	4.9	4.3	33
Mean Equality F-test		7.4***		

***Significant at 1% level

5.6.5 Household Size of the Respondents:

The following table shows the mean number of children, adults and elderly people in each household and mean household size of the respondents. Current borrowers have both the highest average number of children and adults but the lowest average number of elderly people. The rest of the groups of respondents have an almost similar average number of children and adults. The refused category of respondents has

the highest average number of elderly people while non-borrowers and pipeline borrowers have a similar average number of elderly people in the households. On the other hand, current borrowers have the highest average household size while non-borrowers have the lowest. The average household size of the three categories, refused, drop-out and pipeline borrowers, are similar. However, the results of the mean equality F-tests indicate that the household's size of the five groups is statistically significantly different. The number of children, adults and elderly are also separately statistically significantly different across the five groups.

Table 5.7: Age Composition and Mean Household Size of the Respondents

Borrowing Status	No of Children	No of Adults	No of Elderly	Mean HH Size
Borrowers	1.7	2.7	0.1	4.5
Non-Borrowers	1.4	2.5	0.2	4.1
Refused	1.4	2.5	0.4	4.3
Drop-Out	1.5	2.6	0.2	4.3
Pipeline Borrowers	1.4	2.7	0.2	4.3
Mean Equality F-test	6.6***	3.1***	24.5***	8.8***

Note: Children = <15 yrs.; Adults =16-59 yrs.; Elderly = 60 yrs. or above;***Sig. at 1% level

Then, in the following table, the size of the households is broken down by age and gender composition. Current borrowers have the highest number of female and male children and male adults but the lowest number of both female and male elderly. The respondents who were refused a loan have the lowest male adults and the highest female and male elderly people in the households. The mean equality F-tests indicate that the average number of household members are statistically significantly different when it is broken down by age and gender.

Table 5.8: Age and Gender Composition of the Household Members

Borrowing Status	Female Children	Male Children	Female Adults	Male Adults	Female Elderly	Male Elderly
Borrowers	0.8	0.9	1.3	1.4	0.05	0.08
Non-Borrowers	0.7	0.7	1.2	1.3	0.06	0.11
Refused Borrowers	0.7	0.7	1.2	1.2	0.16	0.23
Drop-Outs	0.7	0.8	1.2	1.4	0.08	0.14
Pipeline Borrowers	0.6	0.7	1.3	1.4	0.06	0.10
Mean Equality F-test	2.5**	4.4***	3.0**	4.6***	13.7***	16.1***

**Significant at 5% level; ***Significant at 1% level

5.6.6 Households Income:

The following table shows the monthly mean income and Per Capita Income (PCI) of the respondents. The current borrowers ($187) have the highest average income, followed by pipeline borrowers ($165). Drop-out borrowers ($144) have slightly higher income than both the non-borrowers ($128) and refused ($129). It might be the case that many of the drop-out borrowers take themselves out of the programme because they think that they became well off and no longer need the loan. Similarly per capita income for the borrowers ($48) is the highest, followed by pipeline borrowers ($41). Interestingly, the average income of non-borrowers and the refused category of the respondents are similar but non-borrowers have a higher per capita income than the refused category. However, the results of the F-tests indicate that both the average monthly income and per capita income (monthly) are statistically significantly different across the five groups.

Table 5.9: Monthly Mean Income (Taka) and Per Capita Income (PCI)

Borrowing Status	Obs	Mean	Std. Dev.	PCI
Borrowers	555	14,496 ($187)	6,582	3,707($48)
Non-Borrowers	536	9,899 ($128)	4,500	2,586($33)
Refused	500	10,003 ($129)	4,634	2,494($32)
Drop-Out	500	11,174 ($144)	4,953	2,810($36)
Pipeline Borrowers	507	12,760 ($165)	5,835	3,207($41)
Mean Equality F-test		71.1***		42.1***

***Significant at 1% level; USD. $1 = 77.5 Bangladesh Taka

The following table shows average monthly income of the respondents by various sources of income. Pipeline borrowers have earned the highest income from wages (64 per cent of the total income) followed by current borrowers (52 per cent of the total income). Monthly average income from wages is similar for non-borrowers and refused borrowers. However, average monthly income from business (31 per cent of the total income) is the highest for current borrowers, which is significantly higher compared with the four control groups. This could be explained by the fact that micro-credit institutions provide loans to their borrowers for either existing business or starting-up new businesses. Therefore the difference of business income between the treatment and non-treatment group could be attributed to the impact of micro-credit. Again borrowers are earning the highest average income from agriculture (7 per cent of the total income) but, except for the refused category, there is no significant difference compared with the control groups. Borrowers are also receiving the highest average income from others sources, which include remittance and manual domestic jobs,

compared to the control groups. The results of the F-tests indicate that average incomes received from the various sources, such as wages and businesses, are statistically significantly different across the five groups.

Table 5.10: Average Monthly Income by Source (BDT)

Borrowing Status	Wage	Business	Agriculture	Others
Borrowers	7,478	4,527	1,047	2,008
Non-Borrowers	6,215	1,984	950	1,134
Refused	6,530	2,111	598	1,234
Drop-Out	7,128	2,254	929	1,326
Pipeline Borrowers	8,222	2,512	907	1,777
Mean Equality F-test	12.2***	20.6****	3.5***	9.0***

***Significant at 1% level; USD. $1 = 77.5 Bangladesh Taka

5.6.7 Households Expenditure

The following table shows average monthly expenditure and Per Capita Expenditure (PCEXP) of various categories of the respondents. Both average monthly mean expenditure ($149) and per capita expenditure ($35) are the highest for borrowers followed by pipeline borrowers. Average monthly expenditure is almost similar ($114) for both non-borrowers and the refused category of the respondents but per capita expenditure is much lower for the refused category. Per capita expenditure is similar for non-borrowers and drop-out borrowers. However, the results of the F-tests indicate that both the mean household expenditure and per capita expenditure (monthly) are statistically significantly different across the five groups.

Table 5.11: Average Monthly Expenditure (Taka) and Per Capita Expenditure

Borrowing Status	Obs.	Mean	Std. Dev.	PCEXP
Borrowers	555	11,541($149)	5,263	2,682($35)
Non-Borrowers	536	8,841($114)	3,784	2,300($30)
Refused	500	8,803($114)	3,714	2,190($28)
Drop-Out	500	9,535($123)	3,997	2,366($31)
Pipeline Borrowers	507	10,140($131)	4,335	2,509($32)
Mean Equality F-test		37.9***		17.9***

***Significant at 1% level; USD. $1 = 77.5 Bangladesh Taka

The following table shows monthly expenditure on various categories of food and non-food items such as food, health and education by the status of the borrowers. Monthly expenditure on food items is highest for the borrowers (about 61 per cent of the total expenditure) followed by pipeline borrowers. However, all four control groups spend about 65 per cent of the total monthly expenditure on food items. Again, it appears that borrowers spend the highest amount of money on clothing but the expenditure on clothing is almost the same, just over 8 per cent, as a percentage of the total household expenditure across the five categories of the respondents. However, borrowers spend the highest amount on medical, education and utilities while the refused category of the respondents spends the lowest amount on these three items. Non-borrowers spend the largest amount of money on rent, followed by the refused category. The results of the F-tests indicate that the average monthly expenditures are statistically significantly different for all the food and non-food items across the five groups except rent.

Table 5.12: Average Monthly Expenditure by Various Household Outcomes

Borrowing Status	Food	Clothing	Medical	Education	Utilities	Rent	Others
Borrowers	6,983	942	834	978	563	151	1,180
Non-Borrowers	5,774	739	644	580	408	228	517
Refused	5,842	700	670	555	384	185	554
Drop-Out	6,172	821	740	680	464	179	541
Pipeline Borrowers	6,496	866	713	797	455	150	738
Mean Equality F-test	20.8***	12.3***	6.9***	15.8***	11.4***	1.1	33.4***

***Significant at 1% level; USD. $1 = 77.5 Bangladesh Taka

To summarise, current borrowers have the highest average household's income and expenditure and followed by the pipeline borrowers. The refused borrowers have the lowest per capita income and expenditure. However, the mean year of schooling for the head of household is the highest among pipeline borrowers and the lowest among refused borrowers.

5.7 Econometric Specifications:

This study calculated the three dimensions of poverty, poverty head count ratio, average deprivation and relative deprivation of poverty, by using the FGT poverty measures. However, this study estimates two dimensions of poverty (incidence of poverty and the average deprivation of poverty) empirically. Following the FGT poverty measures, the incidence of poverty, which is a binary variable, is fit into the Probit Model and the average deprivation is fit into standard Tobit regression. The details of the models are explained below.

5.7.1 The Probit Model:

According to the FGT poverty measures, the respondents whose income is less than the poverty line are considered as poor and coded as one (1) and the respondents whose income is below the poverty line are considered as non-poor and coded as 0. Since the dependent variable is binary, this study employs the Probit Model for investigating the impact of micro-credit on poverty. Imai *et al.* (2012) applied the probit model in order to investigate the determinants of access to micro-credit.

According to Gujrati (2004) the probit model can be explicitly specified as:

$$\Phi^{-1}(P_i = 1|X_{ij}) = \boldsymbol{\alpha} + \beta X_{ij} + \delta M_k + \sum_{j=1}^{q} D_{ij}\, T_{ij} + \mu_{ij} \quad \text{.....(5.7.1)}$$

Here, P_i is the probability that an event will occur, in the case of this study, the probability of an individual living below the poverty line which is measured by the standard normal cumulative distribution function (CDF) Φ. X_{ij} is a vector of household (i^{th}-household) characteristics such as age and education from j^{th} Thana. Here, δ measures the effectiveness of the micro-credit programme and M_k (k = 1,2,3..r) is a dummy variable indicating the borrowing status of the respondents. And D_j is the Thana dummies (j= 1,2,3…..q) included in the above model for sweeping out biases arise from the Thana-Level heterogeneity.

5.7.2 Standard Tobit Regression:

Standard Tobit model or Type I Tobit Model refers to regression models in which a specified range of the dependent variable is censored or constrained in some way. This type of model was first introduced by Tobin (1958) in economics. As

discussed elsewhere, this study empirically estimated the two indicators of poverty. One is the incidence of poverty in which this study calculated the number of respondents is poor and non-poor based on a poverty line. Another one is poverty gap ratio, which captures average deprivation of poverty. With respect to the average deprivation of poverty, value of the observations lies between 0 and 1. For the non-poor, value is 0 (zero) meaning that there is no average deprivation from the poverty line or there is no poverty gap for the non-poor. For the poor, the average deprivation of poverty or the ratio of poverty gap lies between greater than zero and less than or equal to 1. There are many observations in this study whose income is above the poverty line. In this situation, we are unable to use any continuous density function to explain the conditional distribution of the average deprivation or the poverty gap because a continuous density is inconsistent with the fact that there are many observations whose income is beyond the poverty line and eventually the average deprivation of poverty is zero for the non-poor (Amemiya, 1984 and Woolridge, 2002). Thus the average deprivation of poverty generates a censored sample and made a suitable candidate for the Tobit Model. However, the model is called truncated if the observations outside a specified range are totally lost. Studies, Maddala (1983) and Amemiya (1984), argued that estimating least squares on the censored sample leads to bias and inconsistent results. Therefore, with the Tobit model, we can at least observe or take into account the exogenous variables if the observations fall outside a specified range, for example the non-poor observations in this study.

Therefore the Standard Tobit model (named after Tobin, 1958) takes the form as below:

$y_{ij}^{*} = X_{ij}\boldsymbol{\beta} + \mu_{ij}$……(5.7.**2)**

$y_{ij} = y_{ij}^{*}$ if $y_{ij}^{*}>0$

$= 0$ if $y_{ij}^{*} \leq 0$

And y_{ij}^{*} is a latent dependent variable and it is observed when it is greater than zero and X_i is the vector of the independent variables and μ_i is the independently distributed error term.

The Standard Tobit model which is described in equation (5.7.2) earlier has now been extended below to capture the impact of micro-credit on the average deprivation of poverty (Greene, 2003, p.788).

$y_{ij}^{*} = X_{ij}\boldsymbol{\beta} + \delta M_k + \sum_{j=1}^{q} D_{ij}\, T_{ij} + \boldsymbol{\mu_{ij}}$**……**(5.7.**3)**

$y_{ij} = y_{ij}^{*}$ if $y_{ij}^{*}>0$

$= 0$ if $y_{ij}^{*} \leq 0$

Where, δ measures the effectiveness of the micro-credit programme and M_k (k = 1,2,3..r) is a dummy variable indicating the borrowing status of the respondents. And D_j is the Thana dummies (j= 1,2,3…..q) included in the above model for sweeping out the potential biases arise from the Thana-Level heterogeneity. This study also attempted to apply branch fixed effects in order to control for the programme placement bias. Since this study selected one branch from each Thana (54 branches from 54 Thanas), thus applying fixed effect at either branch or Thana level would yield the same results. Also this study interviewed both the treatment and control group from

the same neighbourhood where they have access to micro-credit, therefore the programme placement bias was controlled using this survey design.

5.7.3 Propensity Score Matching Method (PSM):

In this method, a comparison group is selected from a large sample of non-borrowers on the basis of some pre-treatment observable characteristics such as age and education. The purpose is to find a similar non-treatment group (non-borrowers) to the treatment (micro-credit borrowers) group in terms of the observable characteristics (Rosenbaum and Rubin, 1983). This method calculates a probability score of participation in the programme on the basis of pre-treatment observable characteristics and then matched on the basis of the probability score.

- The mean differences in the outcomes of these two groups are considered as the average treatment effect or average causal effect. This can be written as:
- **Average Treatment Effect (ATE)** = E[Y(1) - Y(0)]
- This is the expected gain for a randomly selected unit from the population.
- Propensity Score Matching also gives results on the average gain from treatment [micro-credit] for those who actually treated. This can be written as:
- Average Treatment Effect on the Treated **(ATET):** E[Y(1)- Y(0)/Treatment=1]
- **Treatment Group** consists of Current Borrowers and Drop-outs.
- **Comparison Group** consists of Non-borrowers, Pipeline Borrowers and Refused.

5.7.4 Description of the Independent Variables:

This section presents brief discussions about the independent variables. The following table shows the mean and standard deviation of the explanatory variables such as head of household age, education and female education. It also shows the

results obtained from the mean equality F-tests for all the explanatory variables across the five groups. The average age of the head of household (HH Age) is 44 years. The average age of the head of household for all groups is similar, 43 years, except for the refused category which has the highest, 47 years. However, the result of the mean equality F-test indicates that there are statistically significant differences in the mean age of the head of households across the five groups.

With reference to the mean education of both the head of households (typically male) and female (spouse), the highest year of schooling is for the pipeline borrowers and the lowest is for the refused category. Surprisingly, both mean education of the head of households and female are less for the borrowers than the non-borrowers who never applied. The F-tests (mean equality test) indicate that there are statistically significant differences in the mean education of both the head of households and female education across the five groups.

It is widely known that gender discrimination is a big problem in the South Asian countries including Bangladesh and thus male and female household members are treated differently within the households. Typically male children would provide the household's needs or take over the responsibility of providing the household's needs once they get older. Since there is no social security for the elderly, parents are optimistic about receiving elderly care from their children, particularly male children. This is one of the main reasons, in many cases such as access to education and household's assets, male children are prioritised over female children. Most of the parents from the poor households perceive that girls are a financial burden for their households and consequently they receive less investment in health, care and education

(UNICEF, 2004). A recent study, Begum (2015), also expressed a concern that a boy is believed to be a great contributor to the household income while a girl is of no use in this respect. She further argued that there is a negative stance on girls' education in that educating a girl is like watering another man's field, which reflects the fact that girls are usually relocate to their husband's house soon after their marriage and thus the girls' parents will receive no contribution.

Given this context, household size is broken down into six categories by age and gender. These are: number of female and male children (less than or equal to 15 years), number of female and male adults (16-59 years) and number of female and male elderly (60 years or above). The borrowers have the highest number of both male and female children while the pipeline borrowers have the lowest. The number of both female and male adults is almost same for all groups but the borrowers have slightly higher number of male adults. The number of both female and male elderly is similar (one female elder in approximately every 12 households) for all groups except the refused category of the respondents which have the highest. However, the mean equality F-tests for all six categories of household members indicates that there are statistically significant differences of the household size, which is broken down by age and gender, across the five groups. The results of the F-tests indicate that there are statistically significant differences of the respondents across the five groups in many respects. Thus the results of this study might be suffered from the sample selection bias. Thus, this study will apply the Propensity Score Matching method in the first instance and then, compare the results with the Probit and Standard Tobit regression.

Table 5.13: Mean and Standard Deviation of the Independent Variables and F-tests

Independent Variables	All Samples	Borrowers	Non-Borrowers	Refused	Drop-Out	Pipeline	F-tests
HH Age (years)	44[11.6]	43[9.6]	43[11.2]	47[13.8]	43[11.8]	43[10.8]	10.8***
HH Education	4.4[4.1]	4.4[3.8]	4.6[4.5]	3.6[3.9]	4.2[4.1]	4.9[4.3]	7.4***
Female Education	3.9[3.6]	4.1[3.3]	4.2[4.0]	3.0[3.2]	3.5[3.5]	4.4[3.7]	13.8***
Female Children	0.7[0.8]	0.8[0.9]	0.7[0.8]	0.7[0.9]	0.7[0.8]	0.6[0.8]	2.5**
Male Children	0.8[0.8]	0.9[0.9]	0.7[0.8]	0.7[0.8]	0.8[0.9]	0.7[0.8]	4.4***
Female Adults	1.3[0.6]	1.2[0.6]	1.2[0.6]	1.2[0.7]	1.2[0.6]	1.3[0.6]	3.0**
Male Adults	1.3[0.8]	1.5[0.8]	1.3[0.8]	1.2[0.9]	1.4[0.8]	1.4[0.7]	4.6***
Female Elderly	0.08[0.3]	0.05[0.2]	0.06[0.3]	0.2[0.4]	0.08[0.3]	0.06[0.2]	13.7***
Male Elderly	0.13[0.3]	0.08[0.3]	0.11[0.3]	0.2[0.4]	0.14[0.4]	0.01[0.3]	16.1***
N	2,598	555	536	500	500	507	

With respect to the propensity score matching method, the five respondent groups should be merged into two groups on the basis of the receipt of treatment. This means those respondents who ever received a treatment are to be considered as treatment group and those who did not receive a treatment yet should be considered as control group. In this study, current borrowers and drop-out borrowers are considered as treatment group because current borrowers are in receipt of loan and drop-out borrowers had a loan in the past. The rest three groups (pipeline borrowers, refused borrowers and non-borrowers) have not received a loan yet, thus put them in the control group or non-treatment group. As mentioned, the propensity score matching method calculates the probability score of participation in the programme on the basis of the pre-treatment observable characteristics. This study will calculate the probability score of participation in the micro-credit on the basis of some pre-treatment observable characteristics and then matched on the basis of the probability score. The following

table shows the pre-treatment observable characteristics and their mean differences between the treatment and control group.

Table 5.14: Shows the mean of the observable characteristics

Pre-treat. Observable Characteristics	Treatment Group	Control Group	Mean Equality Test [t-test]
Female Age	36.0[9.6]	38.0[11.6]	3.6***
HH Age	43.0[10.7]	44.0[12.1]	1.8*
Female Education	3.83 [3.5]	3.88 [3.7]	0.4
HH Education	4.23 [3.9]	4.38 [4.3]	0.6
No of Female Children	0.74 [0.8]	0.65 [0.8]	2.5**
No of Male Children	0.85 [0.9]	0.72 [0.8]	3.8***
No of Female Adults	1.25 [0.6]	1.25 [0.6]	0.2
No of Male Adults	1.39 [0.8]	1.29 [0.8]	2.9***
No of Female Elderly	0.06 [0.2]	0.09 [0.3]	2.4**
No of Male Elderly	0.11 [0.3]	0.15 [0.4]	2.6**
N = 2,598	1,055	1,543	

Both female age and HH age are slightly higher for the treatment group and the difference is statistically significant. However, both the mean year of schooling for female and male are higher for the control group but the mean difference is not statistically significant. After collapsing the five groups into two groups (treatment and control groups), all the pre-treatment observable characteristics of the treatment group are statistically significantly different from the control group except female education, HH education and the number of female adults in the households.

5.8 Results:

This section critically discusses the results obtained from the FGT poverty measures and these are: incidence of poverty, average deprivation of poverty and relative deprivation of poverty. As explained earlier, the incidence of poverty tells us the proportion of people living below the poverty line. The average deprivation of poverty tells us the average income short-fall from the poverty line, while relative deprivation of poverty tells us the income inequality among the poor. The results of the non-parametric tests such as chi-square tests are also discussed. Finally, this also section presents the empirical results obtained from the econometric models (Probit model and Standard Tobit Regression).

5.8.1 FGT Class of Poverty Measures:

The following table shows the results obtained from the FGT poverty measures. In order to calculate the poverty measures, this thesis uses household's per capita income and the Asian Development Bank (ADB) poverty line which is BDT.3,511 ($45.30) per month per person. Thus, if the household's per capita income is less than BDT.3,511 ($45.30), then the household is considered as poor, otherwise non-poor. Since there are five groups of respondents, the poverty measures have been ranked from the highest to the lowest. Overall, within the sample, 75 per cent of respondents are considered as poor. The incidence of poverty is the highest (84 per cent) among the drop-out borrowers and followed by the non-borrowers (83 per cent). The incidence of poverty is the lowest (62 per cent) among the borrowers.

The average deprivation of poverty measures the extent to which the respondents' income falls below the poverty line. In other words, the average deprivation of poverty tells us the depth of poverty. This study found that the average deprivation of poverty is 27 per cent meaning that on an average shortfall of income is 27 per cent for the poor in the sample. The average deprivation of poverty is also decomposed by the sub-groups. Similar to the incidence of poverty, the highest average deprivation of poverty is 34 per cent among the drop-out borrowers and the lowest average deprivation is 20 per cent among the borrowers. Both the incidence of poverty and the average deprivation of poverty are insensitive to the income inequality among the poor.

As explained earlier, the relative deprivation of poverty reflects the income inequality among the poor or the severity of poverty. Overall, the magnitude of relative deprivation of poverty is about 13 per cent. The relative deprivation of poverty is also decomposed by the groups and ranked the five groups from the highest to the lowest. The magnitude of relative deprivation of poverty is the highest (almost 16 per cent) among the drop-out borrowers and the lowest (approximately 9 per cent) among the current borrowers.

Therefore, the borrowers of micro-credit programme were ranked at the bottom for all the three poverty dimensions of poverty compared with the control groups. However, this study examines a null hypothesis whether the incidence of poverty is statistically significantly different by the borrowing status. A chi-square test is used since the incidence of poverty is a binary variable. The result of the chi-square test indicates that there is a statistically significant difference in the incidence of poverty by

the borrowing status. Moreover, the mean equality F-tests are also carried out to investigate whether the average deprivation of poverty and relative deprivation of poverty among the poor are statistically different or not across the five groups. The results of the F-tests indicate that there are statistically significant differences in the average deprivation of poverty and relative deprivation of poverty across the five groups.

Table 5.15: Results of the FGT Class of Poverty Measures

Concepts of Poverty	Incidence of Poverty[P_0]		Average Deprivation of Poverty [P_1]		Relative Deprivation of Poverty [P_2]	
Borrowing Status	P_0 (%)	Rank	P_1 (%)	Rank	P_2(%)	Rank
All Samples	75%		27%[0.23]		13%[0.15]	
Borrowers	62%	5	20%[0.23]	5	9%[0.14]	5
Non-borrowers	83%	2	31%[0.23]	2	15%[0.16]	2
Drop-out	84%	1	34%[0.23]	1	16%[0.16]	1
Refused	77%	3	28%[0.24]	3	14%[0.15]	3
Pipeline	69%	4	23%[0.22]	4	10%[0.13]	4
Test Statistic and P-value	Chi-square [106,<1%]		F-test [21.8, <1%]		F-test [17.8, <1%]	

5.8.2 Empirical Results:

Now this study is going to investigate whether the results obtained from the FGT poverty measures are still consistent after controlling for the explanatory variables such as head of household age and education and household's size. As mentioned, this study empirically estimates the impact of micro-credit on the two dimensions of poverty (the incidence of poverty and the average deprivation of poverty or the poverty gap). Since this study found that the mean differences of the majority of the independent variables are statistically significantly different across the five groups, this study argues that the selection bias may a problem for estimating the impact. Thus, this

study applies the propensity score matching method in the first instance for measuring the impact of micro-credit on both the incidence of poverty and the average deprivation of poverty. As discussed earlier, the dependent variable is binary for the incidence of poverty. And, with respect to the average deprivation, the dependent variable is constrained someway. For example, there are zeros (0s) for the non-poor and the dependent variable lies between greater than 0 and less than 1 for the respondents who are poor. Therefore, this study also applies the Probit and Standard Tobit Model to estimate the impact of micro-credit on the incidence and average deprivation of poverty respectively and then compare the results with the propensity score matching method.

5.8.2.1 Empirical Results: Propensity Score Matching

The following table shows the average treatment effect and average treatment effect on the treated. The result of the average treatment effect indicates that the respondents who received the micro-credit are less likely to be poor than the non-borrowers. It also reveals that micro-credit causes borrowers' average deprivation to be reduced by 5.7 per cent. As discussed, average treatment effect on the treated actually indicates the average gain from the micro-credit for those who actually treated. The results of both the average treatment effect and average treatment effect on the treated are similar across the two dimensions. Again, the borrowers are less likely to be poor after receiving the micro-credit. The results also suggest that average treatment effect on the treated is about 5.4 per cent among the borrowers. In other words, the average deprivation of poverty is 5.4 per cent less among the borrowers because of having the micro-credit.

Table 5.16: Average Treatment Effect and Average Treatment Effect on the Treated

	Average Treatment Effect		Average Treatment Effect on the Treated	
	(P0)	(P1)	(P0)	(P1)
	Incidence of Poverty	Average Deprivation	Incidence of Poverty	Average Deprivation
Received Treatment (Micro-credit) [YES]	-0.0966*** [0.02]	-0.0577*** [0.01]	-0.112*** [0.02]	-0.0542*** [0.01]

Note: Standard Errors are in Parentheses; Significance levels *** p<0.01, ** p<0.05, * p<0.1

5.8.2.2 Empirical Results: Incidence of Poverty [P_0]:

The incidence of poverty tells us the number of people living below the poverty line. Thus, the dependent variable is binary i.e. households above a certain threshold, BDT. 3511/month/person, are considered as non-poor (0) and households below the thresholds are considered as poor (1). The probit model is applied to investigate the impact of micro-credit on reducing the incidence of poverty. In the following table, results obtained from the OLS (Linear Probability Model) are also provided in column 1 and 2. The standard errors change a little bit across the models but the expected signs remain the same. However, the results obtained from the probit models are explained below.

Table 5.17: Results of the OLS and Probit Model: **Incidence of Poverty [P_0]**

	(1)	(2)	(3)	(4)
Explanatory Variables	OLS	FE- OLS	PROBIT	FE-PROBIT
Borrowers	-0.214***	-0.211***	-0.765***	-0.860***
	(0.260)	(0.250)	(0.0901)	(0.0984)
Pipeline	-0.139***	-0.144***	-0.5103***	-0.603***
	(0.261)	(0.248)	(0.0907)	(0.0977)
Refused	0.0215	0.02003	-0.0284	-0.00043
	(0.0262)	(0.0249)	(0.0985)	(0.107)
Drop-out	-0.0707***	-0.0727***	-0.3407***	-0.384***
	(0.0261)	(0.0248)	(0.0937)	(0.1001)
Head of HH age	.438D-04	.662D-04	0.00026	0.00036*
	(0.533D-04)	(0.524D-04)	(0.00018)	(0.00020)
Head of HH education	-0.00020	-0.00021	-0.00042	-0.00052
	(0.00013)	(0.00015)	(0.00060)	(0.00070)
Female education	-0.00095**	-0.00089**	-0.0781***	-0.0818***
	(0.00041)	(0.00039)	(0.00792)	(0.00888)
Female children	-0.00033	-0.00060	-0.00035	-0.00129
	(0.00042)	(0.00040)	(0.00175)	(0.00175)
Male children	0.829***	0.0771***	0.337***	0.371***
	(0.00927)	(0.00900)	(0.0358)	(0.0396)
Female adults	0.0108	0.0149	0.0784*	0.107**
	(0.0122)	(0.0117)	(0.0453)	(0.0491)
Male adults	-0.0126	-0.00606	-0.0783**	-0.0623
	(0.01031)	(0.00998)	(0.0352)	(0.0384)
Female elderly	-0.0805***	-0.0852***	-0.114	-0.134
	(0.0158)	(0.0154)	(0.0870)	(0.0953)
Male elderly	-0.00017	-0.00021	-0.222***	-0.280***
	(0.00042)	(0.00040)	(0.0838)	(0.0914)
Constant	0.781***	0.718***	1.174***	0.778
	(0.0248)	(0.199)	(0.0976)	(0.704)
Observations	2,598	2,598	2,598	2,598
THANA-Dummies Included	NO	YES	NO	YES
R-Square (%)	7.70			

Notes: Standard errors in parentheses; Significance level *** p<0.01, ** p<0.05, * p<0.1; Income Per Capita = HH Income/HH Size; ADB Poverty Line, BDT.3511/Month/Person, was used. Reference Group is Non-Borrowers. Thana Dummies are not reported here. Econometric software **LIMDEP 10** was used to estimate the models.

As expected, the coefficient estimate of borrower is negative and significant at 1 per cent level, indicating that the borrowers are highly unlikely to be poor compared with the non-borrowers. The estimated co-efficient of borrowers is -0.860 and thus, the predicted probability of being poor is 0.19, which is very low. As hypothesised, the pipeline borrowers had yet to receive a loan, so there should not be any impact of micro-credit on poverty reduction. In other words, this study expects the size of the co-efficient of pipeline borrowers would be very close to zero. The estimated coefficient of the pipeline borrowers is -0.603 and the predicted probability of being poor is 0.27, which is slightly higher than the current borrowers. This result could be explained by the fact that there may be some self-selection bias. The coefficient estimate of refused borrowers is negative but statistically insignificant. However, as expected, the coefficient of the drop-out borrowers is non-linear and significant at 1 per cent, implying that the drop-out borrowers are less likely to be poor compared with the non-borrowers. The coefficient estimate of the drop-out borrowers is -0.384 and the predicted probability of being poor is 0.35, which suggests that the past loans have had an impact on poverty reduction.

The predicted probability of being poor is very low for the borrowers and then it is increased for the pipeline and drop-out borrowers comparing with the non-borrowers. However, this study tests a hypothesis, H_0: $\delta_{(borrowers)}$- $\delta_{(pipeline)}$ =0, whether the difference between the estimated co-efficient of the borrowers and pipeline are statistically significant or not. The result of the chi-square test indicates that the difference is statistically significant. The similar hypothesis tests, [H_0: $\delta_{(borrowers)}$-

$\delta_{(refused)} = 0$ and H_0: $\delta_{(borrowers)} - \delta_{(drop\text{-}out)} = 0$] are also carried out and found the differences are statistically significant.

The head of household's age has a positive and significant effect, implying that a household with an older household head is more likely to be poor. However, the head of household's education has a negative effect but it is statistically insignificant. The co-efficient estimate of female education has a negative and significant effect, which means that a household with a certain level of education of female is less likely to be poor. The number of female children is statistically insignificant. However, the number of male children has positive and significant effect, implying a household with a male child is more likely to be poor. This reflects the fact that since there is no incentive for having a child, bring up children is too expensive for the households and makes the households poorer.

The most important age group is 16-59 which is termed as adult. Because, regardless of the gender, people belonging to this age group are believed to be more productive. The number of female adults has a positive and significant effect at 10 percent level. After controlling for the regional fixed-effects, the co-efficient estimate of female adults is significant at a level of 5 per cent. This result indicates that a household with a female adult is more likely to be poor, which reflects the fact that particularly adult girls are very much restricted to their home and not even allowed to go to school due to the purdah in Bangladesh. Therefore, female adults can rarely contribute to the households economically.

The number of male adults has a non-linear relationship and statistically significant at 5 per cent level, implying that a household with a male adult is less likely

to be poor. However, this result is not consistent after controlling for the regional fixed-effects. The number of female elderly people in a household has a negative association with the dependent variable but it is statistically insignificant. The number of male elderly has a negative and significant effect, which indicates that a household with a male elder is less likely to be poor. Given the context of Bangladesh, typically elderly people live with their children and/or children live together for the sake of their parents which resulting income of all children those who work contribute to the family.

To conclude, it could be argued that the micro-credit programme of ASA has a significant impact on poverty reduction. It is also evident that the level of education of female is a key instrument to reduce a household's poverty. Household's age and gender composition also appears to be one of the important determinants in reducing a household's poverty.

5.8.2.3 Empirical Results: Average Deprivation of Poverty [P_1]:

The average deprivation of poverty tells us the extent to which poor people's income falls below the poverty line. Note that the higher value of the dependent variable (average deprivation) reflects lower well-being or higher poverty. For non-poor, the poverty gap is zero (0). The average deprivation of poverty lies between greater than zero (0) and less than or equal to one (1). In this study, total monthly household income is divided by the household size in order to calculate income per capita per month. Then the Asian Development Bank poverty line ($1.51/day/person) is converted ($1 = 77.50 Taka) to the Bangladeshi currency (TAKA) and multiplied by 30 in order to work out monthly income threshold for each individual which is 3,511 Taka.

Therefore, the respondents whose income per capita is less than 3,511 Taka per month are considered to be poor, otherwise non-poor. And, the average deprivation is zero (0) for the individuals whose income is more than 3,511 Taka per month. Suppose an individual's income is 4,000 Taka per month, the average deprivation is zero (0) because his/her income exceeds the poverty line. Again, suppose an individual income is 3,000 Taka per month, then the average deprivation is [(3511-3000)/3511*100] 14.6 per cent. Since the poverty gap ratio for each individual looks very small, hence the poverty gap ratio is multiplied by 100 in order to express the results in terms of percentage. The detail discussions on the poverty line and income per capita can be found in the methodology section of this chapter. The following table shows the estimation results of the OLS and the Tobit model. In particular, column 2 and column 4 show the results in which the regional heterogeneity is controlled by plugging-in regional dummies in the models. Note that the following estimates are in percentage terms.

As explained earlier, there is no average deprivation for the people who are non-poor and there are about 25 per cent observations of non-poor (clustered at zero) in the total sample. In this circumstance, the literature stresses that Tobit is the best candidate and gives robust results although the results are obtained from the OLS are presented in the following table. The Tobit regression censored those observations which are clustered at zero and in addition, the Tobit model takes into consideration of the covariates of all observations including censored ones. However, as we can see from the table that both the models are showing similar pattern of the results and

expected signs. Now the estimation results on the average deprivation of poverty obtained from the Tobit models are explained below:

Table 5.18: Results of the OLS and Tobit models: **Average Deprivation [P_1]**:

Explanatory Variables	(1) OLS	(2) FE-OLS	(3) TOBIT	(4) FE-TOBIT
Borrowers	-11.201***	-11.124***	-15.720***	-15.605***
	(1.851)	(1.765)	(1.794)	(1.589)
Pipeline	-8.585***	-9.418***	-11.416***	-12.333***
	(1.858)	(1.753)	(1.785)	(1.563)
Refused	3.0818*	2.617	3.461*	3.0193*
	(1.866)	(1.762)	(1.768)	(1.543)
Drop-out	-5.00962***	-5.542***	-4.324***	-4.662***
	(1.863)	(1.757)	(1.777)	(1.549)
Head of HH age	0.00039	-0.00013	0.00158	0.00274
	(0.00381)	(0.00371)	(0.00368)	(0.00334)
Head of HH education	-0.00470	-0.00895	-0.00863	-0.0138
	(0.0948)	(0.0105)	(0.0892)	(0.00918)
Female education	-0.06003**	-0.0605**	-0.0692**	-0.0686***
	(0.0293)	(0.0277)	(0.0274)	(0.0239)
Female children	-0.607	-0.0230	-0.0103	-0.0355
	(0.03005)	(0.0285)	(0.0280)	(0.0245)
Male children	6.372***	6.132***	7.691***	7.358***
	(0.661)	(0.637)	(0.632)	(0.563)
Female adults	1.467*	1.115	1.752**	1.459**
	(0.870)	(0.831)	(0.833)	(0.738)
Male adults	-1.517**	-.809	-1.976***	-0.963
	(0.735)	(0.706)	(0.706)	(0.629)
Female elderly	-6.320***	-6.433***	-7.449***	-7.831***
	(1.124)	(1.091)	(1.0784)	(0.969)
Male elderly	0.0127	0.0144	0.00998	0.00981
	(0.0301)	(0.0285)	(0.0281)	(0.0245)
Constant	27.218***	18.0756	24.0647***	13.789
	(1.766)	(14.0793)	(1.688)	(12.486)
Obs. Uncensored	2,598	2,598	1,878	1,878
THANA-Dummies Included	NO	YES	NO	YES
R-Square (%)	6.90			

Notes: Standard errors in parentheses; Significance level *** p<0.01, ** p<0.05, * p<0.1; Income Per Capita = HH Income/HH Size; Asian Development Bank Poverty Line, BDT.3511/Month/Person, was used. TOBIT = Lower Limit (0); Estimates are in percentage terms. Non-borrowers are in the reference group. Econometric software LIMDEP 10 was used to estimate the models.

Column 3 shows the results of the Tobit regression in which the regional heterogeneity is not taken into consideration. Column 4 shows that the standard errors change a little after controlling for the regional fixed-effects. Most of the co-efficient estimates of the dependent variable show the expected signs.

The results of the Tobit regression show that the average deprivation is negatively associated with the respondents' borrowing status which indicates that access to micro-credit reduces the average deprivation. In other words, with access to micro-credit, the households' income increases and hence, reduces the households' average deprivation relative to the poverty line. The estimated co-efficient of the average deprivation of poverty is about 15.6 per cent less for the current borrowers compared with the non-borrowers and it is statistically significant at 1 per cent level. This is expected because one of the main aims of the micro-credit programme is to increase households' income and thus lift them out of poverty.

The result shows that the average deprivation of poverty is about 12.3 per cent less for the pipeline borrowers and statistically significant at 1 per cent level. This is unexpected because this group has not had micro-credit yet and it cannot be ruled out that a promised loan has a positive impact on income. This indicates that there is a self-selection problem. Moreover, the result of the drop-out borrowers shows that the average deprivation is almost 4.7 per cent less for them. This is expected because they were involved in the micro-credit programme for a while and this may be the impact of the past loans and sustained impact on income. The respondents who were refused a loan are found to have a linear relationship with the average deprivation of poverty and it is statistically significant at 10 per cent. It is believed that this group has some

unobservable characteristics such as enterprising skills which may not be found among the non-borrowers who never apply for the micro-credit. Thus, this study hypothesised that the refused borrowers might be doing better than the non-borrowers even without the credit. Surprisingly, the result reveals that the poverty status of the refused borrowers becomes worse because of the credit constraint compared with the non-borrowers.

As part of a randomised experiment, Karlan and Zinman (2010) provided credit services to those who were rejected for credit and found that the average treatment effect on various household's outcomes such as employment, income, food consumption and subjective well-being, such as community status, is significant and positive. Therefore, it could be argued that the households, who realised that they had a need of credit and eventually they were refused after applying, could have done better if they had credit. Again, this indicates that self-selection is a problem indeed. In this situation, the pipeline borrowers, who were accepted for a loan but had not yet received it, would enable us to control for the self-selection bias because if the pipeline borrowers are self-selected and then the current borrowers are also self-selected. Thus, the difference between the estimated co-efficient of the current borrowers and pipeline borrowers could be attributed to the micro-credit programme. This study found a significant and positive impact of micro-credit on the average deprivation of poverty reduction, 3.3 per cent reduction, after netting out the self-selection bias. This study would have erroneously concluded that the micro-credit programme of ASA reduces the average deprivation of poverty as much as 16 per cent if the self-selection bias was unaccounted for.

This study tests whether the difference between the estimated co-efficient of the borrowers and the control groups are statistically significant or not. The result of the hypothesis test (F-test), H_0: $\delta_{(borrowers)}$- $\delta_{(pipeline)}$ =0, indicates that the estimated co-efficient of the borrowers are statistically significantly different from the pipeline borrowers. The results of the hypothesis tests [H_0: $\delta_{(borrowers)}$- $\delta_{(refused)}$ =0 and H_0: $\delta_{(borrowers)}$- $\delta_{(drop\text{-}out)}$ =0] indicate that the difference between the estimated co-efficient of the borrowers and the control groups are also statistically significant.

With regards to the head of households' age (HH age), it is found that there is a positive association between the average deprivation and HH age but this is statistically insignificant. However, as we know that education is an important element for increasing households' income and therefore, reducing households' vulnerability. It is evident here that the head of household's level of education is non-linear with the dependent variable but it is statistically insignificant. With regards to the level of female education, the result indicates that there is a strong non-linear relationship between the average deprivation of poverty and female education and which is statistically significant at 1 per cent. Therefore, it could be claimed that the level of education of a female in the household has a significant impact on the reduction of the average deprivation.

With regards to the number of children in the households, the number of female children is negatively associated with the dependent variables, which is statistically insignificant while the number of male children is positively associated, which is statistically significant at 1 per cent level. The results could be explained by the fact that it is generally expected by many poor households that female children should do

some of the domestic work such as cooking while their brothers attend the school. In other words, poor households try to find ways to send boys to schools and save money by keeping the girls at home (UNICEF, 2010).

This study found that the number of female adults, in the age cohort 16-59 years, is positively associated with the household's average deprivation of poverty and it is statistically significant at 5 per cent level. This result suggests that the number of female adults increases a household's average deprivation of poverty. This is expected because in Bangladesh where households are dominated by the male head of households and therefore, female adults are restricted to go outside their home for work. Thus they rarely have the opportunity to contribute economically. Begum (2015) argued that at puberty, girls' mobility is very much restricted, which limits access to education and socio-economic activities. On the other hand, as expected, this study found that the number of male adults is negatively associated with the average deprivation of poverty, indicating that the number of male adults reduces a household's average deprivation. This result is statistically significant at 1 per cent level but it is turned to be statistically insignificant after controlling for the regional fixed-effects.

This study found that the number of female elderly is negatively associated with the average deprivation of poverty and is statistically significant at 1 per cent. This could be explained by the fact that the female elder(s) gain(s) more power within the household and in most cases they act as a head of household and involved in household decisions. They are also actively involved in the homestead management such as rearing cattle for generating cash or meeting the nutritional needs for the households.

On the other hand, unexpectedly the number of male elderly is found to be positively associated with the dependent variable but it is statistically insignificant.

To sum up, there is evidence that the micro-credit programme of ASA has had a significant and positive impact on the average deprivation of poverty reduction in Bangladesh. This study also found evidence that poor people, who were refused for a loan, became worse-off because of the credit constraint. Finally, level of education of female also plays an important role in reducing the households' average deprivation of poverty.

5.9 Discussion of the Results:

This study used a quasi-experimental survey design which is similar to that of Khan and Wright (2015) to collect data in order to estimate the impact of micro-credit on poverty in Bangladesh. This study interviewed five types of households which included current borrowers, pipeline borrowers, refused borrowers, drop-out borrowers and non-borrowers. This study put in effort to control for the potential self-selection biases by including multiple control groups in the sample (Meyer, 1995). Pipeline borrowers are similar to the treatment group in terms of unobservable characteristics such as entrepreneurial skills, gender equality and risk taking ability. If the pipeline borrowers are self-selected then the current borrowers are self-selected as well. Thus the pipeline borrowers enable us to control for the potential self-selection biases. By including drop-out borrowers in the sample, this study controls for the attrition bias and incomplete sample bias (Tedeschi and Karlan, 2010). It is believed that refused borrowers are similar to pipeline borrowers in terms of unobservable characteristics but

the only difference between them is the MFIs membership. Inclusion of refused borrowers enables us to better understand the effect of credit constraint on the households' outcomes such as income.

This study used FGT poverty measures in which there are three dimensions of poverty. These are: incidence of poverty, average deprivation of poverty (poverty gap) and relative deprivation of poverty (squared poverty gap). However, this study empirically estimates the first two dimensions of poverty because the third dimension of poverty (relative deprivation) which is a function of average deprivation. Since this study found that the most of the pre-treatment characteristics of the borrowers are statistically significantly different from the control groups, so there might a problem of selection bias. To overcome this selection bias, the author applied propensity score matching method. Then, this study applied the probit model and standard Tobit regression to investigate whether the results on the two dimensions of poverty are consistent even after controlling for the households' characteristics such as age of head of household and education. The probit model is used to investigate the impact of micro-credit on the incidence of poverty. In order to estimate the impact of micro-credit on the average deprivation of poverty, this study applied standard Tobit regression. Note that the same set of explanatory variables was used in all the models.

As discussed earlier, there are about 25 per cent of respondents are poor. After segregating the total sample by sub-groups, it has emerged that the incidence of poverty is the highest among the drop-out borrowers and the lowest among the current borrowers. A chi-square test revealed that there is a statistically significant difference in the incidence of poverty between the treatment group (current borrowers) and the

control groups. Similarly, the average deprivation of poverty, indicating the short-fall of income relative to the poverty line, is the highest (about 34 per cent) among the drop-out borrowers and the lowest (about 20 per cent) among the current borrowers. Finally, the relative deprivation of poverty, which indicates the income inequality or the severity of poverty, is the highest (about 16 per cent) among the drop-out borrowers and the lowest (about 9 per cent) among the current borrowers. The mean equality F-tests suggests that there is a significant difference in the average deprivation and relative deprivation of poverty between the treatment group and control groups.

The impact of micro-credit on poverty is being criticised mainly for two reasons. *First*, potential self-selection biases and which may occur when the households select themselves into the micro-credit programme. These self-selected borrowers might have some unobservable characteristics such as entrepreneurial skills. *Second*, sample selection bias could also arise from non-random programme placement where those who implement micro-credit programmes select (1) villages with specific characteristics such as poverty-stricken regions, availability of government and private offices (post-office, schools and banks) or select relatively wealthy villages to become financially sustainable and/or (2) select households with specific characteristics such as high poverty rates or reasonably good credit records (Imai, Arun and Annim, 2010). This thesis used quasi-experimental survey design in which treatment group and control groups respondents are selected on the basis of a particular criterion that is the quality of the house or living condition. Current borrowers and drop-out borrowers are assigned to the treatment group and control groups which included three types of households (pipeline borrowers, refused borrowers and non-borrowers). This quasi-

experimental design was employed to control for the potential self-selection biases. Moreover, as explained earlier, the micro-credit programme of ASA Bangladesh targets poverty-stricken areas in the country. Hence, the non-random programme placement does appear to be a problem for this study. However, as suggested by Karlan and Goldberg (2011), this study selected the current borrowers and non-borrowers from the same neighbourhood in order to control for the non-programme placement bias. As a robustness test, this study also applied branch fixed effect as suggested by Tedeschi (2008) and found the same results as Thana fixed effect. This is because of selecting only one branch from each Thana.

Following the findings from FGT family of poverty measures, this study applied the propensity score matching method in order to estimate the impact of micro-credit on the incidence of poverty and the average deprivation of poverty. Then, this study used the probit model for estimating the impact of micro-credit on the incidence of poverty. The propensity score matching and the probit model show the similar pattern of the results. The results of both the probit and propensity score matching model confirm that there is a positive impact of micro-credit on poverty reduction in Bangladesh. This study also estimated the impact of micro-credit on average deprivation by using the propensity score matching method and standard Tobit regression.

The empirical evidence of this study suggests that there is a significant positive impact of micro-credit on the average deprivation even after controlling for the self-selection bias. The findings of this study on poverty reduction support the existing empirical studies, for example Pitt and Khandker (1998) and Khandker (2005), that

found positive impact of micro-credit on poverty reduction. As explained earlier, this study found that the average deprivation of poverty is reduced by 16 per cent when it is compared with the non-borrowers. However, after netting out the self-selection bias (comparing with the pipeline borrowers), this study concluded that the average deprivation of poverty is reduced by 3.3 per cent. Also, the result of the propensity score matching method reveals that the impact of micro-credit on average deprivation of poverty is slightly bigger, about 5 per cent. Thus, if the self-selection bias was not taken into consideration, then this study would have erroneously concluded such a high impact of micro-credit on poverty reduction. Hence, this study casts a considerable doubt on the existing studies due to the inclusion of single control group in their studies which is non-borrowers. Earlier studies, for example Karlan and Zinman (2010), argued that poor people could have improved their households' outcomes such as income and expenditure if they had no credit constraint. The findings of this study also confirm that the average deprivation of poverty has been widened for the refused category of the respondents because of the credit constraint.

This study found that the level of education of female is important for reducing the households' average deprivation of poverty. The results of this study also reveal that the age of head of households and gender composition of family members influence the households' poverty status. For example, the households' average deprivation is likely to increase if there are female adults in the households, which reflects the fact that female adults, in particular those who are marriageable, are both burdens for the households. On the other hand, the households' average deprivation is likely to decrease if there are male adults or elderly females in the households. There is

a great expectation on the male adults within the households that they engage in economic activities and earn money and thus contribute to the households' income. This is one of the main reasons that most parents prefer to have baby boys than baby girls and the parents become optimistic in breaking the cycle of their households' poverty if they have boys in the family.

Chapter 6: Conclusions

6.1 Introduction:

Most of the empirical studies on the impact assessment are concerned about the endogenous programme placement and selection bias and cast a doubt on the impact of micro-credit programme on poverty. It appears that these are the two major problems in the impact assessment. Hence, this study focuses on tackling both the non-random programme placement is a bias and the potential self-selection biases while the impact of micro-credit was measured. The first empirical chapter focuses on the branch placement and branch density of micro-financial institutions in Bangladesh. To do this, this study collected data from almost all Thanas (Lower Administrative Unit) in Bangladesh as well as all (2,936) branches of ASA Bangladesh. This study also collected data from 2,936 non-ASA villages which were randomly selected. To the best of my knowledge, this is the only study which investigated the issue of the distance and the branch placement of MFIs. The second empirical chapter focuses on measuring the impact of micro-credit on poverty. To do this, this study collected the primary data from 2,598 households which include current borrowers, pipeline borrowers, drop-outs, refused and non-borrowers.

This is the first impact assessment study in Bangladesh which included drop-outs and refused borrowers in the sample. There is a concern in the literature, for example Karlan (2001), that exclusion of drop-out borrowers from the sample can produce biased estimates of the impact. Hence this study included drop-out borrowers in the sample to control the potential biases. With the inclusion of refused borrowers, this study enabled us to control for some aspects of the self-selection bias as well as

enabling us to understand the impact of credit constraint on the households' outcomes. However, this study provided empirical evidence of the impact of micro-credit on the two dimensions of poverty and these are: incidence of poverty, average deprivation and relative deprivation of poverty by using households' level data. This study found significant positive impact of micro-credit on these two dimensions of poverty. This chapter presents briefly the main findings of the study, policy recommendations, limitations of the study and in the end, provides some suggestions for the future research.

6.2 Micro-credit Programme Placement: Summary of the Main Findings

There are about twenty-one thousand branches of 576 micro-financial institutions including Grameen Bank in Bangladesh which is possibly one of the highest numbers of MFIs in a particular country in the world (MRA, 2011). Many of these institutions stated that they are focused on poverty reduction by giving the poor people access to credit and help generating income. However, there is a very little evidence on how the branches of these MFIs are distributed across the country or what factors motivate the management of MFIs to place a branch in a particular location.

This study attempted to investigate the factors which affecting the branch placement decision of MFIs in Bangladesh. This is the first study which showed an evidence between the distance (from the headquarter to branch) and the branch placement decision of MFIs. The results of the distance variable are mixed (positive and negative sign across the specification). In other words, this study did find any systematic relationship between the distance and branch placement. The hypothesis

tests suggest that there may be no impact of the distance on branch placement of MFIs because, as explained elsewhere, MFIs carry out their banking activities quite opposite way of the commercial banks. The competition variables, such as the presence of Grameen bank, BRAC and any other NGO, are statistically significant and positively associated with the branch placement. Several studies argued that commercial banks only establish their branches in relatively developed regions and thus, the presence of the commercial banks could be used as a proxy for the developed regions. The results of this study suggest that ASA is less likely to place a branch in a village where there is a branch of a commercial bank. The results also suggest that a range of village level characteristics such as village market centre, village population, and the rate of poverty are positively associated with branch placement of MFIs in Bangladesh.

Since there are many MFIs and tens of thousands of their branches across the country, this study aimed to investigate how they are allocated their branches within a Thana in Bangladesh. This is the first study which attempted to provide empirical evidence on the factors affecting the branch density of MFIs in Bangladesh. As similar to branch placement, this study attempted to establish a relationship between the distance and branch density. This study found that the distance has a positive relationship with branch density and it is statistically significant. However, the effect of the distance disappears after including the Thana level characteristics such as the presence of ASA's competitors, population, and the rate of poverty in the model. This study did not find any systematic relationship with the distance. Therefore, the distance might not be an important determinant for increasing the branch density in a particular location as it is important for the general banking. The results of this study also

revealed that the branches of MFIs are spatially clustered. The result of this study reveals that branch density increases in regions where the rate of poverty is high. This finding indicates that the micro-credit programmes placement could be a potential bias in assessing the impact and expressed a concern that the impact of micro-credit may be underestimated unless it is carefully dealt with.

6.3 Role of Micro-credit Programmes on Poverty: Summary of the Main Findings:

This study aimed at investigating the impact of micro-credit on poverty in Bangladesh. Particularly, this study evaluated the impact of micro-credit on the incidence of poverty and average deprivation. To do this, a survey was carried out in 54 Thanas (lower administrative unit) in Bangladesh. The study locations were selected based on the poverty indicators such poverty head count ratio and literacy rate. Thus the study selected some Thanas where the poverty headcount ratio is high and literacy rate is low as well as selected some Thanas where the poverty headcount ratio is low and literacy rate is high. This study also selected 5 Thanas which are known as marshland (locally known as *Haor areas*). Finally, the survey interviewed five types of households which include current borrowers, pipeline borrowers, drop-outs, refused and non-borrowers and collected data from 2,598 households. There are four types of control groups included in the study and each group controls for some aspects of the self-selection bias.

This study applied FGT class of poverty measures to capture the three dimensions of poverty (incidence of poverty, average deprivation and relative deprivation of poverty) as proposed by Sen (1976) in the data. The incidence of poverty

tells us the proportion of people living below the poverty line. The results show that the incidence of poverty is the highest among the drop-out borrowers and the lowest among the current borrowers. A non-parametric Chi-square test suggests that there is a significant difference in the incidence of poverty by the borrowing status. The average deprivation of poverty indicates the extent to which the income of poor people falls below the poverty line, while the relative deprivation of poverty reflects the income inequality or the severity of poverty. The results suggest that the average deprivation and relative deprivation of poverty are also the highest among the drop-out borrowers and lowest among the current borrowers. The results of the F-tests (mean equality) indicate that the differences in the average deprivation and magnitude of relative deprivation of poverty are statistically significant across the five groups.

Since there are statistically significant differences in the pre-treatment characteristics such as age, education and household size, therefore the selection bias might be a problem. To overcome the selection bias, this study applied propensity score matching method in order to estimate the impact of micro-credit on the incidence of poverty and average deprivation of poverty. Then this study applied the probit model for estimating the impact of micro-credit on the incidence of poverty. Both the propensity score matching method and probit model shows the similar results. The results indicate that there is a significant positive impact of micro-credit on reducing the incidence of poverty. This study also evaluated the impact of micro-credit on average deprivation by using propensity score matching method as well as standard Tobit regression. The results suggest that there is a statistically significant positive impact of micro-credit on the average deprivation of poverty reduction. The results of

the standard Tobit regression also suggest that the average deprivation of poverty is increased for those households who were refused for the loan, which reflects the fact that the credit constraint makes the households poorer. Furthermore, the results suggest that the households' age and gender composition play an important role in the households' poverty status. Adult girls are appeared to be a burden for the households since the number of female adults increases the average deprivation of poverty. On the other hand, adult male appears to be contributing towards the households' poverty reduction. However, it is evident here that the level of education of females help in reducing the households' average deprivation of poverty.

6.4 Policy Recommendations:

The micro-finance institutions (MFIs) such as ASA Bangladesh aim to reduce poverty in Bangladesh through giving poor people access to collateral free credit. Having accessed to micro-credit, poor households are able to increase their households' income by investing the loan in small businesses and therefore, reducing poverty. Over the last three decades, there has been a steep growth in micro-credit activities in Bangladesh. The government and development organisations such as the World Bank and DFID put in effort and provided subsidised funding to MFIs to expand micro-credit programmes in order to reduce poverty in Bangladesh. Nevertheless, there is a still lot more to be done in Bangladesh in terms of increasing outreach, education and gender equality to reduce poverty. This study confirms that micro-credit programmes have a positive and significant impact on poverty reduction in Bangladesh. After a thorough investigation, this study identified that credit constraint, lack of education and

households' age and gender composition are the main factors in increasing the households' vulnerability.

First, findings of this study highlighted the fact that the poor households, who were refused a loan, became poorer because of the credit constraint. Given this situation, MFIs need to rethink their lending requirements and try to bring the households who still remain out of the traditional banking process or the households who still receive the credit from the so called loan sharks.

Second, findings of this study also highlighted the fact that the level of education of female is very important in order to reduce the households' average deprivation of poverty. According to CAMPE (Campaign for Population Education) (2005), about 34 per cent of students drop-out from the secondary schools in Bangladesh and of which, almost 90 per cent of them are girls.

Given this situation, MFIs should also focus on increasing the enrolment of girls in school and put in effort to retain them in school. First of all, MFIs could take initiatives to encourage and create awareness about the importance of the girls' education among their members. And then, MFIs may offer scholarships every year especially for the girls' in order to encourage them. Finally, this study sheds light on the impact of age and gender composition of households' on poverty status. It is believed that MFIs target those women who are married for the micro-credit programmes in order to increase their mobility as well as giving access and control over the households' resources. The results of the impact of micro-credit programmes on female empowerment, such as access to household's resources and social mobility, are mixed (Goetz and Gupta 1996; Montgomery, Bhattacharya and Hulme 1996;

Kabeer 2001, Garikapati, 2013). Nevertheless, there has been a very little focus on the adult girls', age cohort 16-25, in order to let them engage in the economic activities and changing the perception, having an adult girl in the household appears to be burden, of the parents towards them. The government should make an appropriate strategy, such as encouraging the parents to send their daughters to school, providing cash or in-kind subsidies for the girls to keep them in school, based on the context of the various regions of the country and then the MFIs and the government should work together to eradicate the problem.

6.5 Limitations of the Study:

The current research acknowledges some limitations as follows. *First*, the rate of poverty is not available at village level. Therefore, Thana level variable (only the rate of poverty) is used at village level. However, using Thana level variable at the village level may cause less severe endogeneity problem. *Second*, with respect to the distance, in particular travel time, it may be the case that the travel time might have been reduced over the years due to the fact that the government had been spent considerable amount money in order to improve the roads and communications infrastructure of the country. Lastly, with respect to the impact assessment of micro-credit, this study is not fully experimental.

6.6 Future Research:

A randomised experiment is becoming increasingly important to assess the impact of micro-credit in the context of Bangladesh. As the results of this study suggest that the average deprivation of poverty is increased for the refused borrowers, a further

experimental study could be done by giving the micro-credit to those households who are refused by the loan officers. It may be helpful for the MFIs to rethink about the eligibility criteria for lending micro-credit among the households who are credit constrained in Bangladesh. The details of the respondents who were interviewed for this study are kept on the database. Over the coming years, the author is thinking to conduct another wave of the survey in order to construct a panel data set and carry out further research on the impact of micro-credit.

Appendix 1: Poverty and Macro-economic Indicators across Districts

SL No	Name of District	Poverty	Literacy	GDP Per Capita(current price in TK 2010-11)	Loan Disbursement PKSF (million TK)	Advances by Banks 2010-11 (million TK)
1	Bagerhat	42.8	59	48696	7851	4338
2	Bandarban	40.1	35.9	29220	983	1144
3	Barguna	19.0	57.6	40225	3888	3573
4	Barishal	54.8	61.2	37934	5969	13262
5	Bhola	33.2	43.2	37023	9075	5837
6	Bogra	16.6	49.4	34396	30581	34105
7	Brahmanbaria	30.0	45.3	28318	7354	8903
8	Chandpur	51.0	56.8	31998	13563	7323
9	Chapai Nawabganj	25.3	42.9	28442	10673	8311
10	Chittagong	11.5	58.9	55281	58284	539320
11	Chuadanga	27.7	45.9	33955	13131	5115
12	Comilla	37.9	53.3	24705	33522	21930
13	Cox's Bazar	32.7	39.3	35225	8293	11524
14	Dhaka	15.7	70.5	66548	82689	1935393
15	Dinajpur	37.9	52.4	34811	21907	18325
16	Faridpur	36.3	49	30405	13802	12660
17	Feni	25.9	59.6	26225	7264	10955
18	Gaibandha	48.0	42.8	29090	12766	7747
19	Gazipur	19.4	62.6	45481	38210	22846
20	Gopalganj	42.7	58.1	31984	4935	3379
21	Habiganj	25.3	40.5	27915	4548	5399
22	Jamalpur	51.1	38.4	32922	6712	10045
23	Jessore	39.0	56.5	39242	27683	32097
24	Jhalakathi	40.5	66.7	30407	1330	2357
25	Jhenaidah	24.7	48.4	34131	12814	7244
26	Joypurhat	26.7	57.5	39664	12761	5949
27	Khagrachhari	25.5	46.1	24556	1922	1002
28	Khulna	38.8	60.1	58346	13345	67281
29	Kishoregonj	30.3	40.9	29325	9926	9441
30	Kurigam	63.7	42.5	35107	12058	5176
31	Kustia	3.6	46.3	35036	17253	20545
32	Lakshmipur	31.2	49.4	30862	9124	7613
33	Lalmonirhat	34.5	46.1	32528	6547	4257
34	Madaripur	34.9	48	33895	4753	5010
35	Magura	45.4	50.6	35171	6470	2328

36	Manikganj	18.5	49.2	35347	10046	3727
37	Maulavibazar	25.7	51.1	28797	2651	9286
38	Meherpur	15.2	46.3	36414	7480	2124
39	Munshiganj	28.7	56.1	29713	8804	6268
40	Mymensingh	50.5	43.5	32629	14246	20678
41	Naogaon	16.9	48.2	36223	20916	15117
42	Narail	20.0	61.3	37911	2186	2085
43	Narayangonj	26.1	57.1	47707	28449	69915
44	Narsingdi	23.7	49.6	37021	15255	22390
45	Natore	35.1	49.6	37940	12020	6581
46	Netrokana	35.3	39.4	31780	6259	5859
47	Nilphamari	34.8	44.4	27870	11009	10195
48	Noakhali	9.6	51.3	29565	15658	16367
49	Pabna	31.5	46.7	38938	21871	13907
50	Panchagar	26.7	51.8	30477	5708	3863
51	Patuakhali	25.8	54.1	38582	8289	5991
52	Pirojpur	44.1	64.9	33453	5370	3247
53	Rajbari	41.9	53.3	32615	4946	3776
54	Rajshahi	31.4	53	40008	22731	28865
55	Rangamati	20.3	49.7	36934	2233	1447
56	Rangpur	46.2	48.5	32232	13407	17878
57	Satkhira	46.3	52.1	37083	12647	7022
58	Shariatpur	52.6	47.3	30277	8485	2961
59	Sherpur	48.4	37.9	34354	2241	5689
60	Sirajganj	38.7	42.1	29088	17308	10715
61	Sunamganj	26.0	35	25872	5026	4462
62	Sylhet	24.1	51.2	31966	4440	34388
63	Tangail	29.7	46.8	30957	20578	9555
64	Thakurgaon	27.0	48.7	36460	7489	6759
	Bangaldesh	31.5	51.8	37610	850158	3212849

Source: BBS 2012, 2014.

Appendix 2: Questionnaire for ASA Branch Managers:

Section 1: Information on the branch:

1.1 Total number of loan centre in the branch:

1.2 Number of village covered by the branch

1.3 Distance covered by the branch (square km):

1.4 Number of loan officers in the branch:

1.5 Please write the date of the branch was established:

1.6 Location of the branch (Urban or Rural): 1. Urban 2. Rural.

Section 2: Please write the distance to the following administrative units from your branch (in kilometre)

Distance to THANA town centre	Distance to District Headquarters	Distance to Division headquarters	Distance to the Capital (Dhaka)	Distance to the nearest branch

Section 3:

3.1 Please indicate the availability of the following Private and Public Infrastructures (YES/NO) where your branch is located:

Secondary Schools (YES/NO)	College (YES/NO)	Grameen Bank(YES/NO)	BRAC (YES/NO)	Other NGOs	Commercial Bank	Community Hospital

3.2 If possible, please indicate the availability of the following private and public infrastructures where there is no ASA branch but could have a possible branch there.

Secondary Schools (YES/NO)	College (YES/NO)	Grameen Bank(YES/NO)	BRAC (YES/NO)	Other NGOs	Commercial Bank	Community Hospital

Section 4: Branch Managers information:

4.1 Branch manager's age

4.2 Branch manager's education: 1. Higher secondary 2. Bachelor 3. Masters

4.3 Branch manager's years of experience:

Section 5: Others:

5.1 How is the transportation system in your area? 1. GOOD 2. Not-so-good 3. Bad

5.2 Is the Thana having at risk of flooding/river erosion/located in marshland? 1. YES 2. NO

Appendix-3: Branch Placement: Robustness Test: Probit Model

VARIABLES	(1) PROBIT	(3) PROBIT	(4) PROBIT
DISTHQ	-0.000266	0.000431**	0.000183
	(-1.586)	(2.034)	(0.776)
GRAMEEN		1.087***	1.077***
		(22.78)	(22.52)
BRAC		1.008***	1.012***
		(21.02)	(21.07)
Any Other NGO		0.418***	0.421***
		(6.982)	(7.027)
Commercial Bank		-0.137***	-0.130***
		(-2.891)	(-2.757)
Village Market		0.399***	0.399***
		(5.314)	(5.305)
Population		4.24e-05***	4.37e-05***
		(11.50)	(11.68)
Poverty Rate			0.00359**
			(2.410)
Constant	0.0532	-2.142***	-2.254***
	(1.426)	(-24.12)	(-22.40)
Observations	5,872	5,872	5,872

z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix-4: Robustness Test: Branch Density

Variables	(1) OLS	(2) FE-OLS	(3) OLS	(4) FE-OLS	(5) OLS	(6) FE-OLS	(7) OLS	(8) FE-OLS
ln_ROAD_DIST	0.124	0.129	0.110	0.118				
	(1.5)	(1.1)	(1.3)	(1.0)				
ln_ROAD_DISTsq	-0.0116	-0.00959	-0.0113	-0.0121				
	(-1.2)	(-0.6)	(-1.1)	(-0.7)				
ln_GRAMEEN	0.407***	0.336***	0.396***	0.328***	0.405***	0.335***	0.394***	0.325***
	(9.3)	(7.2)	(8.9)	(7.0)	(9.2)	(7.2)	(8.9)	(6.9)
ln_BRAC	0.305***	0.292***	0.308***	0.292***	0.307***	0.293***	0.309***	0.294***
	(6.7)	(6.3)	(6.9)	(6.4)	(6.9)	(6.4)	(7.0)	(6.4)
ln_ALL_NGOs	0.0339**	0.0349*	0.0323*	0.0366*	0.0323*	0.0342*	0.0314*	0.0366*
	(2.0)	(1.8)	(1.9)	(1.9)	(1.9)	(1.8)	(1.8)	(1.9)
ln_BANK_BR	0.0119	0.0300	0.0213	0.0394*	0.0139	0.0262	0.0218	0.0360
	(0.6)	(1.4)	(1.0)	(1.8)	(0.7)	(1.2)	(1.1)	(1.6)
ln_MARKET	0.0374*	0.0290	0.0359*	0.0249	0.0394**	0.0306	0.0384**	0.0259
	(1.9)	(1.3)	(1.8)	(1.1)	(2.0)	(1.4)	(2.0)	(1.2)
ln_pop2011	0.236***	0.295***	0.234***	0.292***	0.241***	0.293***	0.238***	0.290***
	(6.8)	(7.6)	(6.8)	(7.5)	(6.9)	(7.5)	(6.8)	(7.4)
ln_Pov_rate_05			0.0497*	0.0902*			0.0432	0.104**
			(1.6)	(1.9)			(1.4)	(2.2)
ln_TIME_DISThrs					0.0516*	0.0342	0.0384	-0.000402
					(1.7)	(0.6)	(1.2)	(-0.01)
ln_TIME_hrs SQ					-0.00522	-0.0352	-0.00513	-0.0376
					(-0.4)	(-1.5)	(-0.3)	(-1.6)
Constant	-1.248***	-1.551***	-1.351***	-1.738***	-1.020***	-1.091***	-1.143***	-1.391***
	(-5.3)	(-4.8)	(-5.6)	(-5.2)	(-6.3)	(-5.4)	(-6.2)	(-5.7)
Observations	512	512	512	512	512	512	512	512
R-squared	0.830		0.831		0.831		0.831	
No. of DISTRICTS		64		64		64		64

Appendix 5: Questionnaires for the Field Survey

Questionnaire for ASA Borrowers:

Interviewer Name:...….....Branch Name:……..Date:

Section 1: Demographic Information:

1.1

Name…….Village……Thana.....District…….....

.....

1.2. Age……1.3. Gender: 1. Male 2. Female

1.4 Marital Status: 1. Married 2.Unmarried 3.Widow 4.Divorced

1.5 Respondent/borrower's Year of Schooling (please put 0 if the respondent did not go to school):

1.6 Who is the head of your household? 1. Respondent/borrower 2.Husband 3.Father/Mother 4. Son/Daughter 5.Other (Specify)

1.7 Years of schooling for the head of the household (please put 0 if the head of household did not go to school):

1.8 The highest year of Schooling among children (if any):

1.9 Household members' details (including respondent):

Age (in years)	Sex (Male=1 and Female =2)	Family member's current occupation? (Going to School=1; Going to College/University = 2; Self-employed (agriculture) =3; Self-employed (non-agriculture) = 4; Service = 5; Day labourer (agriculture) = 6; Day labourer (non-agriculture) = 7; Unemployed = 8; House-wife = 9; Others (specify) = 10

1.10. What type of accommodation do you currently own? 1. Own house 2.Renting 3.Sharing a house 4.Other (specify).

1.11. What is the type of the house? 1. Kacha (Mud) 2.Semi-pacca (made with bricks and other materials) 3.Pacca (made by bricks) 4. Made with bamboo and Tin 5.Other (specify).

1.12. How many room(s) do you have in your house?

1.13. Do you have electricity in your house? 1. Yes 2. No

1.14. Do you have a mobile phone? 1. Yes 2. No

1.15. Do you have proper latrine at your house? 1. Yes 2. No.

1.16. Do you have access to pure/tube-well drinking water? 1. Yes 2. No

Section 2: Village Level Information:

Facility	Availability of the facilities (Yes = 1; No = 2)	Distance from villages (km)
Primary School		
Secondary School		
College		
Commercial Bank		
Micro-credit/NGO Offices		
Post Office		
Hospital/Health Clinic		
Local Market		
Electricity		NA

Pacca (black-topped) Road		NA
Distance to Town Centre/Upzila Sadar	NA	

2.1 Is the village developed? (Interviewer should answer this) 1. Yes 2. No

Section 3: Types of Skill:

3.1 Pease define your (respondent/borrower)/family member's skills:

Types of Skill	Put a Tick (if any)	Who received training? Borrowers = 1; Spouse/Son/daughter =2
1.Received Income Generating activities training from NGOs		
2.Received training from department of Youth and Development on skill enhancement such as weaving, sewing, fishery, poultry etc.		
3.Received training from Thana agriculture office on crop cultivation/vegetable production/plantation in a scientific way		
4.Working on your existing small business, previously worked for others		
5. Have you worked previously in the garments/food/poultry/fishery industry?		
6. Received training on how to a drive taxi/bus or other vehicles for being employed or worked as an assistant of driver to gain some experiences?		
7. Head of household is educated (Secondary or above), so he or she can easily maintain business		
8. You are doing some income generating activities which you have started on your own.		
9. Other (specify)		

10. None		

Section 4: Household Income and Expenditure/Savings:

Details of your HH Monthly Income:	Amount	Details of HH Monthly Expenditure (Do NOT include expenditure associated with business and wedding ceremonies or dowry or gift)	Amount
Income from wage employment (monthly)		Food (monthly)	
Income from business (monthly)		Clothing (Yearly/12)	
Income from agricultural products (yearly income/12)		Medical Treatment (yearly/12)	
Foreign remittance received in the last 12 months (If not, put 0) (Yearly amount/12)		Education (yearly/12)	
Donation/Zakat received in the last twelve month (If not, put 0) (yearly amount/12)		Utilities (Telephone, electricity, kerosene, gas and other fuel) (Monthly)	
If you do menial domestic job then how much did you earn in the last twelve months? (if not, put 0) (amount/12)		Rent (Monthly)	
Other Monthly income (specify)		Transport cost/other costs (Monthly)	
Total Income		Total Expenditure	

4.1 How much was your monthly income 12 months before?

4.2 How much was your monthly expenditure 12 months before?

4.3 Are/Were you a member of Vulnerable Group Development Programme (VGD) or any other poverty reduction project? Yes = 1, No = 2.

4.4 How much savings do you have currently (cash or in-kind like government bonds, savings account and other financial assets) in total?

Section 5: Value of Household land and non-land assets:

Please put the code below where necessary [Code number is within bracket]: Purchase with your income or savings- (1), Purchased on loan from ASA- (2), Inherited- (3), Received as dowry- (4), Received as Gift- (5), Purchased on loan from relatives/friends- (6), Other (specify)- (7) **(These codes are only valid for the question below "How did you acquire assets?")**

5.1 What is the current total value your land asset?	Homestead land (decimal)	Cultivable land (decimal)	Other type of land (Pond, Orchard, bamboo groves) (decimal)	Total
How did you acquire assets? Put codes	Code:	Code:	Code:	
Size of the land				
Value of Assets (TK)				

Value of Household Durable Assets (in Taka):

5.2 What is the current total value of your household durable assets?	Transportation Assets (Auto rickshaw, motor cycle, bi-cycle, rickshaw/van)	Electric Goods(Radio/cassette player/TV/Fridge/others)	Agricultural equipment (Tiller/Tractor/Others)	Livestock (cow/ goat/poultry/others)	Furniture	Gold/Jewelleries	Total Value (Taka)
How did you acquire these assets? Put code	Code:	Code:	Code:	Code:	Code:	Code:	
Value of Assets							

(TK)							

5.3 How much worth of land assets did you buy over the last 12 months? (Put 0, if not)

5.4 How much worth of non-land assets (listed above/non-listed) did you buy over the last 12 months? (Put 0, if not)

Section 6: Credit Related Information:

6.1 What was the purpose of the loan? 1. Personal/Family reason 2.Start-up a business 3.Expand existing business 4. Other (specify)

6.2 What kind of business: 1. Agriculture/nursery 2.Livestock/Poultry farming/Fishery 3.Purchase of auto rickshaw/van/other types of transport assets 4.Grocery/variety store/Vending of vegetable/fruits/ Food Processing 5.Pottery/goldsmith/blacksmith/recycling business 6.Tailoring 7.Other (specify)

6.3 How long have you been involved in the micro-credit programme? (Number of months)

6.4 How much is your current loan amount (Taka)?

6.5 How much is your current weekly instalment?

6.6 How many times have you borrowed so far?

6.7 How many people are employed in the business (do NOT include family members if they are un-paid)?

6.8 Who motivated you to join a micro-credit programme? 1. Self-motivated 2.Spouse 3.MFI staff 4.Existing borrowers 5.Other (specify)

6.9 Why did you join a micro-credit programme? 1. No access to commercial banks 2.Cheaper credit 3.No need of collateral 4.Group feeling 5.Other (specify)

6.10 Who uses the loan? 1. Borrower alone 2.Spouse alone 3.Both borrower and spouse jointly 4. Son/daughter/other family members 5.Other (specify)

6.11 Do you obtain loan from alternative sources such as MFIs, banks and relatives? 1. Yes, 2. No.

6.12 If YES, then what other sources do you obtain loan from? 1. BRAC 2.Grameen Bank 3.Krishi Bank 4.Local NGOs 5. Other (specify)

6.13 What was the reason to borrow from another source? 1. Insufficient loan 2. Not qualified for second loan 3.To meet family's emergency cash crisis 4.Expense on emergency medical treatment 5. Crops damaged/livestock damaged 6.Working capital for your existing business/starting a new business 7.Other (specify)

Section 7: Distress Handling: Description of distresses if it was subjected to last 3 years

7.1 Types of Distress (Tick all that apply)	7.2 How did you tackle this distress? (Tick all that apply)	7.3 Expenses for tackling distresses (Taka)
1. Death incidence of Head of Household 2. Serious illness/Chronic diseases of household's head/family members/accident 3. Crops damaged/House damaged due to river overflow/flood/cyclone 4. Livestock(s)[buffalo, goat, cow] stolen/died 5. Dowry related assault/harassment 6. Loss of business funded by ASA 7. Job losses 8. None	1. Borrowed from MFI 2. Borrowed from friends/relatives 3. Selling land asset/other assets 4. Support received from NGOs/Government 5. Managed to tackle by household's income/savings 6. Other (specify)	

Section 8: Subjective Poverty:

8.1 How was your poverty status five years back? 1. Very poor 2.Poor 3.Not Poor

8.2 How do you rate your present poverty status? 1. Very poor 2.Poor 3.Not Poor

8.3 What are main factors for improving poverty status? (Please tick all that apply)	8.4 Why did you fail to improve? (Please tick all that apply)
1. Head of household is having regular income 2. Children contribute to family income after being employed 3. Children are engaged in existing family business 4. Received continuous financial support from MFIs 5. Other (specify):	1. Head of household was unemployed 2. Death of household's head 3. Children got separated after being grown up 4. Children are still going to school 5. Other (specify)

9.5 How many meals can you afford for your family members a day? 1. Three meals a day 2.Two meals a day 3. Single meal a day

Questionnaire for ASA Dropped-Out:

Interviewer Name:...….....Branch Name:……..Date:

Section 1: Demographic Information:

1.1 Name……..Village…….Thana.....District…….....

1.2. Age…….1.3. Gender: 1. Male 2. Female

1.4 Marital Status: 1. Married 2.Unmarried 3.Widow 4.Divorced

1.5 Respondent Year of Schooling (please put 0 if the respondent did not go to school):

1.6 Who is the head of your household? 1. Respondent/borrower 2.Husband 3.Father/Mother 4. Son/Daughter 5.Other (Specify)

1.7 Years of schooling for the head of the household (please put 0 if the head of household did not go to school):

1.8 The highest year of Schooling among children (if any):

1.9 Household members' details (including respondent):

Age (in years)	Sex (Male=1 and Female =2)	Family member's current occupation? (Going to School=1; Going to College/University = 2; Self-employed (agriculture) =3; Self-employed (non-agriculture) = 4; Service = 5; Day labourer (agriculture) = 6; Day labourer (non-agriculture) = 7; Unemployed = 8; Housewife= 9; Others (specify) = 10

1.11. What type of accommodation do you currently own? 1. Own house 2.Renting 3.Sharing a house 4.Other (specify).

1.12. What is the type of the house? 1. Kacha (Mud) 2.Semi-pacca (made with bricks and other materials) 3.Pacca (made by bricks) 4. Made with bamboo and Tin 5.Other (specify).

1.13. How many room(s) do you have in your house?

1.14. Do you have electricity in your house? 1. Yes 2. No

1.15. Do you have a mobile phone? 1. Yes 2. No

1.16. Do you have proper latrine at your house? 1. Yes 2. No.

1.17. Do you have access to pure/tube-well drinking water? 1. Yes 2. No

Section 2: Village Level Information:

Facility	Availability of the facilities (Yes = 1; No = 2)	Distance from villages (km)
Primary School		
Secondary School		
College		
Commercial Bank		
Micro-credit/NGO Offices		
Post Office		
Hospital/Health Clinic		
Local Market		
Electricity		NA
Pacca (black-topped) Road		NA
Distance to Town Centre/Upzila Sadar	NA	

2.1 Is the village developed? (Interviewer should answer this) 1. Yes 2. No

Section 3: Types of Skill:

3.1 Pease define your (respondent/borrower)/family member's skills:

Types of Skill	Put a Tick (if any)	Who received training? Borrowers = 1; Spouse/Son/daughter=2
1.Received Income Generating activities training from NGOs		
2.Received training from department of Youth and Development on skill enhancement such as weaving, sewing, fishery, poultry etc.		
3.Received training from Thana agriculture office on crop cultivation/vegetable production/plantation in a scientific way		
4.Working on your existing small business, previously worked for others		
5. Have you worked previously in the garments/food/poultry/fishery industry?		
6. Received training on how to a drive taxi/bus or other vehicles for being employed or worked as an assistant of driver to gain some experiences?		
7. Head of household is educated (Secondary or above), so he or she can easily maintain business		
8. You are doing some income generating activities which you have started on your own.		
9. Other (specify)		
10. None		

Section 4: Household Income and Expenditure/Savings:

Details of your HH Monthly Income:	Amount	Details of HH Monthly Expenditure (Do NOT include expenditure associated with business and wedding ceremonies or dowry or gift)	Amount
Income from wage employment (monthly)		Food (Monthly)	
Income from business (monthly)		Clothing (Yearly/12)	
Income from agricultural products (yearly/12)		Medical Treatment (yearly/12)	
Foreign remittance received in the last 12 months (If not, put 0) (Yearly amount/12)		Education (yearly/12)	
Donation/Zakat received in the last twelve month (If not, put 0) (yearly amount/12)		Utilities (Telephone, electricity, kerosene, gas and other fuel) (Monthly)	
If you do menial domestic job then how much did you earn in the last twelve months? (if not, put 0) (amount/12)		Rent (Monthly)	
Other Monthly income (specify)		Transport cost/other costs (Monthly)	
Total Income		Total Expenditure	

4.1 How much was your monthly income 12 months before?

4.2 How much was your monthly expenditure 12 months before?

4.3 Are/Were you a member of Vulnerable Group Development Programme (VGD) or any other poverty reduction project? Yes = 1, No = 2.

4.4 How much savings do you have currently (cash or in-kind like government bonds, savings account and other financial assets) in total?

Section 5: Value of Household land and non-land assets:

Please put the code below where necessary [Code number is within bracket]: Purchase with your income or savings- (1), Purchased on loan from ASA- (2), Inherited- (3), Received as dowry- (4), Received as Gift- (5), Purchased on loan from relatives/friends- (6), Other (specify)- (7) **(These codes are only valid for the question below "How did you acquire assets?")**

5.1 What is the total value of your land asset?	Homestead land (decimal)	Cultivable land (decimal)	Other type of land (Pond, Orchard, bamboo groves) (decimals)	Total
How did you acquire these assets? Please put code here	Code:	Code:	Code:	
Size of the land				
Value of Assets (Taka)				

Value of Household Durable Assets (in Taka):

5.2 What is the total value of your household durable assets?	Transportation Assets (Auto rickshaw, motor cycle, bi-cycle, rickshaw/van)	Electric Goods(Radio /cassette player/TV/Fridge/others)	Agricultural equipment (Tiller/Tractor/Others)	Livestock (cow/ goat/poultry/others)	Furniture	Gold/Jewelleries	Total Value (Taka)
How did you acquire these	Code:	Code:	Code:	Code:	Co	Code:	Code:

assets? Please put relevant code from the above list					d e:		
Value (in Taka)							

5.3 How much worth of land assets did you buy over the last 12 months? (Put 0, if not)

5.4 How much worth of non-land assets (listed above) did you buy over the last 12 months? (Put 0, if not)

Section 6: Credit Related Information:

6.1 How long were you involved in the micro-credit programme? (Number of Months)

6.2 How many times had you borrowed during that period?

6.3 Can you borrow from the Relatives/friends/Neighbour or other sources (interest free loan)? 1. Yes 2. No

6.4 How much have you borrowed from Relatives/friends/Neighbour in the last 12 months? (put 0 if not):

6.5 Why did you drop-out of the micro-credit programme? (Please tick all that apply)

1. Dropped out due to becoming a defaulter 2. Failed to repay previous instalments on time

3. Unable to raise income with the small loans 4. Got an interest free loan from friends/relatives

5. Repayment is too strict 6. Other (specify)

Section 7: Distress Handling:

Part A: Description of distresses if it was subjected to last 3 years

7.1 Types of Distress (Tick all that apply)	7.3 How did you tackle this distress? (Tick all that apply)	7.3 Expenses for tackling distresses (Taka)
1. Death incidence of Head of Household 2. Serious illness/Chronic diseases of household's head/family members/accident 3. Crops damaged/House damaged due to river overflow/flood/cyclone 4. Livestock(s)[buffalo, goat, cow] stolen/died 5. Dowry related assault/harassment 6. Loss of business funded by ASA 7. Job losses 8. None	1. Borrowed from MFI 2. Borrowed from friends/relatives 3. Selling land asset/other assets 4. Support received from NGOs/Government 5. Managed to tackle by household's income/savings 6. Other (specify)	

Section 8: Subjective Poverty:

8.1 How was your poverty status five years back? 1. Very poor 2.Poor 3.Not Poor

8.2 How do you rate your present poverty status? 1. Very poor 2.Poor 3.Not Poor

8.3 What are main factors for improving poverty status? (Please tick all that apply)	8.4 Why did you fail to improve? (Please tick all that apply)
1. Head of household is having regular income 2. Children contribute to family income after being employed 3. Children are engaged in existing family	1. Head of household was unemployed 2. Death of household's head 3. Children got separated after being grown up

business 4. Other (specify)	4. Children are still going to school 5. Other (specify)

8.5 How many meals can you afford for your family members a day? 1. Three meals a day 2.Two meals a day 3. Single meal a day

Questionnaire for Non-Borrowers:

Interviewer Name:...….....Branch Name:…….Date:

Section 1: Demographic Information:

1.1 Name……..Village……..Thana.....District……

1.2. Age…….1.3. Gender: 1. Male 2. Female

1.4 Marital Status: 1. Married 2.Unmarried 3.Widow 4.Divorced

1.5 Respondent Year of Schooling (please put 0 if the respondent did not go to school):

1.6 Who is the head of household? (Please tick only one) 1. Respondent/Borrower 2.Husband 3.Father/Mother 4. Son/Daughter 5.Other (specify)

1.7 Years of schooling for the head of the household (please put 0 if the head of household did not go to school):

1.8 The highest year of schooling among children (if any):

1.9 Household members' details (including respondent):

Age (in years)	Sex (Male=1 and Female =2)	Family member's current occupation? (Going to School=1; Going to College/University = 2; Self-employed (agriculture) =3; Self-employed (non-agriculture) = 4; Service = 5; Day labourer (agriculture) = 6; Day labourer (non-agriculture) = 7; Unemployed = 8; 9. Housewife = 9; Others (specify) = 10

1.10. What type of accommodation do you currently own? 1. Own house 2.Renting 3.Sharing a house 4.Other (specify).

1.11. What is the type of the house? 1. Kacha (Mud) 2.Semi-pacca (made with bricks and other materials) 3.Pacca (made by bricks) 4. Made with bamboo and Tin 5.Other (specify).

1.12. How many room(s) do you have in your house?

1.13. Do you have electricity in your house? 1. Yes 2. No

1.14. Do you have a mobile phone? 1. Yes 2. No

1.15. Do you have proper latrine at your house? 1. Yes 2. No.

1.16. Do you have access to pure/tube-well drinking water? 1. Yes 2. No

Section 2: Village Level Information:

Facility	Availability of the facilities (Yes = 1; No = 2)	Distance from villages (km)
Primary School		
Secondary School		
College		
Commercial Bank		
Micro-credit/NGO Offices		
LOAN CENTRE (SAMITY)		
Post Office		
Hospital/Health Clinic		

Local Market		
Electricity		NA
Pacca (black-topped) Road		NA
Distance to Town Centre/Upzila Sadar	NA	

2.1 Is the village developed? (Interviewer should answer this) 1. Yes 2. No

Section 3: Types of Skill:

3.1 Pease define your (respondent/borrower)/family member's skills:

Types of Skill	Put a Tick (if any)	Who received training? Borrowers = 1; Spouse/Son/daughter
1.Received Income Generating activities training from NGOs		
2.Received training from department of Youth and Development on skill enhancement such as weaving, sewing, fishery, poultry etc.		
3.Received training from Thana agriculture office on crop cultivation/vegetable production/plantation in a scientific way		
4.Working on your existing small business, previously worked for others		
5. Have you worked previously in the garments/food/poultry/fishery industry?		
6. Received training on how to a drive taxi/bus or other vehicles for being employed or worked as an assistant of driver to gain some experiences?		
7. Head of household is educated (Secondary or above), so he or she can easily maintain business		
8. You are doing some income generating activities which you have		

started on your own.		
9. Other (specify)		
10. None		

Section 4: Household Income and Expenditure/Savings:

Details of your HH Monthly Income:	Amount	Details of HH Monthly Expenditure (Do NOT include expenditure associated with business and wedding ceremonies or dowry or gift)	Amount
Income from wage employment (monthly)		Food	
Income from business (monthly)		Clothing (Yearly/12)	
Income from agricultural products (yearly/12)		Medical Treatment (yearly/12)	
Foreign remittance received in the last 12 months (If not, put 0) (Yearly amount/12)		Education (yearly/12)	
Donation/Zakat received in the last twelve month (If not, put 0) (yearly amount/12)		Utilities (Telephone, electricity, kerosene, gas and other fuel) (Monthly)	
If you do menial domestic job then how much did you earn in the last twelve months? (Put 0, if you don't)		Rent (Monthly)	
Other Monthly income (specify)		Transport cost/other costs (Monthly)	
Total Income		Total Expenditure	

4.1 How much was your monthly income 12 months before?

4.2 How much was your monthly expenditure 12 months before?

4.3 Are/Were you a member of Vulnerable Group Development Programme (VGD) or any other poverty reduction project? Yes = 1, No = 2.

4.4 How much savings do you have currently (cash or in-kind like government bonds, savings account and other financial assets) in total?

Section 5: Value of Household land and non-land assets:

Please put these codes below where necessary [Code number is within bracket]: Purchase with your income or savings- (1), Purchased on loan from ASA- (2), Inherited- (3), Received as dowry- (4), Received as Gift- (5), Purchased on loan from relatives/friends- (6), Other (specify)- (7) **(These codes are only valid for the question below "How did you acquire assets?")**

5.1 What is the total value of your land asset?	Homestead land (decimal)	Cultivable land (decimal)	Other type of land (Pond, Orchard, bamboo groves) (decimals)	Total
How did you acquire these assets? Put above code here)	Code:	Code:	Code:	
Size of the land				
Value of Assets (Taka)				

Value of Household Durable Assets (in Taka):

5.2 What is the total value of your household durable assets?	Transportation Assets (Auto rickshaw, motor cycle, bi-cycle, rickshaw/van)	Electric Goods(Radio/cassette player/TV/Fridge/others)	Agricultural equipment (Tiller/ Tractor/ Others)	Livestock (cow/ goat/poultry/ others)	Furniture	Gold/Jewelleries	Total Value (Taka)
How did you acquire these assets? Put code from the above	Code:	Code:	Code:	Code:	Code:	Code:	Code:
Value (in Taka)							

5.3 How much worth of land assets did you buy over the last 12 months? (Put 0, if not)

5.4 How much worth of non-land assets (listed above) did you buy over the last 12 months? (Put 0, if not)

Section 6: Credit related Information:

6.1 Can you borrow from the Relatives/friends/Neighbour or other sources (interest free loan)? 1. Yes 2. No

6.2 How much have you borrowed from Relatives/friends/Neighbour in the last 12 months? (put 0 if not):

6.3 Why did you not join in any credit programme? (Please tick all that applies):

1. Irregular household income 2.Head of household was unemployed

3. No MFI in the village 4.Getting interest free loan from friends/relatives

5. Fear of loan default 6. Size of the loan is fairly small

7. Head of household did not allow you to join. 8. Other (specify)

Section 7: Distress Handling:

Description of distresses if it was subjected to last 3 years

7.1 Types of Distress (Tick all that apply)	7.2 How did you tackle this distress? (Tick all that apply)	7.3 Expenses for tackling distresses (Taka)
1. Death incidence of Head of Household 2. Serious illness/Chronic diseases of household's head/family members/accident 3. Crops damaged/House damaged due to river overflow/flood/cyclone 4. Livestock(s)[buffalo, goat, cow] stolen/died 5. Dowry related assault/harassment 6. Job losses 7. None	1. Borrowed from friends/relatives 2. Selling land asset/other assets 3. Support received from NGOs/Government 4. Managed to tackle by household's income/savings 5. Other (specify)	

Section 8: Subjective Poverty:

8.1 How was your poverty status five years back? 1. Very poor 2.Poor 3.Not Poor

8.2 How do you rate your present poverty status? 1. Very poor 2.Poor 3.Not Poor

8.3 What are main factors for improving poverty status? (Please tick all that apply)	8.4 Why did you fail to improve? (Please tick all that apply)
1. Head of household is having regular income 2. Children contribute to family income after being employed 3. Children are engaged in existing family business 4. Other (specify)	1. Head of household was unemployed 2. Death of household's head 3. Children got separated after being grown up 4. Children are still going to school 5. Other (specify)

8.5 How many meals can you afford for your family members a day? 1. Three meals a day 2.Two meals a day 3. Single meal a day

Questionnaire for Refused Borrowers

Interviewer Name:...….....Branch Name:……..Date:

Section 1: Demographic Information:

1.1 Name……Village……. Thana.....District……

1.2. Age……1.3. Gender: 1. Male 2. Female

1.4 Marital Status: 1. Married 2.Unmarried 3.Widow 4.Divorced

1.5 Respondent Year of Schooling (please put 0 if the respondent did not go to school):

1.6 Who is the head of your household? 1. Respondent/borrower 2.Husband 3.Father/Mother 4. Son/Daughter 5.Other (Specify)

1.7 Years of schooling for the head of the household (please put 0 if the head of household did not go to school):

1.8 The highest year of Schooling among children (if any):

1.9 Household members' details (including respondent):

Age (in years)	Sex (Male=1 and Female =2)	Family member's current occupation? (Going to School=1; Going to College/University = 2; Self-employed (agriculture) =3; Self-employed (non-agriculture) = 4; Service = 5; Day labourer (agriculture) = 6; Day labourer (non-agriculture) = 7; Unemployed = 8; Housewife = 9; Others (specify) = 10

1.10. What type of accommodation do you currently own? 1. Own house 2.Renting 3.Sharing a house 4.Other (specify).

1.11. What is the type of the house? 1. Kacha (Mud) 2.Semi-pacca (made with bricks and other materials) 3.Pacca (made by bricks) 4. Made with bamboo and Tin 5.Other (specify).

1.12. How many room(s) do you have in your house?

1.13. Do you have electricity in your house? 1. Yes 2. No

1.14. Do you have a mobile phone? 1. Yes 2. No

1.15. Do you have proper latrine at your house? 1. Yes 2. No.

1.16. Do you have access to pure/tube-well drinking water? 1. Yes 2. No

Section 2: Village Level Information:

Facility	Availability of the facilities (Yes = 1; No = 2)	Distance from villages (km)
Primary School		
Secondary School		
College		
Commercial Bank		
Micro-credit/NGO Offices		
Post Office		
Hospital/Health Clinic		
Local Market		
Electricity		NA
Pacca (black-topped) Road		NA
Distance to Town Centre/Upzila Sadar	NA	

2.1 Is the village developed? (Interviewer should answer this based on the above information) 1. Yes 2. No

Section 3: Types of Skill:

3.1 Pease define your (respondent/borrower)/family member's skills:

Types of Skill	Put a Tick (if any)	Who received training? Borrowers = 1; Spouse/Son/daughter=2
1.Received Income Generating activities training from NGOs		
2.Received training from department of Youth and Development on skill enhancement such as weaving, sewing, fishery, poultry etc.		
3.Received training from Thana agriculture office on crop cultivation/vegetable production/plantation in a scientific way		
4.Working on your existing small business, previously worked for others		
5. Have you worked previously in the garments/food/poultry/fishery industry?		
6. Received training on how to a drive taxi/bus or other vehicles for being employed or worked as an assistant of driver to gain some experiences?		
7. Head of household is educated (Secondary or above), so he or she can easily maintain business		
8. You are doing some income generating activities which you have started on your own.		
9. Other (specify)		
10. None		

Section 4: Household Income and Expenditure/Savings:

Details of your HH Monthly Income:	Amount	Details of HH Monthly Expenditure (Do NOT include expenditure associated with business and wedding ceremonies or dowry or gift)	Amount
Income from wage employment (monthly)		Food (Monthly)	
Income from business (monthly)		Clothing (Yearly/12)	
Income from agricultural products (yearly income/12)		Medical Treatment (yearly/12)	
Foreign remittance received in the last 12 months (If not, put 0) (Yearly amount/12)		Education (yearly/12)	
Donation/Zakat received in the last twelve month (If not, put 0) (yearly amount/12)		Utilities (Telephone, electricity, kerosene, gas and other fuel) (Monthly)	
If you do menial domestic job then how much did you earn in the last twelve months? (Put 0, if you don't)		Rent (Monthly)	
Other Monthly income (specify)		Transport cost/other costs (Monthly)	
Total Income		Total Expenditure	

4.1 How much was your monthly income 12 months before?

4.2 How much was your monthly expenditure 12 months before?

4.3 Are/Were you a member of Vulnerable Group Development Programme (VGD) or any other poverty reduction project? Yes = 1, No = 2.

4.4 How much savings do you have currently (cash or in-kind like government bonds, savings account and other financial assets) in total?

Section 5: Value of Household land and non-land assets:

Please put the code below where necessary [Code number is within bracket]: Purchase with your income or savings- (1), Purchased on loan from ASA- (2), Inherited- (3), Received as dowry- (4), Received as Gift- (5), Purchased on loan from relatives/friends- (6), Other (specify)- (7) (These codes are only valid for the question below "How did you acquire assets?")

5.1 What is the total value of your land asset?	Homestead land (decimal)	Cultivable land (decimal)	Other type of land (Pond, Orchard, bamboo groves) (decimals)	Total
How did you acquire these assets? Please put code here	Code:	Code:	Code:	
Size of the land				
Value of Assets (Taka)				

Value of Household Durable Assets (in Taka):

5.2 What is the total value of your household durable assets?	Transportation Assets (Auto rickshaw, motor cycle, bi-cycle, rickshaw/van)	Electric Goods(Radio/cassette player/TV/Fridge/others)	Agricultural equipment (Tiller/Tractor/Others)	Livestock (cow/goat/poultry/others)	Furniture	Gold/Jewelleries	Total Value (Taka)
How did you acquire these	Code:	Code:	Code:	Code:	Code:	Code:	

assets? Put code here							
Value (in Taka)							

5.3 How much worth of land assets did you buy over the last 12 months? (Put 0, if not)

5.4 How much worth of non-land assets (listed above) did you buy over the last 12 months? (Put 0, if not)

Section 6: Credit related/refusal Information:

6.1 Who refused you micro-credit? 1. Loan Officer 2.Branch Manager 3.Existing borrowers 4. Other (specify).

6.2 Why were you refused micro-credit? (Please tick all that apply)

1. Refused due to financial circumstances 2. Irregular household income

3. Other (specify).

6.3 Can you borrow from the Relatives/friends/Neighbour or other sources (interest free loan)? 1. Yes 2. No

6.4 How much have you borrowed from Relatives/friends/Neighbour in the last 12 months? (put 0 if not):

Section 7: Distress Handling:

Description of distresses if it was subjected to last 3 years

7.1 Types of Distress (Tick all that apply)	7.2 How did you tackle this distress? (Tick all that apply)	7.3 Expenses for tackling distresses (Taka)
1. Death incidence of Head of Household 2. Serious illness/Chronic diseases of household's head/family members/accident 3. Crops damaged/House damaged due to river overflow/flood/cyclone 4. Livestock(s)[buffalo, goat, cow] stolen/died 5. Dowry related assault/harassment 6. Job losses 7. None	1. Borrowed from friends/relatives 2. Selling land asset/other assets 3. Support received from NGOs/Government 4. Managed to tackle by household's income/savings 5. Other (specify)	

Section 8: Subjective Poverty:

8.1 How was your poverty status five years back? 1. Very poor 2.Poor 3.Not Poor

8.2 How do you rate your present poverty status? 1. Very poor 2.Poor 3.Not Poor

8.3 What are main factors for improving poverty status? (Please tick all that apply)	8.4 Why did you fail to improve? (Please tick all that apply)
1. Head of household is having regular income 2. Children contribute to family income after being employed 3. Children are engaged in existing	1. Head of household was unemployed 2. Death of household's head 3. Children got separated after being grown up 4. Children are still going to school 5. Other (specify)

family business 4. Other (specify)	

8.5 How many meals can you afford for your family members a day? 1. Three meals a day 2.Two meals a day 3. Single meal a day

Questionnaire for ASA Pipeline Borrowers:

Interviewer Name:...….....Branch Name:… ……..Date:

Section 1: Demographic Information: 1.1 Name……Village……..Thana.....District….

1.2. Age……1.3. Gender: 1. Male 2. Female

1.4 Marital Status: 1. Married 2.Unmarried 3.Widow 4.Divorced

1.5 Respondent Year of Schooling (please put 0 if the respondent did not go to school):

1.6 Who is the head of your household? 1. Respondent/borrower 2.Husband 3.Father/Mother 4. Son/Daughter 5.Other (Specify)

1.7 Years of schooling for the head of the household (please put 0 if the head of household did not go to school):

1.8 The highest year of Schooling among children (if any):

1.9 Household members' details (including respondent):

Age (in years)	Sex (Male=1 and Female =2)	Family member's current occupation? (Going to School=1; Going to College/University = 2; Self-employed (agriculture) =3; Self-employed (non-agriculture) = 4; Service = 5; Day labourer (agriculture) = 6; Day labourer (non-agriculture) = 7; Unemployed = 8; Housewife = 9; Others (specify) = 10

1.10. What type of accommodation do you currently own? 1. Own house 2.Renting 3.Sharing a house 4.Other (specify).

1.11. What is the type of the house? 1. Kacha (Mud) 2.Semi-pacca (made with bricks and other materials) 3.Pacca (made by bricks) 4. Made with bamboo and Tin 5.Other (specify).

1.12. How many room(s) do you have in your house?

1.13. Do you have electricity in your house? 1. Yes 2. No

1.14. Do you have a mobile phone? 1. Yes 2. No

1.15. Do you have proper latrine at your house? 1. Yes 2. No.

1.16. Do you have access to pure/tube-well drinking water? 1. Yes 2. No

Section 2: Village Level Information:

Facility	Availability of the facilities (Yes = 1; No = 2)	Distance from villages (km)
Primary School		
Secondary School		
College		
Commercial Bank		
Micro-credit/NGO Offices		
Post Office		
Hospital/Health Clinic		
Local Market		
Electricity		NA
Pacca (black-topped) Road		NA
Distance to Town Centre/Upzila Sadar	NA	

2.1 Is the village developed? (Interviewer should answer this) 1. Yes 2. No

Section 3: Types of Skill:

3.1 Pease define your (respondent/borrower)/family member's skills:

Types of Skill	Put a Tick (if any)	Who received training? Borrowers = 1; Spouse/Son/daughter=2
1.Received Income Generating activities training from NGOs		
2.Received training from department of Youth and Development on skill enhancement such as weaving, sewing, fishery, poultry etc.		
3.Received training from Thana agriculture office on crop cultivation/vegetable production/plantation in a scientific way		
4.Working on your existing small business, previously worked for others		
5. Have you worked previously in the garments/food/poultry/fishery industry?		
6. Received training on how to a drive taxi/bus or other vehicles for being employed or worked as an assistant of driver to gain some experiences?		
7. Head of household is educated (Secondary or above), so he or she can easily maintain business		
8. You are doing some income generating activities which you have started on your own.		
9. Other (specify)		
10. None		

Section 4: Household Income and Expenditure/Savings:

Details of your HH Monthly Income:	Amount	Details of HH Monthly Expenditure (Do NOT include expenditure associated with business and wedding ceremonies or dowry or gift)	Amount
Income from wage employment (monthly)		Food (Monthly)	
Income from business (monthly)		Clothing (Yearly/12)	
Income from agricultural products (yearly/12)		Medical Treatment (yearly/12)	
Foreign remittance received in the last 12 months (If not, put 0) (Yearly amount/12)		Education (yearly/12)	
Donation/Zakat received in the last twelve month (If not, put 0) (yearly amount/12)		Utilities (Telephone, electricity, kerosene, gas and other fuel)	
If you do menial domestic job then how much did you earn in the last twelve months? (Put 0, if you don't)		Rent (Monthly)	
Other Monthly income (specify)		Transport cost/other costs (Monthly)	
Total Income		Total Expenditure	

4.1 How much was your monthly income 12 months before?

4.2 How much was your monthly expenditure 12 months before?

4.3 Are/Were you a member of Vulnerable Group Development Programme (VGD) or any other poverty reduction project? Yes = 1, No = 2.

4.4 How much savings do you have currently (cash or in-kind like government bonds, savings account and other financial assets) in total?

Section 5: Value of Household land and non-land assets:

Please put the code below where necessary [Code number is within bracket]: Purchase with your income or savings- (1), Purchased on loan from ASA- (2), Inherited- (3), Received as dowry- (4), Received as Gift- (5), Purchased on loan from relatives/friends- (6), Other (specify)- (7) **(These codes are only valid for the question below "How did you acquire assets?")**

5.1 What is the total value of your land asset?	Homestead land (decimal)	Cultivable land (decimal)	Other type of land (Pond, Orchard, bamboo groves) (decimals)	Total
How did you acquire these assets? Please put code here	Code:	Code:	Code:	
Size of the land				
Value of Assets (Taka)				

Value of Household Durable Assets (in Taka):

5.2 What is the total value of your household durable assets?	Transportation Assets (Auto rickshaw, motor cycle, bi-cycle, rickshaw/van)	Electric Goods(Radio /cassette player/TV/Fridge/others)	Agricultural equipment (Tiller/Tractor/Others)	Livestock (cow/ goat/poultry/others)	Furniture	Gold/Jewelleries	Total Value (Taka
How did you acquire these assets? Please put relevant code from the above list	Code:	Code:	Code:	Code:	Code:	Code:	
Value (in Taka)							

5.3 How much worth of land assets did you buy over the last 12 months? (Put 0, if not)

5.4 How much worth of non-land assets (listed above) did you buy over the last 12 months? (Put 0, if not)

Section 6: Credit Related Information:

6.1 How many months ago did you join in ASA?

6.2 If you would get loan, then what would you do? 1. Personal/Family expenses 2.Start-up a business 3.Expand existing business 4. Other (specify)

6.2 What kind of business: 1. Agriculture/nursery 2.Livestock/Poultry farming/Fishery 3.Purchase of auto rickshaw/van/other types of transport assets 4.Grocery/variety store/Vending of vegetable/fruits/ Food Processing 5.Pottery/goldsmith/blacksmith/recycling business 6.Tailoring 7.Other (specify)

6.4 Who motivated you to join a micro-credit programme? 1. Self-motivated 2.Spouse 3.MFI staff 4.Existing borrowers 5.Other (specify)

6.5 Why did you join a micro-credit programme? 1. No access to commercial banks 2.Cheaper credit 3.No need of collateral 4.Group feeling 5.Other (specify)

6.6 Can you borrow from the Relatives/friends/Neighbour or other sources (interest free loan)? 1. Yes 2. No

6.7 How much have you borrowed from Relatives/friends/Neighbour in the last 12 months? (Put 0 if not):

Section 7: Distress Handling:

Description of distresses if it was subjected to last 3 years

7.1 Types of Distress (Tick all that apply)	7.2 How did you tackle this distress? (Tick all that apply)	7.3 Expenses for tackling distresses (Taka)
1. Death incidence of Head of Household 2. Serious illness/Chronic diseases of household's head/family members/accident 3. Crops damaged/House damaged due to river overflow/flood/cyclone 4. Livestock(s)[buffalo, goat, cow] stolen/died 5. Dowry related assault/harassment 6. Job losses 7. None	1. Borrowed from friends/relatives 2. Selling land asset/other assets 3. Support received from NGOs/Government 4. Managed to tackle by household's income/savings 5. Other (specify)	

Section 8: Subjective Poverty:

8.1 How was your poverty status five years back? 1. Very poor 2.Poor 3.Not Poor

8.2 How do you rate your present poverty status? 1. Very poor 2.Poor 3.Not Poor

8.3 What are main factors for improving poverty status? (Please tick all that apply)	8.4 Why did you fail to improve? (Please tick all that apply)
1. Head of household is having regular income 2. Children contribute to family income after being employed 3. Children are engaged in existing family business 4. Other (specify)	1. Head of household was unemployed 2. Death of household's head 3. Children got separated after being grown up 4. Children are still going to school 5. Other (specify)

8.5 How many meals can you afford for your family members a day? 1. Three meals a day 2.Two meals a day 3. Single meal a day

Appendix 6: Name of the Locations of the Study

Sl No	Division	Districts	NO of Branch	Thana	Branch
1	Dhaka	Dhaka	**1**	Dhamrai	Dhamrai
2		Gazipur	**4**	Kapasia	Kapasia
3				Sreepur	Sreepur
4			**Pilot Survey**	Gazipur Sadar	Gazipur Sadar
5			**Pilot Survey**	Joydebpur	Joydebpur
6		Narshingdi	**2**	Narsingdi Sadar	Narsingdi Sadar
7				Palash	Palash
8		Kishoreganj	**3**	Kalikaprasad	Kalikaprasad
9				Bajitpur	Bajitpur
10				Gokulnagar	Gokulnagar
11		Mymensingh	**3**	Ishwarganj	Ishwarganj
12				Nandail	Nandail
13				Trishal	Trishal
14		Netrokona	**2**	Purbadhala	Purbadhala
15				Durgapur	Durgapur
16		Jamalpur	**3**	Jamalpur Sadar	Jamalpur Sadar
17				Sarishabari	Sarishabari
18				Islampur	Islampur
19		Shariatpur	**2 (Pilot Survey)**	Shariatpur Sadar	Shariatpur Sadar
20			**Pilot Survey**	Zazira	Zazira
21	Chittagong	Chittagong	**1**	Halishahar	Halishahar
22		Cox's Bazar	**2**	Chokoria	Chokoria
23				Cox's Bazar Sadar	Cox's Bazar Sadar
24		Bandarban	**2**	Ali kadam	Ali kadam
25				LAMA	LAMA
26		Comilla	**2**	Comilla Sadar	Comilla Sadar

27				Chouddagram	Chouddagram
28	Rangpur	Kurigram	**3**	Kurigram Sadar	Dharla Setu
29				Bhurungamari	Bhurungamari
30				Nageshwari	Nageshwari
31		Nilphamari	**3**	Jaldhaka	Jaldhaka
32				Nilphamari Sadar	Nilphamari Sadar
33				Domar	Domar
34		Thakurgaon	**2**	Thakurgaon	Thakurgaon
35				Ranishankail	Ranishankail
36	Rajshahi	Rajshahi	**2**	Tanore	Tanore
37				Godagari	Godagari
38	Barisal	Patuakhali	**2**	Patuakhali Sadar	Patuakhali Sadar
39				Mirzajanj	Mirzajanj
40		Barguna	**2**	Barguna Sadar	Barguna Sadar
41				Bamna	Bamna
42		Bhola	**2**	Manpura	Manpura
43				Dakshin Aicha	Dakshin Aicha
44	Khulna	Bagerhat	**2**	Sarankhola	Sarankhola
45				Fakirhat	Fakirhat
46		Sathkira	**2**	Shamnogor	Shamnogor
47				Kaliganj_Sathkira	Kaliganj_Sathkira
48	Sylhet	Sunamganj	**2**	Shalla	Shalla
49				Derai	Derai
50		Habiganj	**3**	Baniachong	Baniachong-1
51				Lakhai	Kalauk
52				Ajmiriganj	Ajmiriganj
53		Sylhet	**2**	Sylhet Sadar	Shahi Edgah Branch
54				Companiganj	Companiganj-1
		24-Districts	**54**		

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