Do the poorest want credit?
A case study from West Kalimantan, Indonesia

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“Through micro credit, we can put poverty into the museum”

- Muhammad Yunus -

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Bismillaahirrahmaanirrahim,
In the name of Allah, The beneficent, The merciful

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Abstract

The idea of microcredit being a powerful weapon against poverty has become part of the conventional wisdom in development. The more recent debate is about whether microfinance institutions are reaching the poorest or not, and if they have to give special priority to them. One group stands for prioritization of the poorest as they assume there is vast unmet demand from them; the other argues that the poorest cannot be reached in sustainable basis as there is only limited demand from the poorest. This thesis analyzes assumptions used by the two groups and assesses whether the poorest actually want credit services or not.

This study is based on a survey of 104 low to medium-high class households in *Kecamatan* Pemangkat, West Kalimantan, Indonesia. As a measure of poverty, it uses 14 welfare indicators constructed by Indonesian Statistics Bureau (BPS). Factor analysis is applied to compress the indicators into only 4 dimensional welfare variables. Together with a set of control variables, this study assesses the effect of welfare (and control) variables on *willingness to borrow* as an off-market credit demand behavior, and on *credit participation* as an on-market credit demand behavior using *probit* models. As an extended analysis, this study also uses the same set of variables to assess household *willingness to pay*, i.e. the maximum interest rate willing to pay.

There are three major findings of this study. *First,* what matters for *willingness to borrow* are not what matters for *credit participation. Clothing and asset* is found to be the most important variable for *credit participation,* while possession of *business idea* is the most important variable for *willingness to borrow.* The study suggests that supply force is dominating in credit market; therefore in credit participation*. Second,* the poorest possess the lowest credit demand compared to the other household groups. Therefore, we do not need to target the poorest, not only it is risky from the view of supply side, but also because they actually do not want it. And *third,* we found that *willingness to borrow* and *willingness to pay* are driven by similar variables, thus the findings reinforce each other.

The result of this study suggests that instead of targeting the poorest, microcredit movement can target the poor to accelerate poverty alleviation process. The poor are found to have high *credit demand* and *willing to pay* interest as well, but still recording a low rate of *credit participation*. Credit supplier is suggested to start to consider *business idea* in evaluating potential borrower's creditworthiness. In parallel, providing the poor with credit knowledge and education can increase the poor's creditworthiness and *credit participation* rate; therefore giving them the key to go out from poverty.

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CHAPTER 1
Introduction

1.1 Introduction

For those who are born and grown up in the developing countries, poverty is an unavoidable scenery of life. Such living condition makes everybody have this question on their mind: *why are some people rich and some poor?* Not everybody tries to answer this question, but as one of those who has attempted, this question leads me to another one: *is getting out of poverty a question of effort or a question of getting the right opportunities?*

Considering effort level of each individual to be endogenous and the opportunities each one gets to be exogenous, we can say that the existence of opportunities (such as access to market or credit) might influence one's effort level; and not the other way around. Without sufficient opportunities there are not enough incentive mechanisms that drive individual to work more, hence to use less effort and just to stay at survival level becomes a rational behavior. Therefore we cannot assess individual's actual effort level when opportunities are not available. This then leads to a rough conclusion that the root of poverty problem is not on the effort level, but more on the absence of opportunities.

Departing from such logic, the microcredit movement started to bring opportunities for those who do not have them, especially opportunities to start a productive economic activity. The movement began in the 1970s and started to show impressive performance during 1990s. Grameen Bank in Bangladesh, BancoSol in Bolivia, and Bank Rakyat Indonesia (BRI) in Indonesia are some of the notable success stories. After several decades of experience, more and more studies concluded that microcredit has positive welfare effects for the participants and brings opportunities for a better life to many low-income households around the world. Moreover, the declaration of Muhammad Yunus, the founder of Grameen Bank, as a Nobel Peace Prize Laureate in 2006 was a world recognition of the role of microcredit in a war against poverty. The microcredit movement has expanded even further since then, not only in term of services (moving towards microfinance) but also in term of market volume as more and more donors support the activities and more agents deliver the services. Microfinance for poverty reduction is now part of conventional wisdom.

However, the higher the tree the harder the wind blows: the more money donated to microfinance projects, the more questions on its performance in reducing poverty. The debate has shifted from welfare effect of microcredit to its outreach to the poor and the poorest. This issue becomes important as the wider the outreach to the poor and the poorest the greater poverty reduction impact. Have microfinance institutions (MFIs) optimally reached the poor and the poorest? Should MFIs prioritize on targeting the poorest?

The fact that not all MFIs deliver services to the poor and the poorest triggered the former question[1], while the existing different type of MFIs seem to demonstrate a trade-off between financial sustainability and poverty targeting, which has triggered the latter question. Regarding the latter there are two views: *poverty lending* approach and *financial system* approach. (Morduch 1999) is among those who support the former, as he suggests that a dollar increase in income for the very poor borrower has a five times greater impact than the same dollar for the marginally poor borrower, thus MFIs should focus on the poorest borrowers first. This view has high reliance on subsidies or donor as consequence; however, it is still considered cost-effective.

Among those who stands for the latter approach is (Robinson 2001) who argues that MFIs do not have to target the poorest as the poorest don't need debt. Instead, they need shelter, food, and skill training that are more suitable to be financed by development aid or government program. For the poorest, she argued that microfinance is the next step after they're able to work and transform themselves as an economically active poor – people with ability to use the small loan for productive purpose and repay them – to whom financially sustainable MFIs can provide its service for.

In the other debate room regarding financial sustainability and poverty targeting trade-off phenomena, (Fernando 2004) classified three groups of views. *The first group* concludes that the poorest cannot be reached on a sustainable basis. This argument is based on the assumptions that the poorest have very little effective demand[2] of financial services, the cost for providing the services for the poorest is too high such that the poorest will not be able to pay the price of services that sustainable MFI would charge. The standpoint of this group is favoring the *financial system* approach presented above.

The second group argues that the poorest could be reached on sustainable and large-scale basis. The poorest reliance on informal source of credit is noted as the evident of vast effective demand of microfinance services, particularly microcredit, from the poorest. They also argue that the increasing number of MFIs with a focus on the poorest have achieved successful result, thus providing more funds to such MFIs will increase the outreach to the poorest rapidly. This standpoint is favoring the *poverty targeting* approach.

Lastly, *the third group* argues that there is only limited potential to reach the poorest on sustainable and large-scale basis. This group does not reject that the poorest can be reached on sustainable

[1] Few MFIs reach the poorest of the poor, and many MFIs have a high percentage of non-poor clients, studies indicate (Gulli 1998 p. viii-ix)
[2] *Effective demand* here is defined as willingness to consume that are accompanied by ability to pay.

basis, but they also don't agree on the existence of vast effective demand among the poorest. They believe that the search of sustainable model to provide microfinance services for the poorest should be continued; therefore, increasing funds for specific MFIs is considered to not addressing the problem. This group does not favor any approach as it standpoint is to keep innovating in search for a better approach.

From the debate above, first we can conclude that we cannot (yet) generalize whether MFIs should targeting the poorest as there are different types of MFIs (commercial and non-commercial) that targets different clients and objectives, and they all might be effective in their own way. Second, on the debate of financial sustainability and poverty targeting trade-off phenomena, we can go below the surface and see that the actual debate between groups is mainly in the assumptions used. And this leads to another interesting question that grounds the research question of this thesis.

1.2 Research questions

Instead of putting the attention on whether poverty targeting and financial sustainability can work hand-in-hand in every MFIs, this study is putting its attention on the assumptions used. The assumptions used by each groups concern both supply and demand side. Assumption concerning the supply side is about the cost of delivering the services to the poorest, while assumption concerning the demand side is about the extent of effective demand for financial services – especially microcredit service – from the poorest. This study will focus on the demand side. Therefore, the basic question that grounds this thesis is *whether there is an effective demand from the poorest.*

However, the complications in the anatomy of the term effective demand itself make it harder to assess. That is why instead of using that term, this thesis will use the terms *credit participation* and *willingness to borrow.* So taking a derivation from the basic question above, the research question in this thesis is then laying on *whether poor households have lower or higher probability to participate credit market; and whether the poor households have lower or higher willingness to borrow, compared to the non-poor.* In other word, *what is the effect of welfare level on household credit participation and willingness to borrow?* If the effect is positive, it implies there isn't wide credit demand from the poorest; but if the effect is negative, it implies there is a wide credit demand from the poorest.

1.3 Research Objectives

The main objective of this thesis is to find out which assumptions that are more realistic as a basis for design of microcredit programs. This is interesting and important at the same times as development programs or policies are constructed based on different assumptions. In the case of microcredit program, we still have open and inconclusive debate on *poverty targeting* and *financial sustainability* approach. Since the contrary conclusion is mainly caused by contrary assumptions used, it is hoped that this study can provide us a hint on which assumption that is actually more representative of reality, at least in our study area. Therefore we can also get a suggestion on which approach that is favorable to be expanded and or on what kind of innovation we can do on sculpturing a better approach.

This study is prepared and structured based on these objectives. The findings are expected to provide an insight on suitable assumptions regarding the existence of microcredit effective demand from the poor and the poorest. Hopefully this can help any group or agency of interest in designing more relevant programs and policies. At least this study can deliver a small contribution to the world of knowledge, especially in microfinance study. However, since the data used is collected from one specific district in Indonesia, it will be more appropriate to categorize this thesis as a case study. Thus the generalization of the findings would be suitable for areas that have similar characteristics and settings as the *Kecamatan* Pemangkat, Indonesia.

1.4 Thesis Structure

This thesis consists of six chapters. Following this introduction is chapter two that will present the general background of the research, particularly related with microcredit in the place of study. Chapter three will present the theory and hypotheses, while chapter four will present the data and method used. The result will be presented and discussed in chapter five. Lastly, chapter six will present some conclusions of the study.

CHAPTER 2

Microcredit in the place of study

2.1 Microcredit in Indonesia

Microcredit[3] in Indonesia is far from being a new approach used to fight poverty. According to the best knowledge, Robinson (1999) suggests that Indonesia is the home of the oldest commercial MFIs namely Badan Kredit Desa (*Village Credit Bureau)* which began operations in 1896. Indonesia is also the home to Bank Dagang Bali (*Bali Bank of Trade*) that started in 1970 and is presumably the world's oldest licensed, full service commercial bank that provides continues and profitable microfinance services on a substantial scale. And, it is also a home to Bank Rakyat Indonesia, a world success story of financially self-sufficient MFI that started to book profit in 1987. In addition, Indonesia is home of different types of non-bank microfinance institutions distributing microcredit such as Koperasi Simpan Pinjam *(saving and loan cooperation),* Unit Simpan Pinjam (*saving and loan unit),* Lembaga Dana Kredit Pedesaan (*rural fund and credit institution),* and Koperasi Syariah *(cooperation with Islamic Syariah model).* Some are the extension of the government while others are independent institutions protected and regulated by Indonesian law. However microcredit in Indonesia has been through a significant evolution before it became a large movement and one of the biggest microfinance industries in the world.

2.1.1 Shifting microcredit paradigm in Indonesia

Microcredit was at first initiated as a form of subsidized credit program, as it is assumed that many poor households (mainly farmer and fisherman) could not access the formal credit market because its high interest rate. Therefore a subsidy was considered as a good way to bring lower interest rates so that poor households will be able to access credit and improve their life. During 1970s the government appointed BRI as the channeling institution for this subsidized credit program. After a decade of evaluations, the government found that the program is neither efficient nor effective. Limited budget bound the scale of subsidized credit and make it far from meeting demand. As a result, the richer farmers with higher value of collateral often become the winner in the competition of getting the cheap credit. Moreover, the percentage of arrear cases was also high, since most people perceive government credit program as a grant, and instead of using the credit for productive purposes, they use it for consumption.

> *"Not only were our subsidized credit programs not driving rural development, they were actually slowing it down!"*
>
> - Ali Wardhana* (Robinson 1999)
>
> *[1] Minister of finance, Government of Indonesia 1968-1983*

[3] This study is using BRI's definition of microcredit that is any purpose credit of which amount not more than Rp. 50 million (US$ 5,556)

Severe inefficiencies of the program made the government undertaking reforms and decided to leave subsidy orientation and moved to market orientation paradigm. In parallel, the banking sector deregulation in 1983 allowed banks to set their own interest rate for both deposit and credit, this helped the commercialization process as bank could change their interest rate freely adjusting market condition. This gives room of creativity for BRI, as government vehicle, to design microcredit product that is market friendly, especially for the poor households friendly. The absence of similar models in the world at that time made BRI became a pioneer in this field. The new program was launched in 1984 and showed overwhelming result; it didn't take even two years for the reformed BRI to break-even. BRI became subsidy free in 1986, and started booking profit since a year after. BRI's unique microcredit product was sold out. Another interesting fact about BRI, a bank of which rest mostly on micro and small economics activities, is that it has proven to be unaffected by financial crises that hit Indonesia severely during 1997-98. BRI remained booking profit during that tough period.

BRI story change the general frame of government policy regarding microcredit as a tool for fighting poverty, subsidized microcredit program became old fashion, and promoting microcredit market and microfinance sector became the new trend.

2.1.2 Current picture of microfinance industry in Indonesia

Microfinance industry consists of three main markets namely microcredit, savings, and insurance. Microcredit, the product that this thesis is focusing on, is the main product of most MFIs as there are MFIs that don't serve saving or insurance service (yet), but there is no MFI that don't serve microcredit. However in general all the three products are interrelated, therefore using the term microfinance instead of microcredit when talking about the industry is more relevant. So, how is the current picture of microfinance industry in Indonesia?

The empirical studies on microfinance have proven that a microfinance institution is not only a feasible project, but it can even also become profitable. A traditional Indonesian proverb says, "*where there is sugar there are ants*". Together with BRI there were many other success stories occurring in the world, especially the Grameen Bank story, and also the story of BancoSol, BRAC, etc. All these good stories just like the sugar attracting the ants. Commercial microcredit services grew in a more rapid manner and not only became the consumption of public sector, but also private sector. There are more and more private banks providing commercial microcredit services in Indonesia, such as Bank Danamon, Bank Mayapada, BTPN, Bank Pembangunan Daerah (regional

development banks owned by provincial government), and many others. Credit unions and Grameen Bank replication programs (NGOs) were also spreading to Indonesia, bringing new colors in Indonesia microfinance industry. Indonesia has now recorded more than 50,000[4] microfinance institutions consist of bank and non-bank institutions. The picture of the industry has also changed from being a government to a private (both non-profit or profit oriented) dominated industry.

Among the bank MFIs are all the four state-own banks, all Bank Perkreditan Rakyat[5] (BPR), and some private general banks (*bank umum).* During 1990s, when awareness on microcredit success stories highly increased, more and more non-bank MFIs put their footstep and boosts the number of non-bank MFIs in Indonesia. But still in term of lending volume the bank MFIs have way much bigger number than the non-bank MFIs. The volume of BRI outstanding microcredit alone has a total of about Rp. 27.3 trillion (about US$ 3.03 billion[6]) per December 2006[7]. This number is already bigger than the total of microcredit disbursed by all non-bank MFIs (minus Perum Pegadaian).

Table 2.1 Non-bank microfinance institutions in Indonesia

Type	Unit	Lending	
Saving and Lending Cooperative (KSP)	1,598	Rp.	1,154.8 billion
Saving and Lending Unit (USP)	36,485	Rp.	13,495.0 billion
Lembaga Dana Kredit Pedesaan (LKDP)	2,272	Rp.	358.0 billion
Syariah Cooperative	3,038	Rp.	157.0 billion
Credit Union & NGOs	1,146	Rp.	505.73 billion
Total	**44,539**	**Rp.**	**15,670.53 billion**
Perum Pegadaian* (109 years old state-owned pawnshop)	3000	Rp.	48,000.0 billion

Source: *Ministry of Cooperatives and SMEs, Cooperative Statistics 2007*
**) Warta Ekonomi Magazine (Redaksi-1 2009)*
(The number of unit is the position of the year 2009, but the lending volume is a target number for 2009 and it include all lending, not only the micro one)

The number of players and lending volume of microfinance industry in Indonesia is relatively large compared to any other countries in the developing world. An NGO called Microfinance Innovation Center for Resource and Alternatives (MICRA Indonesia)[8] even state that microfinance sector in Indonesia as one of the largest in the world. It is foreseen that the sector will keep on growing as

[4] BRI village units are more than 4000 units.

[5] is Indonesian rural bank, has smaller size and more restriction regarding type of product and services, area of operation, and the size of transactions it can handle. Indonesia now has 121 general banks and 2296 BPR (www.bi.go.id, recapitulation of Indonesia banking institutions, September 2009).

[6] For the sake of convenience, exchange rate used in this thesis is Rp. 9000 per US$ 1.

[7] Microfinance Industry Report: Indonesia (2009)

[8] www.micra-indo.org

Indonesia still has a big number of the *unbankables*. MICRA noted nearly 40 million low-income people are still lacking of financial services, and the central bank noted nearly 80 million people within the productive age (16-64) have not yet had a bank saving account (Nasution 2010).

Moreover the aggregate data showed pleasing figure, as it indicates a negative correlation between the growth of microfinance industry and poverty rate during the past ten years. Indonesia statistics Bureau (BPS) recorded that poverty rate has decreased from 23.4% in 1999 to 14.2% in 2009 (March)[9]. There are many other poverty alleviation policies put in place during the last decade, so we cannot tell how meritorious microcredit *per se* in reducing poverty rate. Thus we cannot tell whether the performance of the existence MFIs in Indonesia is already optimal or not. Assessing this would definitely be a challenging and valuable research project for future study. Nevertheless, the data indicate a good correlation between microfinance industry and poverty rate, so there is no strong reasoning to hold it from growing.

2.2 Profile of the Place of Study: Kecamatan Pemangkat, Indonesia

Indonesia is the largest archipelagos country in the world that administered the country into 33 autonomy provinces. Each province consists of some *Kotamadya* (city) and *Kabupaten* (rural area), and each *Kotamadya* or *Kabupaten* consist of several *Kecamatan* (district). *Kecamatan* Pemangkat is located in the province of *Kalimantan Barat* (West Borneo), *Kabupaten* Sambas, thus it can be categorized as rural district. Within a rural district there are villages (*desa*), *Kecamatan* Pemangkat itself has 5 villages. Below are the brief profile of *Kecamatan* Pemangkat and the map of Indonesia where its position is marked with red dot. It is placed right in the west-northern coast of Borneo, making it as one of the nicest place to enjoy sunset in the region.

Table 2.2 Brief profile of *Kecamatan* Pemangkat

Place	Area size	Inhabitant						Financial Institutions			
		Male	Female	Total	House hold	Poor house-hold	Main occup ation	Bank	Non-bank		
									coopera tives	Credit union	Pawn shop
Kecamatan Pemangkat	8,538 hectars	29,226	30,230	59,456	12,857	3877	Wage labor	4	5	1	1

Source: *Village profile database of year 2008 (compiled by author)*

[9] www.bps.go.id

Figure 2.1 Map of Indonesia, Position of *Kecamatan* Pemangkat

Based on *Kabupaten* Sambas statistics book for 2007, the regional gross domestic product of *Kecamatan* Pemangkat (per capita, current price) is Rp. 13.85 million per year (US$1540), higher than West Borneo's per capita RGDP which is Rp. 10.12 million (US$1124), but lower than national per capita GDP which is Rp. 17.55 million (US$1950). In *Kabupaten* Sambas, *Kecamatan* Pemangkat is one of the trade centers as it has harbor. District statistics confirm this as it reports trade sector as the second largest sector after agriculture and fisheries sector with the volume of about Rp. 277.8 billion (US$ 30.9 million) and Rp. 300.3 billion (US$ 33.4 million) respectively, for 2007.

Food shortage is no longer a problem in *Kecamatan* Pemangkat, but high unemployment, low education attainment level, and low quality of health services are. The major type of occupation is still wage labor, which is in line with the low education attainment level. Unfortunately not all villages in *Kecamatan* Pemangkat can give valid numbers on education. But at least *Pemangkat Kota* village, the capital village, can provide a hint. For the year of 2008 the village record total population of 23,339, and there are only 1 PhD degree holder, 3 masters, and 120 bachelor degree holders (0.5%).

2.2.1 Microcredit in *Kecamatan* Pemangkat

From table 2.2 we know that Kecamatan Pemangkat is not a rural district without formal credit market; this might be related by the role as trade center it plays. The sample of this study indicates that there is about 96% probability that one would know what credit is when we ask him or her. But when we ask about procedures needed to apply for credit from formal market, the probability drops to only 53%. This number implies several phenomena. *First* it implies that the concept of credit *per se* is commonly known, what is not commonly known (yet) is how to do it in a formal way.

Second it might also imply the ignorance of the people, since the local society in general still have debt-averse mentality. Debt is considered as one of tranquility wrecker, it makes one always worry on when or whether they are able to pay back the loan before they die. The sample also gives supporting figure on this. From total respondent that live close (not more than 1 kilometer) to the nearest MFIs, only about 52% can state at least one correct procedure to apply for formal credit. *Finally,* it implies the working of the non-formal credit market that needs no such procedures. This is relevant because in Indonesia, both formal and non-formal sectors exist side by side in many sectors, including microfinance sector.

Formal microfinance institutions in Kecamatan Pemangkat

As briefly stated in table 2.2 above, *Kecamatan* Pemangkat has in total 11 formal MFIs that consist of 4 banks, 4 saving and loan cooperatives, 1 credit union, and 1 pawnshop. All of them provide microcredit services with different mechanisms.

(i) Banks

The banks operating in *Kecamatan* Pemangkat are Bank Negara Indonesia 1946 (BNI 46), Bank Kalimantan Barat (Bank Kalbar), Bank Danamon, and Bank Rakyat Indonesia (BRI). All of them are commercial banks, but all provide microcredit as one of their product. Most of the banks ask for collateral as credit requirements, at least in the form of employment letter to shows that one is entitled with stable income stream. Only BRI who also provide microcredit product that can be proposed without collateral requirement (for loan not more than Rp. 5 million or about US$ 550).

(ii) Saving and Loan cooperatives

Cooperative in theory is the main pillar of Indonesian people's economy planned by one of the founder of the nation, *Bung* Hatta. It is constructed by the member and for the prosperity of all members. The spirits of cooperatives are brotherhood (*kekeluargaan)*, mutual assistance (*gotong-royong*), and trust (*kepercayaan)*, spirits that *Bung* Hatta found very suitable with the characteristics of Indonesian people in general. The first cooperatives movement was launched in July 12, 1947 and it is still now an important generator for Indonesia economy. There are many types of cooperative in Indonesia, but saving and loan cooperatives are the one who provide microcredit services for the members.

(iii) Credit union (CU)

In Indonesia regulation system, CU is actually recognized as type of cooperatives because it is also financed by and serving for the prosperity of the members. What makes CU different from the usual saving and loan cooperatives is the extent of financial services it provides for the member. It doesn't only provide saving and credit services, but also time deposits, and insurance. Moreover, to be a member of CU, one obliges to follow some courses on both basic financial knowledge and motivational trainings. These features are not available in usual cooperatives. The one and only CU operating in *Kecamatan* Pemangkat is CU Pancur Kasih.

(iv) Pawnshop

In national scale, Indonesia has only one formal pawnshop namely Perum Pegadaian, and it is 100% owned by government. Perum Pegadaian has around 3000 branches all around Indonesia, including one in *Kecamatan* Pemangkat. As a pawnshop, Perum Pegadaian delivers credit based on the pledged collateral given by the borrower with agreement that the borrower will purchase the collateral back after some agreed period of time. If the borrower doesn't purchase the collateral back, then the pawnshop has the right to sell it out for auction.

***Non-formal microfinance institutions in Kecamatan* Pemangkat**

There are several types of non-formal microfinance institutions in Indonesia and points below briefly discuss each of them.

(i) *Arisan*

Indonesia is a diverse country colored by more than 300 different tribes and local language attributed with different cultures. However, *arisan* is one of social activities that well induced to all over Indonesia and *Kecamatan* Pemangkat is no exception. As a nation that loves

gathering as a way to get laughter and to be connected, Indonesia has *arisan* as a unique institution that accommodates it.

Arisan is social gathering activity held by group of people that committed to pay an agreed sum of money per each agreed period of time (monthly is the most common). It is usually held among extended family members, friends, or work colleagues. In each period the group draws a winner that will get the whole sum of the money as a prize. In the case of big *arisan* group, they can draw more than one winners and the prize will be divided evenly. The winners will be excluded in the next period draw, to make sure everybody will eventually win. In traditional *arisan*, each period people gather to both submit the money and draw the winner and the winner will be the host of next gathering. But in this time, people use banking transfer and gather in the agreed restaurant to draw the winner, still the last winner will pay for the bill.

In most cases the expense for hosting *arisan* is not more than 20% of the prize. That's why many people like to joint *arisan* since they can both have fun and in a way, save money. Some even join more than one *arisan* group. Another interesting feature of *arisan* is that members can switch the winning timing as long as both sides agree. So, if suddenly one member in situation of need, they can approach the winner and switch. This feature allows *arisan* to serve insurance function as well.

(ii) BNI 47

BNI 47 is the local term for moneylender. The name is a pun of one of state-owned bank namely Bank Negara Indonesia 1946 or BNI 46. The money lender usually offers small loan and charge around 10-20% per month which equal to around 120-240% per year. But since mostly the amount of the loan is micro (not more than 1 million rupiah or around US$ 90)[10], people don't realize that actually the interest rate is *bloodsuckingly* high!

(iii) Kelompok Simpan Pinjam (KSP)

KSP is a saving and lending group constructed by a group of people that are willing to work together on helping each other and raise the prosperity level of all members. KSP is assembled by people from the same community that by nature has higher solidarity toward each other. Some successful KSPs manage to formalize themselves and become saving and lending cooperatives, but some dissolve because of the incidence of fraud in the group. In *Kecamatan* Pemangkat KSP exists in fisherman, farmer, and household businesswoman community.

[10] Based on discussion with several local people

(iv) Family, relatives, and friends altruism

Lending money to other family member, relatives, or friends is relatively common in Indonesian society. Most people do it because they're really in need, such as suffering misfortune like robbery, burned house, natural disaster, having a sick child or parent, or need to send children to school. However local values perceive asking for a loan is equal with lowering self-dignity. So if they do it, it's mostly because they have to. Therefore we can't say this practice is common because it is part of the culture, but more because of the high incidence of poverty and hence the incidence of "in-need" situation is also high. In narrower circle (family and close relatives), asking and giving money when one is really in situation of need are also common to occur in the society.

2.2.2 What do the people use the credit for?

Out of 105 of the total sample of this study, there are 41 (about 40%) observations that note to have credit experience. This is in line with local mentality explained before, that people in general don't like debt. However, if they apply for one, what do they use the credit for? This study separates credit into four different categories regarding its usage, that are consumptive purpose, business start-up, business expansion, and working capital. Figure below show a sketch of credit, in this case microcredit, in *Kecamatan* Pemangkat based on our finding from the sample.

Figure 2.2 Credit usage in Kec. Pemangkat

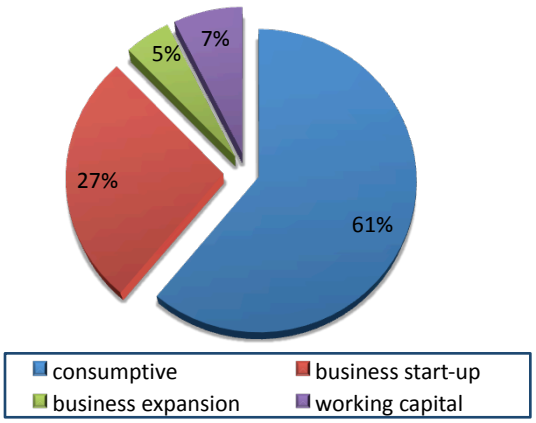
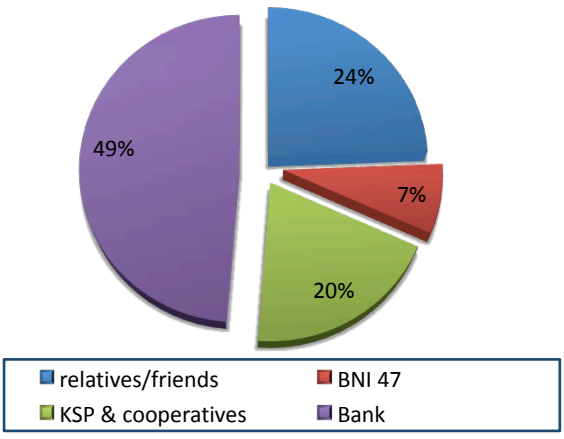
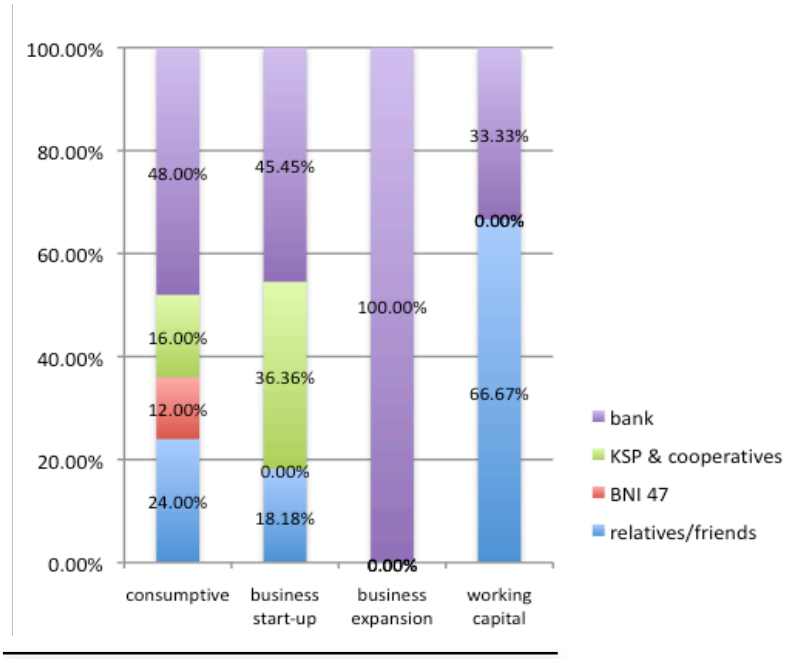


Figure 2.3 Source of credit



Source: sample of this study

Figure 2.4
Credit sources per credit usage



Source: sample of this study

The figures show that credit usage for consumptive purpose is still dominating the distribution. The consumptive use of credit can be related with life cycle (education, health, and death), durable goods (mainly vehicle), housing (either to buy or to renovate), etc. For credit source, bank is captured as the main source of credit in *Kecamatan* Pemangkat. However it is not the main source for all credit purpose (figure 2.4).

CHAPTER 3

Theories and hypotheses

3.1 Theories

The use of microcredit, in practice, can be classified into three categories, namely for consumption, working capital, and investment (business start-up or business expansion). This study examines microcredit as a general product that can be used for those purposes. Therefore the theories used to base the hypotheses are also general theories that can explain the decision of microcredit participation itself, regardless what the purpose is[11]. The context of credit service in this study is microcredit, therefore the term credit in this thesis will always refer to microcredit.

This thesis also studies *willingness to borrow* that has different nature compared with *credit participation.* The main different between the two is that *willingness to borrow* is an off-market demand behavior, while *credit participation* is an on-market demand behavior. The former is an off-market behavior since individual does not need to be in the market in order to possess *willingness to borrow*. It is an arbitrary decision one can make anytime anywhere based on their intrinsic preferences. However, the latter is an on-market behavior since individual has to be in the market, where one can meet the supplier of the service, in order to be involved with *credit participation*. It is not an arbitrary decision as the external forces from the supply side can also affect the final decision. This means an individual that is *willing to borrow* is not necessarily engaged with *credit participation.* Therefore the theoretical framework grounding *credit participation* and *willingness to borrow* will be presented separately. For convenience, the term of credit demand will be used to refer to the off-market credit demand behavior *willingness to borrow,* while the term *credit participation* is kept to refer the on-market credit demand behavior.

3.1.1 Theory for credit participation

As stated above credit participation is an on-market decision, thus we need theories from both the demand and supply side. This study presents *risk aversion* theory to understand *credit participation* decision from the demand side point of view, and *credit rationing* theory to understand the behaviour from the supply side.

[11] Also regardless what the source of credit is.

Demand side point of view: risk aversion theory

(Pratt 1964) is one of the pioneer studies regarding risk averse behavior. In his paper "Risk aversion in the small and in the large", he introduced the term a*bsolute* and *relative risk aversion,* which are derived from thr utility function *U(x)*, where *x* represents total asset. Below are the mathematical expressions of both terms.

absolute risk – aversion	*relative risk – aversion*
$r(x) = -\frac{U''(x)}{U'(x)}$	$R(x) = -x\frac{U''(x)}{U'(x)}$

Expressions above imply that for risk-averse individual, who has a *concave utility function*, the absolute risk-aversion function *r(x)* will be strictly decreasing. This means that absolute level of risk aversion gets lower as the total asset *x* gets higher. Pratt (1964) also translated this theory in term of risk premium function.

Taking *z* to express any given risk, the risk premium function can be expressed as $\pi(x, z)$. As the risk aversion function is strictly decreasing, the risk premium function is also strictly decreasing in *x*. This means for risk-averse individual, who will always put positive risk premium for any given risk, the risk premium attached to any given level of risk *z* gets lower as total asset gets higher.

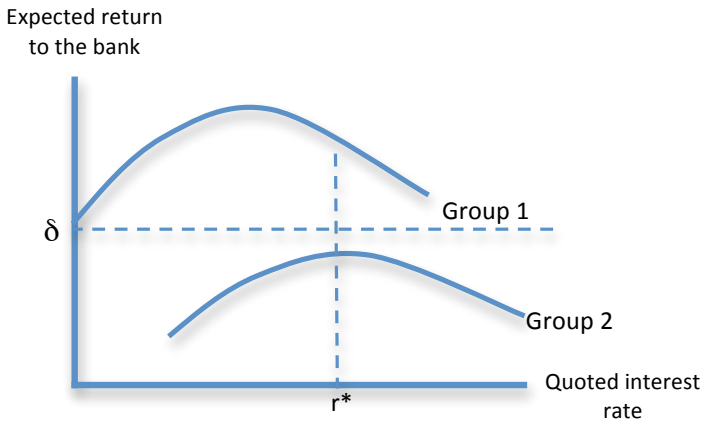
Risk is embedded in every decision made, including the decision whether to participate or not in the credit market. Credit participation entitles risk of default and asset confiscation. There is no certainty that the business started with the credit will generate profit. There is no certainty that the fertilizer bought with credit money will boost yield since the risk of weather will always there. There is also no certainty on whether the monthly income will always be enough to pay for the installment. The bottom line is that there is no certainty that the credit can be paid back, and therefore credit participation is a risky decision. The higher the perceived risk, the less the probability a decision of participation will be taken.

The *theory of risk-aversion* predicts wealthier households will attach a lower risk premium for the risk embedded in credit participation, hence they will have higher probability to participate. In short, the higher the welfare level, the higher the probability of credit participation.

Supply side point of view: credit-rationing theory

The broad definition of credit rationing is a situation in which there exists an excess demand for loans at the current conditions (including level of interest rate)[12] (Jaffee and Stiglitz 1990). There are many types of credit rationing but what we will discuss here is *redlining* where the lender refuse to give credit to a borrower because the lender cannot obtain the required rate of return (δ) at specific interest rate (Jaffee and Stiglitz 1990: 848). Group 2 in the figure below is redlined borrowing group (rationed-out), and group 1 is the fully served borrowing group.

Figure 3.1 Credit rationing status of two borrowing groups



Potential borrowers calculate and attach risk level to each credit usage project they will undertake, while the lender tends to calculate and attach risk level to each potential borrower and not to the credit project *per se*. The lender tends to do this as there is asymmetric information between the lender and borrower. The borrower will know more about the risk and return of the credit project, while the lender will only know the average risk and return of the market; therefore instead of screening the projects, they screen the borrowers. Banks classify borrowing firms into small number of groups based on objective factors such as industry affiliation and firm size, then banks determine single interest rate for each group (Jaffee and Modigliani 1969). However borrowers within the group might differ in term of loan demanded and risk. So a borrower that has credit demand higher than (group) average loan and has higher than (group) average risk might face credit rationing. But this is the case in the context of firms, what about in the context of households? If we assume households within the group have same loan demand and only have different risk level, the bank will presume the wealthier household as less risky compared to the poor household.

[12] Where at market price, supply equal to demand. After some point higher interest rate will lead to higher risk of default, therefore bank's optimum expected return is achieved at lower interest rate (compared to the market clearing interest rate).

Consequently the poor household might face *redlining* type of credit rationing, as they possess higher than average risk level therefore their expected return to the lender is lower. There are two main reasons why poor household would be considered riskier based on banks or MFIs point of view. First poverty is highly correlated with unstable income stream, and the second, the poor are lacking collateral.

(Holden and Binswanger 1998) states that market imperfections are more likely to hurt small and poor farmers than large and rich farmers, they argue that the reason is that poor farmers are more likely to be rationed-out of credit markets. Other studies also support the argument that poor household are more likely to be rationed-out of credit market. (Chowdury 2005) found the poor are constrained by their income and asset position in having access to MFIs in Bangladesh; and Diagne (1999), using evidence from Malawi, found similar results: the share of land and livestock in the total value of household assets is negatively correlated with access to formal credit. The higher the ratio of land-livestock in the total assets value, the poorer the household is, and the lower the access to formal credit[13].

To sum up, based on credit rationing theory we can predict that poor households are entitled with higher probability to be rationed-out of credit market, thus they will have lower probability of credit participation. This is in line with the prediction of risk aversion theory. So marrying both theories from demand and supply side makes us able to derive a hypothesis about welfare effect on the probability of credit participation: the higher the welfare level the higher will the probability of *credit participation* be.

3.1.2 Theory for credit demand (*willingness to borrow)*

Credit demand here is referring to an off-market demand behavior. So it is actually relevant to apply *risk aversion* theory to predict the effect of welfare level on probability of *credit demand*. We do not need to consider the *credit-rationing* theory since the supply side is not taking any role in this game. Using the framework of *risk aversion* theory, we can then predict that welfare level will have positive effect on the probability of *willingness to borrow*. However, there is another approach that also supports this hypothesis.

[13] The study interestingly found that the composition of household assets is much more important as a determinant of household access to formal credit than the total value of household assets or landholding size. However the landholding is still an important determinant of household access to informal credit.

(Gockel 2009) did a study similar to this thesis in Vietnam; the only difference is that he analyzed the determinant of *willingness to borrow more* since the sample is drawn from the member of International Fund for Agricultural Development (IFAD) program in Vietnam. Also using a probit model, the study incorporates household characteristics, individual characteristics, behavioral characteristics, and commune dummies as independent variables in the model. There are several welfare indicators included in household characteristics, such as percent of rice consumption to rice production (food security), saving account belonging, remittance receiver status (1 if more than 100,000 VND or about US$ 5.5 per year), and income stability status.

Out of four welfare variables above, two variables are showing significant effects on *willingness to borrow more* namely food security and remittance receiver status. The results show that higher percentage of rice consumption to production (lower food security) leads to lower the probability of *willingness to borrow more* (coefficient -0.372)*;* and if individual receives remittance more than 100,000 Vietnamese Dong per year, he or she is significantly less likely to *willing to borrow more* (coefficient -0.076). Other significant variables in the study are age, gender, number of children under 16, share of land with formal property right status, and some commune dummy variables (such as Catholicism and area of living).

Regarding welfare variables, Gockel (2009) results indicate a mix picture on correlation between welfare level and probability of *willingness to borrow more.* However coefficients show the positive effect of *food security* variable is exceeding the negative effect of *remittance.* This indicates potential positive effect of welfare variables, in general, on *willingness to borrow more.*

3.2 Hypotheses

Based on the theories presented above, the hypotheses that will be tested in this study regarding the effect of welfare level on probability of credit participation and willingness to borrow are:

- *Welfare level has a positive effect on credit participation;*
- *Welfare level has a positive effect on credit demand*

The hypotheses above would be applied to every welfare indicator used in this study. There are many different indicators available in this world to represent welfare level. This study chooses Indonesian Statistics Bureau (BPS) basic welfare indicators to represent welfare level. These indicators are considered relevant with the setting of the place of study, *Kecamatan* Pemangkat,

Indonesia. The indicators consist of 14 variables that will be summarized, into smaller number of dimensional variables, using factor analysis.

This study also controls for variables of household characteristics, household asset, household microcredit knowledge, and household business idea. These variables are not the main focus of this study, therefore theoretical backgrounds are not crucial. However the reasoning behind the choice of these variables will be presented in Chapter 4.

CHAPTER 4

Data and methods

4.1 Data

This study uses primary data collected by a household survey in *Kecamatan* (district) Pemangkat, West Borneo Province, Indonesia. The survey was held in July 2009 with 105 households included. Besides capturing information on household characteristics, the questionnaire is also including sections on households' knowledge and behavior towards credit market and a set of poverty indicators (as discussed below). The questionnaire is enclosed in *appendix* 1.

4.1.1 Data collection method

In order to get a representative sample, *stratified random sampling* is used as a sampling method. Each *Desa* (village) consists of *Dusuns* (hamlets or settlements). However, we found that *dusun's* population data are not matching with *desa's* population data. This absence of reliable *dusun's* population data makes starting the stratification process from *dusun* level becoe problematic. Therefore the stratification started from *desa* level, so the number of randomly collected sample in each *desa* is proportional with *desa'*s population share of the total population of the *Kecamatan.* However, to make sure that samples taken in each *desa* are not centered in one *dusun,* we set a minimum sample that should be taken per each *dusun.* The setting of minimum sample is based on the average sample per dusun, calculated by dividing total sample per *desa* per total *dusun*. For example, *Desa* Harapan consists of 6 *Dusuns* and total sample taken there is 27, so the average number is 4.5, this means each enumerator should at least get 4 households from each *Dusun.*

Table 4.1 Sample distribution per *Desa* in Kecamatan Pemangkat

	Desa				
	Name	**Population**	**(%)**	**Sample**	**(%)**
Kecamatan Pemangkat	Pemangkat Kota	23,339	39.7	41	39.1
	Harapan	15,376	25.9	27	24.7
	Parapakan	4,755	8.0	9	8.6
	Jelutung	4,574	7.7	8	7.6
	Penjajab	11,404	19.2	20	19.0
(Population: 61,707)*	**Total**	**59,448**	**100.0**	**105**	**100.0**

Sources:
Villages officer (data of 2008)
*) Data from Kabupaten Sambas Bereau of Statistics (data of 2007)

Another sampling consideration was the representation of economic classes. We divided the households in *Kecamatan* Pemangkat into three classes namely middle-high, middle-low, and low. The guidance we used before knocking somebody's door was the house characteristics. The considered middle-high class households is the one who have full cement wall and using porcelain on at least some part of their house. Middle-low class households have cement on at least some part of their wall and floor (no porcelain). Low class households have a full wooden wall and floor. Thus the total sample per *desa* is not only divided per *dusun* but also per economic class. In this case, number of sample per economic class is at least 30% of total sample per *desa.* For example, the total sample in *Desa Harapan* is 27, and 30% of 27 is 8.1, so the least number of sample that enumerator should take from each economic classes is 8 respondents.

Another aspect we needed to carefully consider is the common practice of more than one nucleus family to live in the same roof. Are they classified as one or several households? To avoid the ambiguity, we used a definition of household provided by the Indonesian statistics bureau (Badan Pusat Statistik - BPS). BPS defines "*household"* as "*individual or group of individuals that live together in part or in whole physical building and eat together from one source of kitchen (in the sense that household's daily necessities are managed together as one entity)".* Therefore, when two families live in the same house, using the same kitchen, but mostly prepare or cook food separately, will be considered as two households. This is quite common among young families in *Kecamatan* Pemangkat, as they stay in the parents' house. They use the same kitchen, but they don't eat from the same source of income. The common practice is that younger families feed themselves and help the parents to pay some house bills (like a substitute of rent, but with "family" price that is much lower than the market price).

4.1.2 The variables

The questionnaire of this study is designed to capture five elements of information from the households. The elements are household characteristics, household welfare, household asset profile, household knowledge and credit involvement, and household business idea. Why should household welfare and asset be separated as two different elements?

A wide diversity in welfare measures made choosing the suitable measure for this study become high priority. The choice was to use the BPS basic welfare indicators. These are constructed as a base to determine whether poor households deserve *Bantuan Langsung Tunai* (Direct Cash Assistance). This was a transfer program to reduce the impact of higher gasoline and kerosene

price for the most vulnerable group. The program started in 2006 and lasted until March 2009, as the economic conditions have improved. The BPS basic welfare measure contains 14 indicators and does not capture households' asset profile in values, therefore the element of household's asset is still needed as it provides household asset possession in values. For better pictures, I will describe the variables list of each element.

(1) Household welfare variables

Given the focus of this study, the choice of welfare indicators is of high importance. The thesis adopts the basic welfare indicators constructed by BPS, modify it, and takes these a step further by creating a set of new welfare indicators based on *factor analysis.* The set of welfare variables that produce the best *factor analysis* result (the factors) will be then used as explanatory variables in the *probit* model.

The BPS basic welfare indicators consist of 14 variables that are categorical (0 and 1). The intention to capture more precisely the variation in welfare level led to some modification by creating more categories (not only 0-1) on some variables and then lead to the creation of a larger set of variables, that was tested out in this study, cf. Table 4.3. There are two other sets of variables being tried namely stylized-1 and stylized-2, the difference being the inclusion/exclusion of the electricity (*elec*) variable. The stylized-1 includes the electricity connection status *elec* (same like BPS indicators), while stylized-2 excludes it and includes electricity bill (*elecbil)* instead. Table 4.3 presents the three sets of welfare variables.

Table 4.2 List of household welfare indicators

No	Variable name	Descriptions	BPS	Stylized-1	Stylized-2
1	*hsize*	The floor size of the house is less than 8 m^2	0 = Yes; 1 = No	0 = Yes; 1 = No	
2	*hfloor (floor1)*	The floor of the house is made from low quality material	0= Wood or half cement; 1= Cement or porcelain	0= Wood; 1= Half cement 2= Cement; 3= Porcelain	
3	*hwall (wall1)*	The wall of the house is made from low quality material	0= Wood or palm leaves; 1= Half cement/cement	0= Wood or palm leaves; 1= Half cement; 2= Cement	
4	*toilet (toilet1)*	The toilet facilities is not available or shared with another households	0= No toilet facilities; 1= own toilet facilities	0= No toilet facilities/shared 1= Have own open-latrine 2= Have own WC facility	
5	*elec (elecbil)*	The main source of lighting in the house is not from electricity	0= No electricity 1= with electricity	0=No electricity 1=with electricity	*See table 4.3*
6	*water*	The source of water for consumption is from well, river, or stored water from rain	0= Well, river, stored rain 1= Water utility customer	0= Well, river, stored rain 1= Water utility customer	
7	*firing (firing1)*	Main firing for cooking is firewood, charcoal, or kerosene.	0= Firewood, kerosene 1= Gas	0= Firewood ; 1= Kerosene; 2= Gas	
8	*meatcons*	Consumption of animal protein (meat, chicken, or milk) is very seldom, not more than once per week	0= Once/week or less 1= Twice/week or more	0= Once/week or less 1= Twice/week or more	
9	*newcloth*	Almost no expenditure for new clothing per year for each household member, or only bought one pair of cloth within a year	0=A pair/year or less 1=2 pairs/year or more	0=A pair/year or less 1=2 pairs/year or more	
10	*meals*	Eating frequency for each family member is not more than twice per day	0= Twice/day or less 1= More than twice/day	0= Twice/day or less 1= More than twice/day	
11	*hhhjob*	The main occupation of the household is farmer with less than 0.5 hectare per farmer, fisherman, construction labor, or any other temporary occupation; or doesn't have occupation at all (unemployed)	0= any non-stable job (Small farmer/farm labor/fisherman/ unemployed) 1= stable job	0= any non-permanent job (Small farmer/farm labor/ fisherman/ unemployed) 1= permanent or stable job	
12	*edu (edu1)*	The education level of the household head is not more than elementary school	0= Illiterate/elementary school 1= Junior high school or Higher	0= Illiterate 1= Elementary school 2= Junior high school 3= Senior high school 4= Diploma 5= Bachelor or higher	
13	*asset (asset1)*	The household doesn't have any asset (besides the residence land) that at least worth as much as IDR 500.000,- (around US$ 50), such as motorcycle, gold, cattle, or any other capital goods.	0= Doesn't have any 1= Have at least one worthy asset	0= Doesn't have any 1= Have 1 unit worthy asset 2= Have 2 units worthy asset 3= Have 3 units worthy asset 4= Have 4 units worthy asset 5= Have 5 units worthy asset 6= Have more than 5 units of worthy asset	
14	*hroof (hroof1)*	The roof of the house is made from low quality material[14]	0= palm leaves 1= Zinc/shingle/tiles	0= palm leaves 1= Zinc/shingle/tiles	
Minimum welfare score			**0**	**0**	**0**
Maximum welfare score			**14**	**29**	**33**

[14] The 14th BPS indicator is actually household affordability of any health service. But considering *Jamkesmas* program has reached *Kecamatan* Pemangkat in early 2009, any basic health service became available for free for poor households, and the non-poor family would definitely able to afford basic health care service that is relatively cheap in every public hospital or clinic Indonesia (but private hospital can be very expensive). Since everybody during the survey would be able to afford basic health service, it is then initiated to replace the health service indicator by roof material of the house.

(2) Household characteristics

The main reason of incorporating the household characteristics variables is to control for the observable household characteristics that might also affect the probability of both credit demand behavior namely *credit participation* and *willingness to borrow*[15]. All characteristics included are relevant to households' credit demand behavior. However since these control variables are not the main focus on this study, I will just discuss the rationale behind each household characteristic briefly. There are 12 household characteristics variables included, but only 10 variables incorporated in the model as the three of them are actually capturing very similar aspects. The model therefore will only include one of the three variables alternately, and keep the one that performs better. Below are the brief rationales of each household characteristics variable.

- *hhsize, depratio,* and *cw* are capturing similar pictures: the level of household's necessity. However *hhsize* presents it in an absolute manner (how many mouth to feed), while *depratio* and *cw* present it in relative manner; therefore only one of these variables will be included in the model. These variables have two sides potential effect on credit demand and participation. Higher household necessity might lead to higher credit participation and demand, especially for consumption smoothing purpose. But at the same time higher household size might increase household vulnerability towards risk of shocks including the risk of credit default, therefore households with higher necessity level might also be more reluctant to demand and participate credit.

- *hhhsex*, *workerm,* and *workerfm* are capturing the gender dimension in the households. They are incorporated to control for the unobservable potentially different nature between male and female that might affect credit demand behavior.

- *Age* is the age of household head. It is included to control for the unobservable characteristics of individual that might differ as they are getting old, for example, older people might be more risk averse and reluctant to changes. Thus we hypothesize that higher the age then the lower will the probability of credit demand and participation be.

- *Presence* is capturing household's years of stay in the current address. Individuals who have lived longer in the village may be more aware of microcredit services. Since this study also analyzed microfinance knowledge in the model, it becomes more necessary to control for presence.

[15] This term will be used interchangeably with *credit demand,* as explain in chapter 3.

- *distance* is another variable that have something to do with microfinance knowledge, therefore it needs to be controlled for. Household who live closer to MFI needs lower effort to participate in the credit market, and may also have easier access to information. So it is suspected that the further the distance the lower the probability of credit demand will be.

- *offfarm* is capturing the number of household members that work in off-farm sector. Off-farm sector is associated with better or more stable income stream than farm sector; therefore the existence of household members that work in off-farm sector might support household's idea to demand microcredit.

- *telephon* is capturing the possession of landline telephone connection. The possession of telephone connection is like a symbol of formal settlement. To be connected, it needs fix address and stable income stream so that the utility provider can be sure that the household will be able to pay at least the minimum monthly bill. Thus we suspect telephone connection is positively correlated with probability of credit demand and participation.

- *elecbil* is capturing classes of monthly electricity bill of the household. It is actually the expansion of Indonesian Statistics (BPS) basic welfare indicators that only capture whether the light household is connected with electricity or not (to light the house). This variable is also commonly used as welfare indicators for classifying the registration and tuition fee to all public university freshmen in Indonesia[16]. Therefore it is suspected that class of electricity is positively correlated with the probability of credit demand and participation.

That was it. Table 4.3 below presents the list of the household characteristics variables with descriptions, coding, and the expected signs on both *credit participation (cp)* and *credit demand (wtb)*.

[16] University in Indonesia is not for free and relatively expensive, but every freshman can apply for partial or full relief, depends on their passing and high school grade and their parents welfare level.

Table 4.3 List of household characteristics variables

No	Variables name	Description	Code	Expected sign	
				cp	*wtb*
1	hhsize	household size	discrete number	+/-	+/-
2	depratio	dependency ratio: number of dependant / household size	continues number	+/-	+/-
3	cw	consumer-worker ratio: number of dependant/worker in the household	continues number	+/-	+/-
4	age	age of the household's head	discrete number	+/-	+/-
5	hhhsex	sex of the household's head	0=male; 1= female	+/-	+/-
6	presence	number of years of living in currently address	discrete number	+	+
7	distance	kilometers of distance to the nearest MFI from current address	discrete number	-	-
8	offfarm	number of household member working in off-farm sectors	discrete number	+	+
9	workerm	number of male workers in the household	discrete number	+	+
10	workerfm	number of female workers in the household	discrete number	+	+
11	telephon	possession status of landline telephone connection	0=no connection; 1=connected	+	+
12	elecbil	classes of monthly electricity bill	0=no electricity; 1= below IDR 50,000; 2=IDR50 - <100,000; 3=IDR 100-200,000; 4=>IDR 200,000	+	+

(3) Household asset

As we can see in table 4.3 above, the welfare indicators do not include the value of asset. Therefore it is still considered necessary to control for assets in term of their value so that we can explore how it affects the credit demand. To construct the total value of asset or land, I multiplied the unit of asset belonging with the average market price, and then sum them to get the total number. This study alternately includes total asset (land plus other assets), total land, and land-asset ratio in the model, and analyzes which asset indicator that is more influential compared to the others. Total possession of assets or land is highly correlated with household ability to provide collateral, therefore it is hypothesized that the higher the possession of total asset or land the higher will the credit demand and participation be.

The land-asset ratio may tell a different story. As argued by Diagne (1999), a higher land-asset ratio implies poorer household since the asset composition of poor households tend to be dominated by land and lack of non-land assets. Therefore it is predicted that the higher the land-asset ratio the lower will the credit demand and participation be.

Table 4.4 List of household asset indicators

No	Variables name	Descriptions	Coding	Expected sign	
				cp	*wtb*
1	*lland*	Logarithm form of value of total land possessed[17]	continues number	+	+
2	*ltotasset*	Logarithm form of value of total asset possessed	continues number	+	+
3	*landassetr*	Total value of land per total value of asset	continues number	-	-

(4) Household knowledge and credit involvement

We hypothesize that knowledge about microcredit is important for credit demand and participation. Therefore the more villagers know about the service, the higher the credit demand and participation are expected to be.

This study constructs a microcredit knowledge variable by asking several questions to respondents and then makes a score based on the sum of correct answers. There are 6 questions with a maximum total score of 8. The questions were:

1. Can you shortly describe the meaning of the term "credit"? (maximum score is 1)
2. Based on your knowledge, what are the institutions that provide credit services? (3)
3. Do you know what microcredit is? (1)
4. Please mention at least one formal institution that provides microcredit in this region. (1)
5. Do you know how much the interest rate it (the mentioned MFI) charges? (1)
6. Do you know at least one of the procedures to apply for credit there (the mentioned MFI)? (1)

The credit involvement variables here are *credit participation* and *willingness to borrow (credit demand),* these are the endogenous variables in this study. As additional analysis, this study also extent the study to *willingness to pay.* Below are the questions thrown to respondents to construct the variables of *credit participation, willingness to borrow,* and *willingness to pay* respectively:

1. Do you have a credit history before?
2. If credit service is available for you, will you borrow?
3. For those who answered yes to the previous question, how much is the maximum annual interest rate that you are willing to pay for that loan (zero is not an option)?

[17] Some household only have the land on which they are building their house. For complete wooden house, I didn't include the value of the building in the calculation of land value, but when the house is at least half cement, I include the value of the building (also based on average market price collected by the expected price of respondent and other people in the neighborhood).

Table 4.5 List of household credit knowledge and credit involvement variables

No	Variables name	Descriptions	Coding	Expected sign	
				cp	*wtb*
1	*mfiknowl*	Credit knowledge score	discrete number (from 0 to 9)	+	+
2	*creditpart*	Credit participation record	0= No; 1= Yes	n.a	n.a
3	*willingness*	Willingness to borrow	0= No; 1= Yes	n.a	n.a
4	*rlimit*	Maximum annual interest rate that household is willing to pay for the credit service	Percentage	n.a	n.a

(5) Household business idea

It is hypothesized that the possession of business idea is the important drivers of *credit demand*, but not of *credit participation* as supply forces also affect it. However the latter doesn't mean that business idea is not affecting *credit participation* at all, it is just predicted that it won't be as important. The possession of business idea here is positioned as a reflection of household entrepreneurial spirit that uniquely exists between different individuals. *Bplan* is the variable capturing the business idea possession, which score 0 if the household has no business idea, and 1 if the household possesses at least one idea. The scoring is based on respondent answer of this question: *do you have a business idea that is not yet implemented because of capital constrain?*

4.1.3 General Descriptive statistics

After verbal descriptions presented before, now it comes the turn of quantitative descriptions of the variables. Table 4.6 below presents the general descriptive statistics of the variables. Broader discussion will be presented in the next chapter.

Table 4.6 General descriptive statistics of the variables (STATA result)

Variable	Obs	Mean	Std. Dev.	Min	Max
obs	104	52.5	30.16621	1	104
willingness	104	.6538462	.4780468	0	1
creditprop	104	.4519231	.5000933	0	1
rlimit	104	10.67308	10.47553	0	40
presence	104	23.59615	15.93145	.5	69
distance	104	1.972788	2.21794	.03	9
depratio	104	.5255769	.2316041	0	.83
hhsize	104	4.634615	1.643213	1	10
cw	104	1.637885	1.263574	0	5
hhhsex	104	.125	.3323205	0	1
mfiknowl	104	4.038462	2.042857	0	9
offfarm	104	.8365385	.371577	0	1
workerfm	104	.7692308	.6420654	0	3
workerm	104	1.192308	.6693994	0	4
age	104	45.85577	11.37056	25	83
edu	104	2.105769	1.30658	0	5
edu1	104	.6153846	.4888602	0	1
hhhjob	104	.3942308	.4910514	0	1
hsize	104	.9711538	.1681845	0	1
hwall	104	1.163462	.9042572	0	2
hwall1	104	.6634615	.4748137	0	1
hfloor	104	.7211538	1.169655	0	3
hfloor1	104	.25	.4351096	0	1
hroof	104	.8461538	.3884055	0	2
hroof1	104	.8365385	.371577	0	1
toilet	104	1.846154	.3884055	0	2
toilet1	104	.8557692	.3530249	0	1
water	104	.0961538	.2962297	0	1
firing	104	1.076923	.7063142	0	2
firing1	104	.2884615	.4552408	0	1
elec	104	.9615385	.193239	0	1
elecbil	104	1.567308	.9426715	0	4
meals	104	.3076923	.4637735	0	1
meatcons	104	.4807692	.5020496	0	1
newcloth	104	.5480769	.5000933	0	1
asset	104	1.413462	1.54926	0	6
asset1	104	.6538462	.4780468	0	1
bplan	104	.6442308	.4810641	0	1
telephon	104	.2115385	.410377	0	1
totasset	104	33645.19	53928.47	0	358400
assetcap	104	8322.342	13721.11	0	81025
landassetr	98	.6958242	.3448996	0	1
land	104	23923.08	41673.03	0	200000
ltotasset	98	9.684872	1.310458	5.703783	12.7894
lland	87	9.432693	1.30253	6.684612	12.20607

4.2 Methods

This study employs two methods in analyzing the dataset and assessing research questions. *First, factor analysis* is used to summarize a large number of welfare variables into a smaller set of dimensional variables (factors), also to get the weight of each indicator on dimensional variables that is not provided by BPS basic welfare indicators[18]. And *second,* a *probit model* is used to test the impact of household welfare (and other control variables) on credit demand and participation.

4.2.1 Factor analysis

Factor analysis is a statistical method to analyze the structure of the interrelationships among a large number of variables by defining a set of common underlying dimensions, known as factor, to achieve summarization and data reduction (Joseph F. Hair, Anderson et al. 1995). Factor analysis summarizes a set of variables into smaller number of dimensional variables, which can – as in this thesis – reduce the number of variables in the regression analysis (which makes interpretation easier).

There are two different purposes of factor analysis, namely *explanatory* and *confirmatory perspective*. The first perspective views factor analysis as a way to explain the structure of a set of variables without putting any *a priori* thoughts or restrictions on what the structure should be. The attitude in this perspective is to just listen to what the data has to tell. The second perspective views factor analysis as a way to confirm whether the set of variables has dimensional structures that are inline with the suspected structure or not. The attitude here is to assess whether the story told by the data is inline with the theory or not. This study is implementing factor analysis with *explanatory perspective* since there is no *a priori* assumption on how many factors should be used or what variables should be included in each factor.

Steps in factor analysis

If we employ factor analysis with the confirmatory perspective, the first thing is to select the variables to be analyzed. The researcher needs to make sure that each proposed factor have several (five or more) candidate variables (Joseph F. Hair, Anderson et al. 1995). But if we employ factor analysis with explanatory perspective, then the first thing to do is to make sure that we have large enough sample. The general rule on minimum sample size is that total number of observations should be at least five times the total variables to be analyzed. As always, the bigger the better. This

[18] It assumes that all indicators are equally important for the welfare level, that's why the BPS welfare score is calculated simply by summing up the score of all indicators.

study has 104 observations and uses factor analysis to analyze 14 welfare variables, so it fulfills this criterion.

In general, factor analysis consists of three steps namely factor derivation, factor rotation, and factor prediction and interpretation.

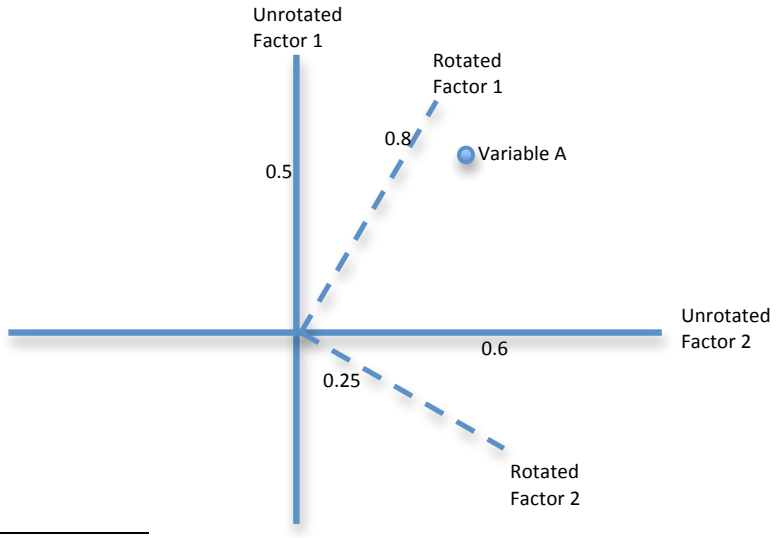
(i) Factor derivation

The activities in this step is first to determine the number of factors, and second to load variables to each factor based on variable's weight or correlation with the factors. We can use factor (variable list), pcf[19] command to do this is STATA. However the factor loading resulted here is still not very unique, such that the weights of each variables in all factors are not significantly different. For example, the weights of variable A in factor 1 is 0.51, and in factor 2 is 0.58. With this result we know that variable A is important the most for factor 2, but it still seems to be also important for factor 1. This is what step 2 is needed for.

(ii) Factor rotation

Factor rotation is employed to compose more unique factor loading coefficients where each factor will have unique significant variables, so that more meaningful factor pattern can be achieved. For example, after the rotation the weights of variable A can be 0.83 for factor 1 and 0.25 for factor 2; thus we can conclude that variable A is loaded for factor 1. There are several rotation methods but STATA, with rotate command; by default uses *orthogonal rotation* in which factor axes are maintained at 90 degrees. Figure 4.1 illustrates how the factor rotation works.

Figure 4.1 Orthogonal factor rotation



[19] Principal component factor.

(iii) Factor prediction and interpretation

Factor analysis consists of two main interpretation processes. The first interpretation is to conclude which variables are significant for each factor. The general guidance states loading coefficient should be at least 0.3 to conclude a variable fulfills the minimum significant requirement; and to conclude a variable as undoubtedly significant, the loading coefficient should be above 0.5 (Joseph F. Hair, Anderson et al. 1995). The application of the guidance is adjustable with the sample size and number of variables or *sample-variable* ratio. The higher the sample-variable ratio, the lower can the undoubtedly significance requirement be. The sample-variable ratio of this study is not small but also not large, therefore we will use loading coefficient 0.5 to conclude a variable as a significant for a factor.

The second interpretation is to analyze the dimension captured by each factor based on the significant variables therein. For example, there are five variables loaded in two factors; earrings, necklace, and bracelet variables are loaded in factor 1, while shirt and trousers are loaded in factor 2. Therefore we can interpret the result that factor 1 reflects jewelries dimension and factor 2 reflects apparel dimension. Then, we can predict the factors and name it with new variable's name that reflect the dimension it represents. Continuing the example above, we can name the factor variables as *jewelry* and *apparel*. STATA can do this prediction process with predict command. The result of this prediction process will be no longer a set of loading coefficients, but a set of weights of each variable on each factor. Variable with significant loading coefficient will usually have the highest weight for that factor (compared to the weights of other insignificant variables). However, factor analysis is not always producing factors with a good structure, thus the loading coefficient and weight result are not always consistent. Significant variable is not always producing highest weight. But the better the results the more consistent the loading coefficients and weight results are.

Limitations of factor analysis

In practice, some variables can have high weight or loading score in more than one factor, even when the result has been rotated. This will make the interpretation job more difficult. Most factor solutions do not result in a simple structure solution in which each variable has single high loading weight on only one factor (Joseph F. Hair, Anderson et al. 1995). This might happen either because the analyzed variables are too many, or because the sample size is too small. Therefore even though

there is a minimum sample size general rule, the higher sample-variables ratio is always recommended.

This study presents the broad picture of factor analysis, hence there is no comprehensive examples presented here. However, it is expected that factor analysis result discussion presented in chapter 5 can give clearer pictures on how factor analysis work.

4.2.2 Probit model

Probit model is one of binary response model that is used to investigate the effect of independent variables on the probability of response. The other binary model commonly used is *logit* model. Both have the same basic functional form; only have different assumption on the distribution of probability function. *Probit* model assumes that the probability function follows the normal distribution, while *logit* model assumes it follows the logistic distribution. Since both distributions are more or less the same, cf. Figure 4.2, the choice between of using *logit* or *probit* model is normally not considered to critical, and they usually produce similar results. But, it is also noted that when the sample taken is response-based[20], the models can produce notably different result (Xie and Manski 1988). Below are the basic functional form and probability distribution function of probit model (Wooldridge 2009).

Basic form of binary response model

$$P(y=1|x) = G(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k) = G(\beta_0 + x\beta) \qquad \rightarrow z = (\beta_0 + x\beta)$$

Basic form of probit model with latent variabel $y^* = (\beta_0 + x\beta) + e, y = 1[y^* > 0]$

$$P(y=1|x) = P(y^*>0|x) = P[e > -(\beta_0 + x\beta)|x]$$
$$= 1 - G[-(\beta_0 + x\beta)] = G(\beta_0 + x\beta) = G(z)$$

Probability distribution function of probit model

$$G(z) = \Phi(z) = \int_{-x}^{z} \Phi(v)dv \quad \rightarrow \text{ where } \Phi(z) \text{ is the standard normal density:}$$

$$\Phi(z) = (2\pi)^{-1/2} \exp(-z^2/2)$$

[20] For example is a study for analyzing individual characteristics with criminal action. It would be hard to find people with criminal history in the normal public area; therefore some samples might be taken from prisoners in the jail. The sample in this study is not response-based.

Figure 4.2 **The probability distribution of *logit* and *probit* models**

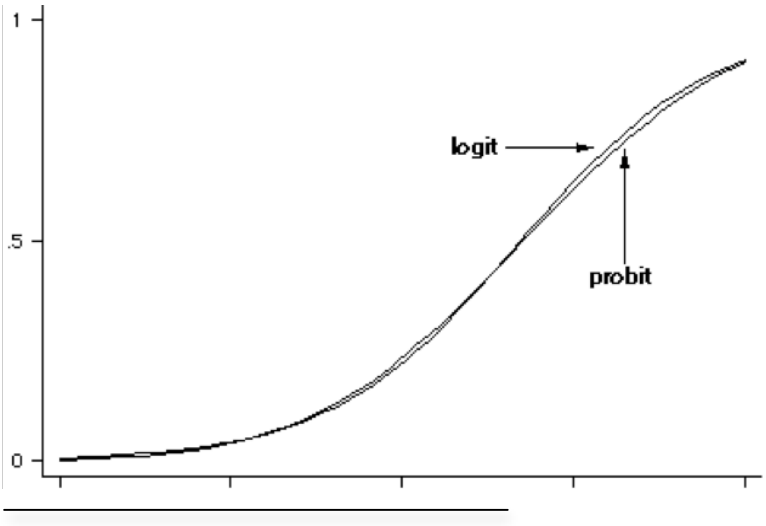


Figure source: http://www.gseis.ucla.edu

And the general forms of the tested models in this study are presented below.

$$P(cp=1|x)=\beta_0+\sum_{1}^{n}\beta_h x_h+\sum_{1}^{k}\beta_j x_j;\ \ and$$

$$P(wtb=1|x)=\beta_0+\sum_{1}^{m}\beta_i x_i+\sum_{1}^{k}\beta_j x_j$$

Where:

- h = all control variables
- i = all control variables
- k = the four welfare variables

Goodness of fit and interpretation of probit model

Goodness of fit procedure is necessary in order to evaluate the quality of a model. *Probit* model has two main procedures of goodness of fit, the pseudo R-squared (pseudo-R2) and the percentage of correct prediction. Pseudo-R2 is a measure that is directly related and comparable to the usual R2 from OLS estimation of linear probability model (Wooldridge 2009). Just like R2, pseudo-R2 gives a portrayal of how well the model (set of independent variables) in explaining the actual response. Therefore the higher the value of pseude-R2, the better the predictive ability of the model.

Another goodness of fit procedure is the percentage of correct prediction. *Probit* model allow us to predict response based on the value of y^* (y=1 if y*>0, and y=0 otherwise). With the information of the predicted and actual response, we can then calculate the percentage of correct prediction. The higher the percentage of correct prediction the better the quality of the model is. However in any case, goodness of fit is usually less important than trying to obtain convincing estimates of *ceteris paribus* effects of explanatory variables (Wooldridge 2009: 582).

When the model is considered good enough based on the two procedures above, then it comes the turn for the model to be interpreted. *Probit* and *logit* model have trickier interpretation because the coefficients resulted are only linear to the *probit* score (z), and not to the probability of the response. So the coefficients or estimates (β) can be interpreted as the increase or decrease in *probit* score, *ceteris paribus,* for each one-unit increase in each explanatory variable. In other words, β is the marginal effect of each explanatory variable on the *probit* score.

To get the effect of explanatory variables on the probability, we then need to input the z into the probability distribution function $\Phi(z)$. For example, there is a simple model of labor market participation as a function of education level. In this case, the *probit* score (z) will differ for each score of education. Let say if education score is zero the z would be 0.7, and become 0.9 if education score is one. Then we can input the z score and derive the probability score for z=0.7 and z=0.9, we can derive the marginal effect on probability by subtracting the probability value when z=0.9 with probability value when z=0.7. However, the probability function is not linear, therefore the marginal effect of one unit increase of education score from zero to one will be different with the marginal effect of one unit increase of education score from one to two.

For general interpretation, the increase in *probit* score will lead to an increase in probability of the response. Even though we can't say anything about marginal effect of each explanatory variable on probability of response from the coefficients (β), at least we can say that variable with positive (negative) coefficient affects the probability of response positively (negatively).

Limitations of probit model

Wooldridge (2009) explains that one of reasons that makes *probit* model more popular than *logit* model is because many researchers go for normality assumption on *error term (e)* distribution. However then this leads to the first limitation of *probit* model. If e does not follow normal distribution, the response probability will not have the *probit* form. But this risk can decrease as the number of sample increase. Another limitation of *probit* model that related with e is heteroschedasticity problem. If $Var(e|x)$ depends on x, the response probability no longer has the form $G(z)$; instead the form will depend on the form of the variance and requires more general estimation. Running probit model with adding *robust* command in STATA can help us in dealing with this problem.

Wooldridge (2009) also notes other limitations that are not related with *e*. First is endogeneity problem. Just like in the linear models, *probit* and *logit* models also are not free from endogeneity problem in explanatory variables that might create bias in the results. Therefore the choice of explanatory variables still has to be done carefully. And the second *e*-non-related limitation is the interpretation complication. Most researcher put interest on the effects of explanatory variables on the response probability. But the non-linear nature of the response probabilities in *probit* and *logit* model make the interpretations, regarding the effect of explanatory variables on the response probabilities, become difficult and complicated to be done.

CHAPTER 5

Results and discussions

5.1 Descriptive analysis

The main focus of this study is on welfare level and credit demand. But instead of presenting the credit demand itself, this study use *credit participation (cp)* and *willingness to borrow* (*wtb*) as representations of credit behavior. The descriptive analysis of this study is arranged to portray the welfare level, *cp,* and *wtb;* and how it seems to relate each other.

5.1.1 Descriptive analysis on welfare level

This study uses the BPS basic welfare indicators as a measure of welfare level. There are 14 welfare indicators that will be discussed and summarized using factor analysis. So for the purpose of descriptive analysis here, I use the score of BPS welfare indicators to categorize household into four groups: *poorest, poor, medium-low, and medium-high* households. BPS defines a household as poor if the welfare score is 6 or less (14 is the maximum score). Using a general definition of the poorest as the bottom 50% of the poor, we can categorize the households whose score is 3 or less as the poorest. We then also use the same mechanism to categorize the non-poor households, whose scores from 7 to 14, into medium low and medium high households: households with a score from 7 to 10 will be categorized as medium-low households, whereas those with a score from 11 to 14 will be categorized as medium-high households.

Figure 5.1 shows the distribution of the sample based on welfare category. The distribution in this sample is not necessarily picturing the distribution in the population because of two reasons. As explained in chapter 4, first this study does not include the rich household that in fact exist in *Kecamatan* Pemangkat; and second, we stratified households based on their house conditions in order to get as vary data as possible, especially in term of welfare of which this study focusing on.

However, table 4.2 will be illustrative of the population of *Kecamatan* Pemangkat since within each welfare category, the sample is taken randomly. Table 4.2 suggests that households' possession of land and asset increase with higher welfare. The table also gives hints that the poor and poorest households are highly dependent on occupations that do not have a stable income stream, while the medium-high households are highly depending on occupation that serve stable income stream. This is not surprising, as the key to get out of poverty and achieve a higher welfare level is to have access to a stable job and income.

Figure 5.1 Sample distribution based on welfare category[21]

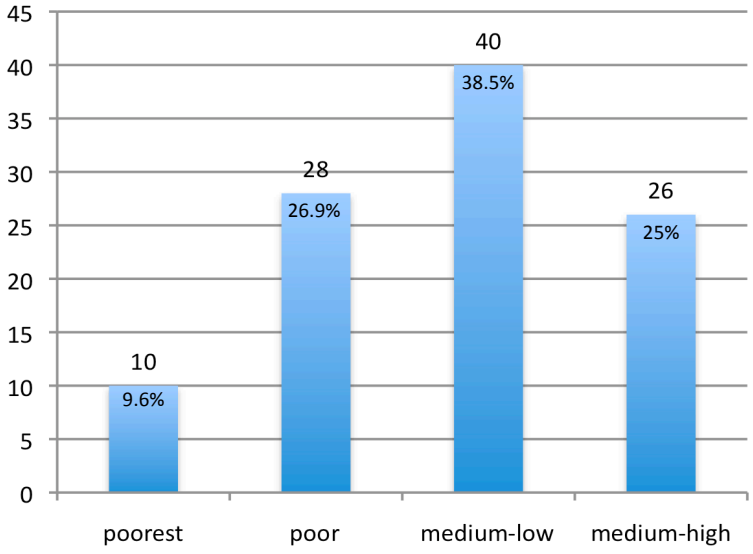


Table 5.1 Welfare category and average of total asset, land, asset per capita, and income stream

Welfare category	Average total asset (in '000 rupiah)	Average total land (in '000 rupiah)	Type of occupation	
			Stable income	Unstable income
poorest	10,778	8,220	10.0%	90.0%
poor	12,864	11,444	7.1%	92.9%
medium-low	32,328	24,568	30.0%	70.0%
medium-high	66,847	42,409	100.0%	0.0%

5.1.2 Descriptive analysis on credit participation and willingness to borrow

This study records 41 respondents (about 40%) that have a microcredit history and 68 respondents (about 65%) declare that they are willing to borrow if there is an institution that can provide them with the microcredit service. However not all respondents that have participated credit market are willing to borrow again, and not all respondents that are willing to borrow participates the credit market. The latter phenomena hints that there might be credit rationing in *Kecamatan* Pemangkat. But is credit rationing the one and only reason that make households that are willing to borrow to not participate the credit market?

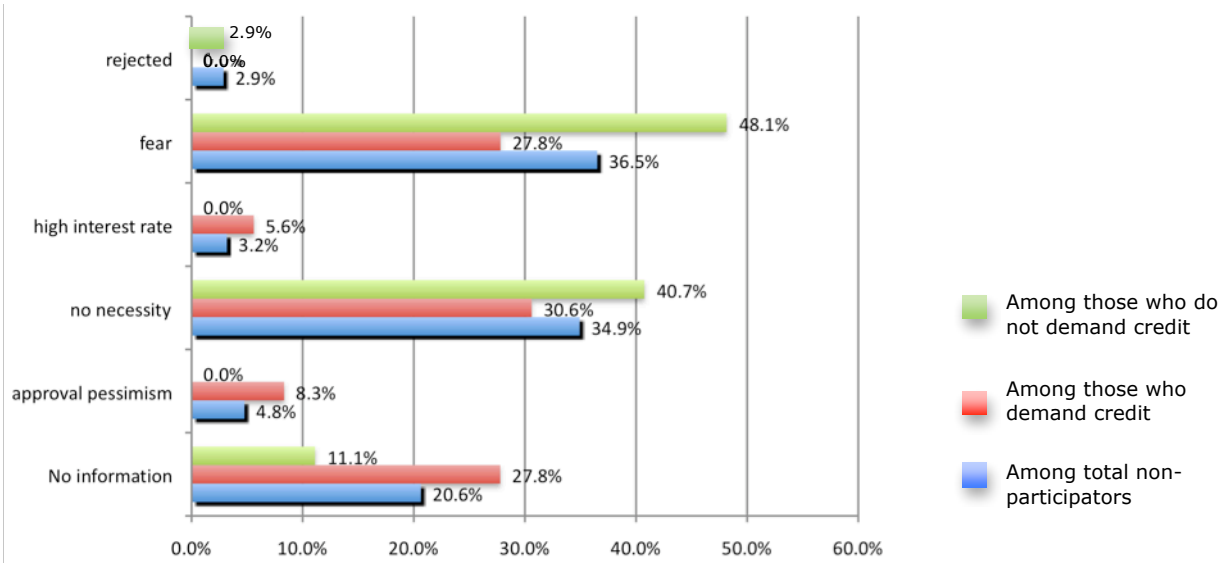
[21] Chapter 4 explains that we only divide the households into three economic classes namely low (the poorest and the poor), middle-low, and middle-high income households in the sampling process. This explains on why the percentage of the poorest households is substantially lower than the other classes. We divide the welfare category into four groups here in order to get wider picture.

Table 5.2 *Credit participation* and *credit demand* matrix

		Credit demand (Willingness to borrow)		Total
		Yes	No	
Credit participation	Yes	32	9	**41**
	No	36	27	**63**
total		**68**	**36**	**104**

The table above shows that 78% of households that have participated credit market are still willing to borrow again if they have the opportunity, while only 22% are no longer willing to borrow. The table also shows that 57.1% of households that never participated have willingness to borrow (credit demand[22]), while 42.9% are unwilling to borrow. It is not hard for us to understand the latter phenomenon since it is very understandable that households without any credit demand do not have any credit participation history. But to understand the former phenomenon, where the households possessing credit demand do not have any credit participation history, is a bit tricky. Figure 5.2. presents the reasons of credit non-participation to give better understanding of this phenomenon.

Figure 5. 2 Reasons of credit non-participation (obs=63)



[22] Credit demand is used interchangeably with willingness to borrow (see chapter 4)

The figure shows us that being rationed out is not the only reason of credit non-participation. There are also voluntary non-participations among those who possess credit demand, which may sound as a contradiction. Before we discuss this further, I will explain what reasons are considered as being rationed out and are considered as voluntary non-participations.

Reasons that are considered as being rationed-out are *rejected*, *high interest rate,* and *approval pessimism.* The former implies that the household is being redlined (by credit supplier), and the latter two imply that the household is redlining themselves after some information gathering process. We can then say that the former is rationed out as they actually have tried to apply for credit and rejected; and the latter two are self-rationed out as they have never actually apply for credit, but their negative expectation (based on information gathered) prevent them from actualizing credit participation. The other reasons are considered as voluntary non-participations. Using this definition we can state that, from all non-participators, 3% are rationed-out, 7% are self-rationed out, and 89% are voluntary non-participators.

The small credit rejection incidences might be part of consequences of the setting of this study that is not distinguishing the non-formal and formal credit market. When one goes to family members to ask for loan, there is big chance that they will get it. What about the large incidences of voluntary non-participation? Why should one willing to borrow when he or she doesn't want to participate credit market? This appears like a paradoxical phenomenon.

Borrowers in credit market know the expected return and risk of the project (Jaffee and Stiglitz 1990). Households willing to borrow are not (yet) borrowers as long as they are still outside of the market, therefore they might not know the expected return and risk of the project in which the credit will be used. But at least as households who are willing to borrow, they will have a rough projecting regarding return and risk entitled with credit participation and their potential credit project. This projection than puts households into discussion process within themselves, so this explain why having the willingness to borrow doesn't automatically lead to credit participation.

As analogy, if anybody is asked whether they want to be rich or not, many will say 'yes'. But this does not mean many will realize it since it costs time and a lot of effort to be rich. Elster (2000) call this individual paradoxical phenomenon as multiple or split self. There are several theories available to explain this split-self phenomenon, but I will just discuss one of them namely *weakness of will*[23] that argue individual tend to make present decision diagnostic of the later ones (Elster 2000). The diagnoses of later consequences then tend to weaken the will and make individual end

[23] Contribution of George Ainslie in Elster (2000)

up with decision that is the opposite of the will (paradoxical). For example, somebody that possess credit demand might think, what will happen if the business do not go well, or what will happen if suddenly my daughter fall sick? I do not have insurance for health service, how could I manage to pay the monthly credit installment and pay my daughter's medicine bill at the same time? They fear later consequences and become reluctant to participate credit market, even though he or she (or some parts of he or she) actually wants to. This is relevant to explain the phenomena of large voluntary non-participation in credit market among households that are actually willing to borrow. This is also relevant to explain the weakness level of the will itself.

The existences of rationed-out and voluntary non-participation indicate that there are different classes on weaknesses level of credit demand. If we categorize the weakness level into three groups that would be: strong (*the least weak*), moderate (*moderately weak*), and weak (*the weakest*). The *strong group* belongs to households whose reasons of their non-participation are high interest rate and approval pessimism. The incidence is 8% of total households that demand credit. This group's *willingness to borrow* is considered strong because they have tried to act consistently with their will, such as collecting information regarding interest rate and credit application procedures. However they still end up with non-participation as they found, based on collected information, that they are constrained to participate credit market. The *moderate group* belongs to households whose reasons of non-participation are the absence of information and urgent necessity (55.5%). They do not possess fear, but their will is also not strong enough to motivate them to search for information; as it is also not strong enough to consider their credit project as urgent need. And the *weak group* belongs to households whose main reason of non-participation is the possession of fear. We consider these households as possessing the weakest will as they are in a paradoxical situation; they want something but fear it. The *strong group* is actually eager to realize their will, they are unfortunately just not able to do so. The *moderate group* is neither eager nor reluctant to realize their will, they just play passive, play wait and see. And the *weak group* tends to be reluctant to realize their will.

However, is there any indication that the poor and the poorest have weaker credit demand?

5.1.3 Descriptive analysis on correlation of welfare level with *credit participation* and *credit demand*

So far we have descriptively discussed the welfare level and credit demand and participation separately. Now we will see whether the data indicate any correlation between welfare level and credit demand and participation, and also between welfare level and the weakness level of willingness to borrow (credit demand). We will discuss this issue one by one.

Correlation between welfare category and credit demand and participation

Table 5.3 presents statistics that can give us some insights regarding this issue. The statistics show that the poor and poorest households have a low credit participation rate. The credit participation share of the poorest and the poor are only 10% and 21.4%, respectively (table 5.3, column cp=1), much lower than the involvement of medium low and medium high households that are 50% and 53.8% respectively. If we compress the welfare category to only two namely poor (poorest and poor households) and non-poor (medium low and medium high households), the participation share of the poor will be 15.7%and of the non-poor will be 51.9%, a quite large gap of participation between the poor and non-poor. Overall, the results indicate that the welfare level is positively correlated with credit participation.

Table 5.3 *Credit demand* and *participation* per welfare category

Welfare category	Wtb = 0 (obs=36)		Wtb = 1 (obs=68)		Total		Cp=0 (obs=63)		Cp = 1 (obs=41)		Total	
poorest	6	60%	4	40%	10	100%	9	90%	1	10%	10	100%
poor	7	25%	21	75%	28	100%	22	78.6%	6	21.4%	28	100%
medium-low	14	34.1%	26	65.9%	40	100%	20	50%	20	50%	40	100%
medium-high	9	34.6%	17	65.4	26	100%	12	46.2%	14	53.8%	26	100%

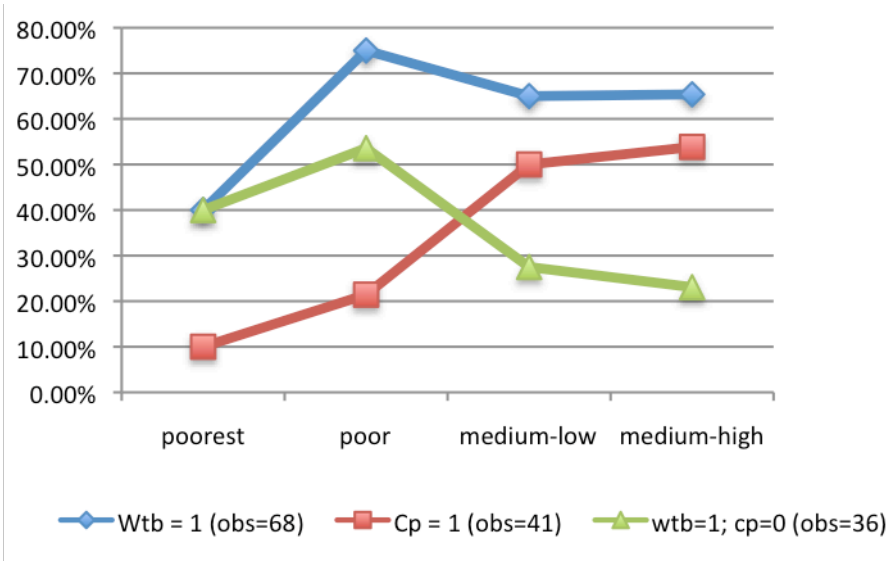
Welfare category	Wtb = 0				Wtb = 1				Total	
	cp = 0		cp =1		cp = 0		cp =1			
poorest	5	50.0%	1	10.0%	4	40.0%	0	0.0%	**10**	100%
poor	7	25.0%	0	0.0%	15	53.6%	6	21.4%	**28**	100%
medium-low	9	22.5%	5	12.5%	11	27.5%	15	37.5%	**40**	100%
medium-high	6	23.1%	3	11.5%	6	23.1%	11	42.3%	**26**	100%
total	**27**	**26%**	**9**	**8.6%**	**36**	**34.6%**	**32**	**30.8%**	**104**	100%

Table 5.3 shows different pictures regarding willingness to borrow (credit demand). It shows that the poor and poorest to have a large credit demand, especially the poor. The shares of the poor and poorest that possess credit demand are 75% and 40%, respectively, and of the medium-low and medium-high households are 65% and 65.4%. The credit demand seems to first increase as the welfare level increase, but then it becomes lower as the welfare level increase further.

If we compress the welfare category into two, the credit demand share of the poor and non-poor becomes 57.5% and 65.2%, respectively, which is much smaller than the gap in credit participation. Given the small sample size, one should be careful and not draw any firm conclusions. The data show no straightforward correlation between welfare level and credit demand, as opposed to what it did for credit participation.

Figure 5.3 shows the credit demand and participation share in each welfare category. We have discussed above that credit demand is off-market and credit participation is on-market, and the gap between credit demand and participation can be interpreted as unmet demand (by the market). The figure illustrates that the widest unmet demand occurs among the poor households, following is the poorest, middle-low, then middle-high households. Thus, the higher the welfare level the narrower the unmet demand is. This follows directly from the above finding that welfare level is more more strongly correlated with credit participation than with credit demand.

Figure 5.3 ***Credit demand*** **and** ***participation*** **rate per welfare category**



Correlation between welfare level and the weakness of credit demand

Previously we have discussed that the reasons of credit market non-participations can reflect the weakness level of credit demand strong, moderate, or weak. In this part we are interested to see whether the poor and the poorest households have stronger or weaker credit demand compared to the non-poor. Table 5.4 presents the reasons of credit market non-participation per welfare category, and Table 5.5 presents the weakness level of credit demand per welfare category. The latter table is constructed based on the categorization discussed in section 5.1.2.

Table 5.4 Reasons of credit market non-participation and weakness level of credit demand per welfare category

Welfare category	Credit participation = 0 and willingness to borrow = 1						Total	
	Approval pessimism	High interest	No information	No necessity	Fear			
poorest	25.0%	0.0%	25.0%	0.0%	50.0%		100.0%	
poor	6.7%	13.3%	33.3%	13.3%	33.3%		100.0%	
middle low	9.1%	0.0%	36.4%	36.4%	18.2%		100.0%	
middle high	0.0%	0.0%	0.0%	83.3%	16.7%		100.0%	
Welfare category	**Weakness level of credit demand**						**Total**	
	Strong		**Moderate**		**Weak**		**Number**	**(%)**
poorest	1	25.0%	1	25.0%	2	50.0%	**4**	100.0%
poor	3	20.0%	7	46.7%	5	33.3%	**15**	100.0%
middle low	1	9.1%	8	72.7%	2	18.2%	**11**	100.0%
middle high	0	0.0%	5	83.3%	1	16.7%	**6**	100.0%
Total	**5**	**13.9%**	**21**	**58.3%**	**10**	**27.8%**	**36**	100.0%

From Table 5.4 we find that most households have moderate credit demand (58.3%), some has weak (27.6%), and few has strong credit demand (13.9%). We also find that the share of the poor and poorest households that have weak credit demand is much larger than the share of the non-poor (50% and 33.3% versus 18.2% and 16.7%); and the share of the poor and poorest households that have strong credit demand is larger than the share of the non-poor (25% and 30% versus 9.1% and 0%). These figures suggest that, first, there is tendency that the poor and poorest to have weak credit demand; second, there is small tendency that the poor and poorest to possess strong credit demand; and third, there is no tendency that the non-poor households to possess strong credit demand. All in all, the picture is not straightforward, although it indicates that the poverty leads to weak demand for credit.

5.2 Factor analysis result and analysis

This study apply factor analysis on the three sets of welfare variables, labelled BPS, stylized-1, and stylized-2, each of them consisting of 14 welfare indicators. Factor analysis is not only a way to compress a set of variables into smaller number of dimensional variables (factors), but also a convenient way to derive weights for each variable based on correlation between the variable and the factors. A variable will become a member in the factor in which it has the highest weight.

As discussed in chapter 4, factor analysis has three basic steps: factor derivation, factor rotation, and factor prediction. However, the discussion here will be focus on the interpretation of the result. The first interpretation would be on the number of factors constructed for set, and the second would be on the choice of the best factors prediction result. The full STATA results of factor analysis for each set of welfare variables are available in Appendix 2.

5.2.1 Number of factors for each variables set

To get the number of factors constructed by factor analysis, we have to look at the eigenvalues. The criteria is to retain the factors that have eigenvalues equal or higher than 1. From the table below we can conclude that factor analysis suggests 4 factors for BPS variables set, 3 factors for stylized-1 set, and also 4 factors for stylized-2 set. The full STATA result can be seen in Appendix 2.

Table 5.5 Summarized eigenvalues of each welfare variable set

Factors	Eigenvalues		
	BPS	Stylized-1	Stylized-2
factor 1	4.43522	4.75358	5.04955
factor 2	1.38858	1.41985	1.34096
factor 3	1.16547	1.1039	1.11773
factor 4	1.09671	0.97367	1.08803
factor 5	0.96687	0.9227	0.89862
:	:	:	:
:	:	:	:
factor 14	0.28642	0.21661	0.21543

5.2.2 Interpretation of the results

After the numbers of factors are known, the next step to do is interpreting the loading coefficients to obtain the variables are significant for each factor. This interpretation is also done to get the best result among the three sets of welfare indicators. If the best result is concluded, dimensional interpretation can start. We will discuss each interpretation process in turn.

Interpretation of factor loading results

Table 5.6 presents the significant variables' loading coefficient[24] in each factor and its highest weight. Loading coefficients are resulted from factor rotation process, while weights are resulted from factor predictions process. The complete STATA result can be seen in *Appendix 2*.

We can see clearly in Table 5.6 that the best factor analysis results came from BPS set of welfare indicators. It is not resulting in a clear simple structural solution, which is common, but it is the best result because the rotated loading coefficients are all strongly significant (above 0.5) and unique such that not even a single variable is strongly significant in more than one factor. This then lead to a consistent prediction result in which the significant variable has the highest weight within the same factor. For instance, *edu* is significant in factor 1, and it is consistently has the highest weight (0.305) also in factor 1 (the weight of *edu* for other factors are smaller than 0.305, see appendix 2). However, the results in stylized-1 and stylized-2 set are not like this.

In stylized-1, there are two variables that are not strongly significant, namely *edu* and *elec.* This leads to the weak prediction results shown by the existence of significant variable that do not have highest weight. Those variables are *hfloor* and *newcloth* that are strongly significant for factor 1 but its highest weight coefficients present in factor 3. The result for stylized-2 is even "worse". Though the loading coefficients are rotated, there are still a variable that is strongly significant in more than one factor, namely *edu*. The result also shows two variables, *hhhjob* and *hfloor,* that are not strongly significant. The existence of weakly significant and non-unique variables leads to weaker results in prediction procedure. There are four variables namely *hhhjob, firing, hfloor, and newcloth* having highest loading coefficient that do not have highest weight within same factor.

Dimensional interpretation of the results

The factor loading results of the three sets of welfare indicators bring us to conclusion that BPS set is producing the best result. Therefore only the BPS results that will be discussed further to dimensional interpretation. However the factor analysis, for BPS set, does not result in a simple structure solution with clear dimensional aspects. This is common to happen and does not mean that we cannot get out of the result. It just implies that we need to keep in mind that the main purpose of the dimensional interpretation is to have each factor to not represent the same dimension.

[24] The significance threshold used is 0.5, but some loading coefficients less than 0.5 but as long as more than 0.3 are still included since that is the only highest loading coefficient that variable has (see chapter 4).

Table 5.6 Variables' loading and weight coefficient in each factors

Factor 1			Factor 2			Factor 3			Factor 4		
var	**load**	**weight**	**var**	**load**	**weight**	**var**	**load**	**weight**	**var**	**load**	**weight**
BPS											
edu1	0.593	0.305	water	0.536	0.326	hwall1	0.611	0.272	hsize	0.805	0.634
hhhjob	0.603	0.298	meals	0.774	0.476	hroof1	0.761	0.429	newclot	0.537	0.334
hfloor1	0.8	0.482	meatcon	0.749	0.414	toilet1	0.688	0.373	asset1	0.523	0.308
firing1	0.7	0.342				elec	0.537	0.346			
Stylized-1											
edu	0.489	0.122	hhhjob	0.578	0.217	**hfloor**	-	0.281			
hwall	0.65	0.206	water	0.541	0.264	**newclot**	-	0.266			
hroof	0.686	0.29	meals	0.75	0.381	hsize	0.855	0.731			
toilet	0.745	0.344	meatcon	0.724	0.309						
firing	0.642	0.181	asset	0.692	0.235						
elec	0.478	0.262									
hfloor	0.513	-									
newcloth	0.522	-									
Stylized-2											
hhhjob	0.479	-	**edu**	0.511	-	**edu**	0.576	0.4	hsize	0.883	0.757
elecbil	0.685	0.324	**hfloor**	0.493	-	water	0.832	0.665	**hfloor**	-	0.25
meals	0.805	0.439	hroof	0.709	0.332	**hhhjob**	-	0.147	**newclot**	-	0.264
meatcon	0.66	0.26	toilet	0.766	0.392						
asset	0.662	0.227	hwall	0.658	0.237						
firing	0.554	-	firing	0.587	0.157						
			newclot	0.504	-						

Table 5.6 shows us that:

(i) Factor 1 is significantly loaded by *edu1, hhhjob, hfloor, and firing*

Both *hfloor* and *firing* are house related indicators, while *edu1* and *hhhjob* has its own distinctive dimension. To interpret this factor as housing factor, we have factor 3 that is loaded by only house related indicators. Thus *housing* title will be more suitable for factor 3, and *job and education* title will be more suitable for factor 1. For further discussions and uses, , the term *job and education* will be used to label factor 1.

(ii) Factor 2 is significantly loaded by *water, meals,* and *meatcons*

Factor 2 seems clearer than factor 1, as it contains household water utility usage status and indicators related with eating habits. Eating habit reflects the nutrition level consumed by the household. Therefore we can interpret that factor 2 is capturing the dimension of *water and nutrition source*. The term *water and nutrition* will be used to label factor 2.

(iii) Factor 3 is significantly loaded by *hwall1, hroof1, toilet1,* and *elec*

As briefly stated before, factor 3 seems even clearer than factor 2 as it only contains housing related indicators like wall and roof material, the availability of toilet facility and electricity connection. Therefore, the term *housing* will be used to label factor 3.

(iv) Factor 4 is significantly loaded by *hsize, newcloth,* and *asset1*

Factor 4 does not seem to have a clear structure as it contains house related variable (house size), the frequencies of buying new cloth, and possession of non-land asset worth more than IDR 500,000. As housing dimension is already captured in factor 3, factor 4 will be more suitable to represent the dimension of *clothing and asset.*

The dimensions captured by the factors are more or less in line with an old Indonesian concept of welfare that consists of three basic elements (primary needs), namely *pangan* (food), *papan* (housing), and *sandang* (clothing). This concept dates back to a time when education was not yet considered as a primary need.

5.3 Probit model result

As discussed in Chapter 4, three household characteristics will be used alternately in the Probit models, namely *hhsize (household size), depratio (dependency ratio),* and *cw (consumer worker ratio).* It also explains that the three household assets variables namely *totasset (total asset value), land (total land value), and landassetr (land-asset ratio),* will also be included in the model alternately. Therefore the first purpose of playing around with the models is to find the best variable to represent household needs and household asset. Since this is not the main concern of this thesis, the process of finding the best variable is not discussed here, but the checking procedure is explained. The STATA result regarding this can be verified in *Appendix 3*.

There are three factors considered in choosing the best variable. The first is whether the model is free from multicollinearity. The basic correlation matrix is used to assess this, and *cw* is found to have high correlation with *workerfm* (0.56), therefore it is not chosen. The second is how it affects the statistical significance of other variables. And the third is whether it derives higher pseudo-R2 than the other candidates. If a variable is suspected to cause multicollinearity, then it will automatically be taken out from the equation. If there is no multicollinearity tendency, then the second factor is considered. If then again there is no change in other variables significance status after variable replacement, then the third factor is considered. Using this approach, I conclude that

hhsize is the best variable as a proxy of household needs and *ltotasset* is the best variable to represent household possession of asset (in value).

The table only presents three scenarios, the full model, the model without *ltotasset,* and the model without *elecbil.* The latter two models are included to show that *ltotasset* and *elecbil* are influential variables for the model as its elimination lowers the quality of the result[25]. The full models, *cp* and *wtp model* I, are the basis for the discussion that follows.

5.3.1 Discussion on welfare variables

The main purpose of this study is to find out how welfare level affects the probability of *cp* and *wtp.* In this way we can derive conclusion that can answers the main research question aksed: *does the poorest want credit services?* The descriptive statistics results indicate that the poorest does not seem to want credit service, but the poor does. It is indicated by: (1) the smaller gap (between the poor and non-poor) in credit demand compared to the gap in credit participation, and (2) the poorest report the lowest rate of credit demand, but the poor report higher credit demand than the medium high households, thus the correlation between poverty and credits demand was weak. Now we want to find out whether these preliminary results are confirmed by the regression model.

Table 5.7 presents the result of the *probit* model. In a *probit* model, the coefficients are interpreted as marginal effect (*ceteris paribus)* of each explanatory variable to *probit* score. Higher *probit* score will always lead to higher probability of response. A positive coefficient is interpreted as positive marginal effect of an explanatory variable on either credit demand or participation (keeping in mind that from now, the term credit demand and participation are actually referring to the *probability* of both credit demand and participation).

[25] The elimination of other control variables are not as strong as both *ltotasset* and *elecbil,* therefore it is not worth reporting. Since the elimination of other control variables are not significantly affecting the results, particularly regarding the significant variables, I decide to present the full model so that all significant and insignificant variables are reported.

Table 5.7 The results of *probit* models

Explanatory variables		Endogenous variable					
		Credit participation (*cp model*)			Credit demand (*wtb model*)		
		I	II	III	I	II	III
Welfare variables							
	1. job and education	0.59* (0.216)	0.581* (0.219)	0.537 (0.184)	-0.034 (0.269)	-0.025 (0.289)	-0.01 (0.277)
	2. water and nutrition	0.032 (0.19)	-0.05 (0.187)	0.045 (0.189)	-0.153 (0.25)	-0.102 (0.256)	-0.234 (0.243)
	3. housing	0.39** (0.182)	0.29*** (0.173)	0.468* (0.18)	0.56*** (0.299)	0.425*** (0.251)	0.585*** (0.313)
	4. clothing and asset	0.775*** (0.315)	0.87* (0.31)	0.638** (0.285)	-0.786* (0.278)	-0.595** (0.249)	-0.427** (0.176)
Control variables							
	1. hhhsex	0.49 (0.504)	0.789 (0.546)	0.127 (0.484)	0.61 (0.581)	0.731 (0.583)	0.581 (0.604)
	2. age	0.0027 (0.222)	0.0046 (0.0218)	0.003 (0.018)	-0.065** (0.032)	-0.0445 (0.027)	-0.049** (0.025)
	3. hhsize	0.156 (0.107)	0.157 (0.106)	0.071 (0.098)	-0.138 (0.142)	-0.089 (0.139)	-0.14 (0.119)
	4. presence	-0.0024 (0.012)	-0.0024 (0.012)	-0.0004 (0.0104)	-0.012 (0.016)	-0.017 (0.015)	-0.011 (0.015)
	5. distance	0.207** (0.102)	0.266* (0.099)	0.149*** (0.09)	-0.046 (0.085)	0.012 (0085)	0.031 (0.095)
	6. mfiknowl	0.203*** (0.107)	0.175*** (0.102)	0.176*** (0.097)	0.086 (0.148)	0.047 (0.147)	0.066 (0.131)
	7. offfarm	-0.236 (0.5)	-0.279 (0.483)	-0.201 (0.467)	0.393 (0.563)	0.309 (0.506)	0.401 (0.554)
	8. telephon	0.605 (0.479)	0.221 (0.434)	0.639 (0.486)	1.565* (0.596)	0.908 (0.583)	1.802* (0.597)
	9. elecbil	-0.537** (0.214)	-	-0.641* (0.226)	-0.514*** (0.288)	-	-0.437 (0.288)
	10.workerfm	0.129 (0.276)	0.079 (0.270)	0.203 (0.264)	0.784 (0.508)	0.555 (0.445)	0.754 (0.495)
	11.workerm	-0.237 (0.256)	-0.211 (0.259)	-0.259 (0.255)	1.502* (0.468)	1.272* (0.394)	1.461* (0.478)
	12.ltotasset	0.009 (0.186)	-0.046 (0.181)	-	0.149 (0.196)	0.075 (0.195)	-
	13.bplan	0.542 (0.34)	0.519 (0.35)	0.619 (0.323)	4.278* (0.806)	3.829* (0.608)	4.142* (0.717)
Constants		-1.799 (1.742)	-2.192 (1.67)	-1.065 (1.174)	-1.785 (1.689)	-2.094 (1.586)	-1.29 (1.129)
	Psedu-R2	**0.329**	**0.287**	**0.3063**	**0.6904**	**0.6735**	**0.6904**
	% correct prediction	**78.57%**	**77.55%**	**74.04%**	**93.88%**	**92.86%**	**93.27%**

The numbers presented are the coefficients and robust standard error (in the brackets)

*Significance: * = significant in 1% level, ** = in 5% level, and *** = in 10% level*

As a first, general conclusion, the results in Table 5.8 confirms that welfare variables are more influential for credit participation than credit demand. This is shown by:

(1) There are three statistically significant welfare variables in *cp model* but only two in *wtb model;*

(2) The absolute magnitude of welfare variable is much larger in *cp model* compared to in *wtb model.*

This finding points to the role of supply-side forces on credit participation. Credit rationing theory states that *asymmetric information* makes credit suppliers tend to evaluate the borrower instead of the credit project. And some of the commonly used criteria in evaluating borrower creditworthiness are the possession of collateral and income stability status that are highly correlated with household welfare level. Therefore the results confirm that *welfare variables are more important on credit participation than credit demand, and suggests that households with low welfare face stronger credit constraints than other households*.

Analysis of welfare variables' coefficients

The following discussion will contrast the effect of each variable on credit demand and participation.

(1) *Water and nutrition*

This is not significant for neither credit participation nor demand. This might be related to the observation that of basic nutrition necessities that are no longer an issue in Indonesia. This implies that *water and nutrition* is a weak welfare measures as it captures less diversity in the sample compared to the other welfare variables. The scoring of BPS welfare indicators, for all observations, is attached in *Appendix 4* where we can see the variation of the variables. The data shows that this dimension contains less diversity as it has two elements, water and meal frequency, that are not varying a lot.

(2) *Housing*

This is a significant variable for both credit participation and demand. *Housing* coefficient in both *cp* and *wtb model* are 0.39 and 0.56, respectively. So the better the housing conditions, the higher both credit participation and demand will be. However the magnitude of the coefficients suggests that *housing* is less important for credit participation compared for credit demand, indicating that housing condition is not a major criteria for credit supplier in any creditworthiness evaluation process.

(3) *Job and education*

This is not a significant variable for credit demand, but is for credit participation. So we can interpret that credit demand is not being dependent on *job and education*. However, if a household wants to realize their demand by participating in the market, their *job and education* status is important. This finding supports earlier result that income stability and educational level are commonly used criteria to evaluate creditworthiness. Income stability

gives an assurance that the borrower will be able to pay the credit installment smoothly, and education[26] assures the borrower is able to write, read, and calculate properly.

(4) *Clothing and asset*

This is the most "eccentric" variable among welfare variables. It is significant and most important – as the coefficients show – for both credit demand and participation, but it affects them in opposite manner. The coefficient of *clothing and asset* on credit demand and participation are -0.786 and 0.775 respectively. Therefore we can say that it is more or less as important for both credit demand and participation, but in opposite directions: *clothing and asset* is lowering credit demand while increasing credit participation. This finding is not problematic regarding credit participation. It is not only in line with the hypothesis of this study, but it is actually also supporting the notion stated above. But it is puzzling regarding credit demand as it counter to our initial hypothesis. We will discuss about this finding further below.

Analysis of clothing and asset effect on credit demand

While the result that *clothing and asset* lowers credit demand is puzzling, but has already been hinted to in the descriptive analysis. The descriptive statistics do not indicate any straightforward correlation between welfare level and credit demand, except that it seems after some point higher welfare level no longer leads to higher, but lower credit demand. Gockel (2009) study is also hinting mix picture on correlation between welfare level and *willingness to borrow more.* However, the *probit* results are more or less telling the same story.

Relating the *probit* result with some hints we get from descriptive analysis indicate that there is some ranking among welfare variables, in this case, the *housing* and *clothing and asset. Clothing and asset* is negatively signed, implying that when households afford to buy at least two pairs of clothing for each family member per year and possessing other valuable asset (except land of residence), they will be less likely to demand credit. But it is not the case with *housing*, since the better housing condition the higher will credit demand be. The combination of these two stories indicates that *clothing and asset* is representing higher state of welfare, compared to *housing.*

However, this is not explaining that *clothing and asset* result shows opposite phenomena than what is hypothesized. This study predicts that all welfare variables will affect credit demand positively.

[26] In this case whether the household head is elementary school graduate or not

The *risk aversion* theory says individual will attach lower risk premium on any given risk as they are getting wealthier, therefore it will lead to higher credit demand. So what is the story beyond the negative sign of *clothing and asset?* There are some possible indications.

(1) Welfare variables do not only affect credit demand *via* the link of *risk-aversion.*

The law of diminishing marginal utility states that the marginal utility caused by the consumption of one additional unit good, *ceteris paribus,* will decrease as the consumption of that good increase. Let say level of welfare is the good in this case. Then we can say that the marginal utility of each additional welfare unit (potentially) obtained by credit project will decrease as the state of welfare increase. In other word, the households value the incentive of credit less as their welfare level is getting higher. In other words, people tend to have less eagerness to borrow when they think their welfare state is already in a good shape. This implies, together with smaller risk premium attached, there is also smaller (perceived) incentive of credit as welfare level increase.

(2) Among medium to low-income households, the decrease in the perceived incentive of credit demand is still less than the decrease in risk premium attached on credit service when *housing* variable is positive and *clothing and asset* is zero. Therefore higher *housing* will leads to higher credit demand. However, when *clothing and asset* is starting to be positive, then it will start to make the decrease in perceived incentive exceeds the decrease in risk premium attached. This might explain why the two welfare variables have different signs.

(3) Point 2 indicates, for medium to low-income households, that being able to buy at least two pairs new cloth for each family member (per year) and to have at least one other valuable asset (except land of residence) as comfortable state of welfare (well-being). Therefore once these two conditions are fulfilled, the marginal utility of additional welfare unit drops substantially, making the incentive of credit demand becomes less attractive. Even though the risk premium attached on credit demand is smaller, it becomes not small enough to compete with the lower perceived incentive. And technically, the possession of the two conditions means both *clothing and asset* and *housing* have positive values, making the net effect of both variables on credit demand becomes negative. When the value of *clothing and asset* is zero, the welfare variables will still contribute positive effect on credit demand.

Analysis of overall welfare variables result

There are two main results suggested by above findings:

(1) Welfare variables are more important for credit participation than for credit demand.
(2) Higher welfare level (all variables increase) does not always lead to higher credit demand. It does when the *housing* variable is the only variable that has positive value, but not when *clothing and asset* also has positive value. However, higher welfare level always leads to higher credit participation.

Results 1 and 2 together imply the potential of supply-demand mismatch in credit market concerning:

- As household welfare level gets higher – when household *housing* value is positive but *clothing and asset* is zero – credit demand increase as welfare level increase. *Housing* coefficients show larger number in credit demand than in credit participation, implying demand side has higher likeliness to borrow than supply side.
- As household welfare level gets further higher – when household *housing* and *clothing and asset* are positive - the supply side is more likely to give credit to them, but on the other side, the demand side is less likely to borrow.

Result 2 also implies there is only a small credit demand from the poorest, since at lower state of welfare (when only *housing* that has positive value), credit demand will rise as welfare level increase. In other word, based on this result we can also say that credit demand from the poorest is the least, if not small, compared to the other higher welfare groups. Relating this finding with the debate presented in chapter 1, regarding whether we should target microcredit for the poorest, we can conclude that the result of this study supports the assumption used by the *first group,* that the poorest do not have vast effective demand therefore they could not be reached on sustainable and large-scale basis.

Finally, another implication of result 2 is that *clothing and asset* is a key welfare indicator for credit demand, and it is suggested as comfortable state for household in which the effect of welfare level on credit demand may change the sign of the welfare impact.

5.3.2 Discussion on control variables

Given the focus of this study, I have not provided a strong theoretical background for each control variables, but will attempt to interpret the results in the following. I will not discuss the results by model, but by variables (with a focus on the significant ones). Table 5.7 above shows that there is only one control variables that is significant in both *cp* and *wtb model,* namely *elecbil,* confirming the different nature between *credit participation* and *credit demand.*

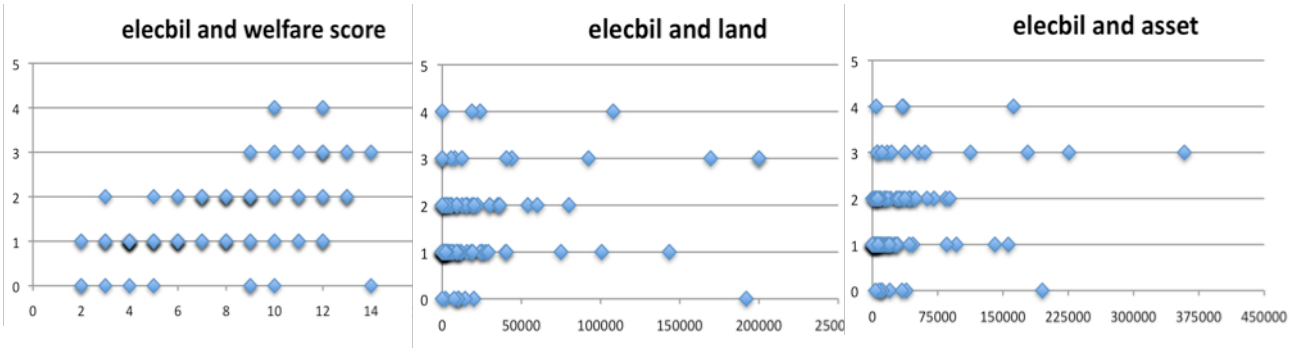
Variable elecbil (electricity bill)

As one of the variable that is included to control for other potential welfare proxy, *elecbil* is expected to have positive partial correlation with *credit participation* and *demand.* But surprisingly the results show the opposite story, with relatively large magnitude of the effect (-0.537 and -514, respectively). This result makes me analyzing the scatter plot of *elecbil* with BPS welfare score, total value of asset, and total value of land shown by figure 5.4 below.

The figure shows that with this category of electricity bill (5 groups, see table 4.6), there are no specific patterns between *elecbil* and the three other welfare and asset proxies. It implies that the early perception of *elecbil* as one of other welfare proxies that should be controlled for is actually not true. However this is a significant variable for *credit participation,* and I have tried to not including *elecbil* into the two models, but makes the quality of the results significantly lower.

Therefore we need to keep it. So what does the result tell us? The higher the *elecbil* score the higher is the household class of electricity bill. Our result suggests that *elecbil* acts more a proxy for expenses than for welfare. Higher electricity expense makes household more reluctant to add some other monthly expense that credit entails via installment. This then explains the negative coefficient.

Figure 5.4 Scatter plot of *elecbil* with *welfare score, total value of asset,and total value of land*



Significant control variables on cp but not on wtb model

There are two variables included in this group, namely *distance,* and *mfiknowl.*

i. *Distance*

Distance is one of variable that has a surprising result. It was expected that distance from nearest MFI would have negative correlation with *credit participation,* but what is found here is that it has positive correlation; even though the magnitude itself is relatively small (0.207). What does this result imply? The fact that this study does not limit credit market as only the formal credit market might be related to this study. There are three main non-formal credit sources in *Kecamatan* Pemangkat namely BNI 47, friends or relatives, and *Kelompok Simpan Pinjam* (KSP)[27]. I will focus on the latter since this is the most possible link that causes the coefficient sign to be positive.

Together with *Jamkesmas* program, in 2008 Indonesian government launched *Program Nasional Pemberdayaan Masyarakat (PNPM)* that give direct transfer as much as IDR 1 billion per year to every districts (*Kecamatan)* in Indonesia to be managed and used directly by districts official and involving local people to determine the use of the money. However, the most popular usage of PNPM money is for infrastructure building and revolving fund (*dana bergulir)* of which the distribution is targeted to women and people without credit access. The distribution of the revolving fund is done *via* KSP that mostly exist in relatively remote area in the sense that is far from market center. This movement seems to make distance no longer a burden for the people; in fact it becomes an incentive as the government as one of supplier of microcredit fund, *via* PNPM program, is targeting those people who live far away from the market center in which most formal MFI operates.

However, *distance* is not significant for credit demand. As discussed in chapter 3, there is no supply-side force taking role in credit demand, therefore supply side interference such as PNPM program will not be captured. The insignificance of *distance* on credit demand implies that the incidence of credit demand is random in term of *distance.* Every individual, no matter where they live, might possess credit demand.

[27] See chapter 2 for explanation

ii. *mfiknowl*

This variable ends up with suspected result, but only on *cp* model and not in *wtb* model. Knowledge of microcredit has a significant positive correlation with *credit participation,* but has no significant correlation with *credit demand.* What does this result imply?

It seems that this results want to tell us the egg and chicken story between *credit knowledge* and *credit participation.* Once an individual participates credit market, he or she will automatically have better knowledge on microcredit, at least he or she will become aware of the range of interest rate and know the procedure of credit application, and he or she will also know what institutions are providing the service. And this is not the case with *credit demand*, particularly on those who never participated in the credit market, some of them might just play passively until the information come by itself either from government campaign or from other exogenous sources. Moreover, it is not like the credit information is limited to only certain community in *Kecamatan* Pemangkat. The information is open for anybody that is willing to search for it, to get information on credit market (formal and non-formal) cost nothing in term of money, it costs only effort however. Therefore the insignificance of *mfiknowl* on *credit demand* may also imply the ignorance of the people.

Significant control variable on wtb but not on cp model

There are four variables that are significant on *wtb* but not on *cp model,* namely *age, telephon, workerm,* and *bplan.* We will also discuss them briefly one by one.

i. *Age*

The older the people are the more reluctant they will be to become involved with credit. This is pictured by the negative coefficient of *age* on *credit demand.* However the result shows that the credit participation is random regarding the age of the household head. An explanation can be found in the dual nature of age: at one hand the older somebody are the more reluctant toward changes they will be, but the other hand older hsoueholds may have accumulated more wealth and therefore have a higher probability of having a credit history.

ii. *Telephon*

This variable ends up with as expected result that telephone has positive correlation with probability of *wtb,* and the magnitude is large (1.53). It seems like *telephon* is a strong proxy for stability of livelihood, especially regarding income stream and permanence of residence, so that it is highly correlated with household *credit demand.*

iii. *workerm*

The number of male worker in the family is significantly correlated with *credit demand.* It implies more male worker in the family reduce household vulnerability, therefore increase the credit demand.

iv. *Bplan*

This is the special variable that is expected to have high correlation with credit demand but not with credit participation as the latter involves supply forces. The *probit* model results confirm this, since the variable is strongly significant on *wtb model,* and not significant on *cp model.* In *wtb model*, *bplan* is not only proven to has a high significance, but also to has highest coefficient (4.142) compared to the other variables (including welfare variables). From this result we can say that the possession of business idea is the most important factor for *credit demand,* and its insignificance in the *cp model* also support an earlier suggestion on credit suppliers attitude that is not to look at the credit project, but instead putting the attention on the borrower profile.

5.4 Extended analysis: determinants of willingness to pay

In descriptive analysis section we have discussed about the prevailing of weakness of will. Looking at the reasons of credit non-participation among household who demand credit, we found there is tendency that poorer households have weaker demand or willingness to borrow. So what we're doing here is to verify this tendency statistically by analyzing welfare effect on *willingness to pay.* This uses the maximum annual interest rate, that household is willing to pay to enjoy credit service, as a proxy for *willingness to pay*. Lower *willingness to pay* reflects weaker credit demand.

As an additional analysis, this study uses the usual *Ordinary Least Square* method to analyze the determinant of *willingness to pay* for credit service. Presuming the same variables affect *willingness to pay,* the OLS regression is first tried out with a full model. However, the result shows only one variable is significant, namely *housing*. This might be related to the nature of OLS that is more sensitive toward redundant variables. Therefore we tried to take out some of insignificant variables, starting from the most insignificant one. The first and final results are presented below, together with the Probit *credit demand* model as comparison.

Table 5.8 OLS result for *willingness to pay* model

Explanatory variables	Models		
	Wtp model-1	***Wtp model-2***	***Wtb model***
Welfare variables			
1. job and education	-0.951 (1.291)	-0.757 (0.999)	-0.034 (0.269)
2. water and nutrition	-0.345 (1.544)	-0.431 (0.998)	-0.153 (0.25)
3. housing	3.485* (1.188)	3.755* (1.131)	0.56*** (0.299)
4. clothing and asset	2.867 (2.482)	2.01 (2.11)	-0.786* (0.278)
Control variables			
1. hhhsex	-1.482 (3.626)	-	0.61 (0.581)
2. age	-0.187 (0.166)	-0.194** (0.089)	-0.065** (0.032)
3. hhsize	0.245 (0.709)	0.356 (0.478)	-0.138 (0.142)
4. presence	0.007 (0.065)	-	-0.012 (0.016)
5. distance	0.024 (0.58)	-	-0.046 (0.085)
6. mfiknowl	0.779 (0.817)	0.844 (0.647)	0.086 (0.148)
7. offfarm	2.318 (4.2)	-	0.393 (0.563)
8. telephon	-1.004 (2.927)	-	1.565* (0.596)
9. elecbil	-2.145 (1.401)	-2.346** (0.978)	-0.514*** (0.288)
10.workerfm	0.961 (1.931)	-	0.784 (0.508)
11.workerm	-0.0358 (1.89)	-	1.502* (0.468)
12.total asset	-0.016 (1.442)	-	0.149 (0.196)
13.bplan	3.16 (3.474)	3.917*** (2.34)	4.278* (0.806)
Constants	17.409 (10.661)	19.3* (5.157)	-1.785 (1.689)
R-squared	**0.3425**	**0.3075**	
*significance level: *) is 1%; **) 5%; and ***) 10%*			

There are less significant variables in *willingness to pay model.* However, if we look at the coefficient of the significant variables and compare it with coefficients in *credit demand* model, we can see that all of the coefficients have the same signs as in the *credit demand* model. These results indicate that *credit demand* and *willingness to pay* are behaving in a similar manner, particularly regarding its reactions towards welfare and control variables of this study. As *housing* is significant and positively signed on *willingness to pay,* this result confirms that the *credit demand* of poorer household is weaker.

CHAPTER 6

Conclusions

6.1 Drawbacks and room for future studies

One of the main drawbacks of this study is the small sample size. Although a sample size of 104 is above what is sometimes considered a minimum sample, when we divide the sample into subcategories (according to welfare class and credit market behavior), the sample in each subcategory becomes quite small. Therefore we cannot claim that the findings of this study are strong conclusions, but rather indicative and suggestions for further analysis. Similar studies with much bigger samples and other contexts would be interesting to try to be more assured on whether the poorest actually want credit so that we can answer whether we should target them or not.

The factor analysis results do not show a well-structured solution. Even though this happens commonly, it is still necessary to look out for potential biases in the welfare indicators used in the factor analysis. There might be better set of welfare indicators that are worth searching for and that produce a better-structured solution. It would be interesting how different set of welfare indicators affect the whole results (in both factor analysis and *probit* model), whether it is supporting or opposing the findings of this study.

This study also limits the sampling process to only include households from low to medium high class; rich households are not included here. In this case, the use of BPS welfare indicators is convenient as it embrace all basic welfare dimensions, suitable with the situation of the society in the place of study, and its scoring method make classification of poorest, poor, medium low, and medium high family becomes clear. This also makes descriptive analysis process very practical and still providing valuable insights. However, it would be also interesting to try out similar studies using a wider range of sample regarding household classes of well-being, so that we can see whether the welfare variables show similar stories. Then BPS welfare indicators will not be valid anymore because the scoring method is only 0 and 1, making rich households look the same like medium high households. So basically, there is no point of widening sample range if we still use BPS welfare indicators. Therefore, the search and use of other alternatives as welfare measures would be a more urgent agenda when we want to widen the sample range in the future research.

6.2 Conclusions

This study uses the same set of explanatory variables in *credit demand* and *credit participation* model. Given the nature of *credit demand* as an off-market behavior and *credit participation* as an on-market behavior, we can then conclude the force that makes the results of *credit demand* and *credit participation* model differ significantly is found on the supply side. Therefore we can interpret significant variables in *credit participation* (and not in credit demand) as being variables that explain the supply forces in credit market.

What matters for credit demand are not what matters for credit participation

The results clearly show how different the significant variables in *credit demand* and *credit participation* model are. Most of the significant control variables for credit demand are not significant for credit participation. On welfare variables, *job and education* is not significant for credit demand but is for *credit participation*; and *clothing and asset* is the most important positive variable for *credit participation*; but it is not the most important for *credit demand*, moreover, it is actually significantly negative. Only *housing* that is significant and positively signed for both *credit demand* and participation, nevertheless, the coefficient shows that it is more influential for *credit demand* than for *credit participation.*

The most important variable for *credit participation* is among the welfare variables, but the most important variable for *credit demand* is not among them. The possession of business idea (*bplan)* is the most important factor for *credit demand*, but it is not important for *credit participation.* Besides business idea, number of male worker, and telephone connection status are also important, that are also not important at all for *credit participation. Clothing and asset* is found to be the most important variable for *credit participation.* These findings indicate two things. First, there is a market mismatch, where many households who want credit service still do not have the opportunity to enjoy it. *Second,* among low to medium class households – as captured by the sample of this study - supply forces are dominant in the credit market.

That microcredit is a major weapon in war against poverty is now part of conventional wisdom. But it seems like the gun has not been directed to the main target. Our next challenge is to converge the factors of credit demand and of credit participation, so that what matters for credit demand are also what matters for credit participation. As supply forces are dominant in the credit market, the most effective intervention should come from the supply side. It does not mean we have to push the supply side to not care about *clothing and asset* or other factors that can be relevant for the risks that lenders face. But at least we can promote the supply side to start taking household *business*

idea into account. On the demand side, we can spread credit knowledge and basic education more actively, so that more households can have better picture about credit market before they decide to demand the service, and that more households become able to read, write, and calculate properly.

The main target is not the poorest

Our results suggest that *housing* and *clothing and asset* represent different state of welfare, where in this case *housing* is representing a lower state of welfare compared to what is represented by *clothing and asset*[28]. The *probit* results show that the coefficient of *housing* is positive in both the *credit demand* and *participation* models. This result suggests, the poorer the household are the lower the credit demand, therefore the poorest the household are the lowest the credit demand. However, the *probit* model also results negative coefficient for *clothing and asset,* implying that the net effect of further higher welfare on credit demand *might* be negative. One possible explanation, put forward in chapter 5, is that the negative sign may indicate at low levels of the *clothing and asset* variable, households start to think that they are not in urgent situation to borrow, therefore their credit demand gets lower as they get "richer" along this dimension.

If we apply this result to the debate presented in chapter 1, we can say that this thesis support the *first group* arguing that there is no vast effective demand from the poorest. So we actually do not need to target the poorest, not only because it is very risky for credit supplier, but also because they do not want it. This result also confirms Robinson (1999) argument saying that the poorest does not need credit, instead they need subsidy to help them fulfilling basic needs such as food continuity and shelter.

The *probit* results indicate that the highest *credit demand* might lie among the poor and the medium-low household. But if we re-look figure 5.3 in the descriptive analysis section, we can see that actually the highest *credit demand* lies among the poor. They are the group with the highest demand-participation gap[29], so the poor should be our main target in the process of converging the factors of *credit demand* and *credit participation.* By doing so, hopefully we can put poverty into the museum before the microcredit movement celebrate its first century.

[28] The dataset of this study shows that most of households who has score 1 on *newcloth* and *asset* also have score 1 in most of their house condition variables, confirming that *clothing and asset* is representing higher state of welfare (see appendix 5).
[29] Credit demand rate minus credit participation rate. Rate here is percentage of the household in each welfare group, that demand and/or participate credit.

Those who are willing to borrow are those who are willing to pay

This is the last conclusion of this study that is derived from the result of our extended analysis (chapter 5.4). The results only show four, out of seven significant variables for *credit demand,* which are also significant for *willingness to pay.* All four variables have the same coefficient signs with results in *credit demand* model. This is notable evidence that the explanatory variables are driving *credit demand* and *willingness to pay* to the same direction. Therefore we can conclude that the same factors that explain willingness to borrow are those who also explain willingness to pay.

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Appendix 1: the questionnaire

Field Work Questionnaire
"Does the poorest want credit?"

A. Identification

1 Respondent code :
2 District name :
3 Birth date :
4 Place of Birth :
5 Sex :
6 Tribe :
7 Living period in the village :
8 Address :
9 Distance from the nearest MFI :

B. Respondent's Profile (check one of the available options)

1 What is respondent's marital status?

1) Married and living together
2) Married but spouse working away
3) widow/widower
4) divorced
5) single

2 How many members do you have in the household? ( )

3.a Please descripe your household profile by filling the table below.

No	Name	Sex	Age	Status in the household	Category of Occupation	Occupation	Income
1							/(day/month)
2							/(day/month)
3							/(day/month)
4							/(day/month)
5							/(day/month)
6							/(day/month)
7							/(day/month)
8							/(day/month)
9							/(day/month)
Total household income							/(day/month)

Coding

* Status in the household: 1 = Head of household; 2 = Wife/husband of the household head; 3 = Son/daughter; 4 = son/daughter in law; 5 = grandchildren; 6 = other:
* Category of occupation: 0= unemployed/dependant; 1=wage labor; 2=self-employed without any employee;
3= self-employed with at least one employee ; 4=employee (salary labor); 5= pensionary; 6) others, please specify.
*Occupation: 0=housewife/unemployed/dependant; 1=farmer; 2= farm labor; 3=other labor; 4=fisherman; 5=trader; 6=self-employed, manufacture sector
7= sef-employed, service sector; 8=public servant; 9=private company's employee

3.b Based on your household income profile, do you categorize your household as a poor household?

1) No
2) Yes

4 *Do you have a house?*

1) No, but live in somebody's house (for free)
2) No, but renting a house on your own
3) Yes, live in inherited house
4) Yes, live in own-build/bought house

5 What kind of house do you have?

5.a) How much is the size of the floor?
1) less than 8 m2
2) 8 m2 or more

5.b) What is the type of material of (most of) the walls?
1) wood
2) half cement
3) cement

5.c) What is the type of material of (most of) the floor?
1) wood
2) half cement
3) cement
4) porcelain

5.d) What is the type of material of (most of) the roof?
1) *rumbia* (leaves of palm tree)
2) Zinc or *sirap* (thin-shaped wood)
3) roof tile

5.e) Is there any toilet and shower facilities in the house?
1) No
2) Separated-open latrine
3) In house WC

5.f) What is the main source of drinking or cooking water in the house?
1) mountain/river
2) common well
3) own-well
4) storing rain water, amount of water tank:
5) buy clean water
6) customer of water utility service (PDAM)

5.g) What is the main source of non-consumption water (for washing, showering, etc) in the house?
1) mountain/river
2) common well
3) own-well
4) storing rain water, amount of water tank:
5) buy clean water
6) customer of water utility service (PDAM)

5.h) What is the main fuel for cooking in the house?
1) firewoods
2) kerosene
3) gas

5.i) Do you have electricity connection in the house?
1) No
2) Yes, but joining neighbour's or family's connection
3) Yes, own connection

5.j) Do you have a landline telephone in the house?
1) No
2) Yes, how much (approximately) do you pay per month for the phone expense:

6 How is your income and consumption profile?

6.a) How many times do respondent and each other family members eat meal per day?
1) less than twice
2) twice or more

6.b) How many time do respondent and family member consume animal protein (meat, chicken, or fish) per week?
1) not more than once per week
2) more than once per week, specify:

6.c) How many new pair of clothing do respondent and family member buy per year?
1) not more than one pair per year
2) more than one pair, specify:

6.d) How much is the proportion of foods expenditure from household's total income?
1) 80% or more
2) less than 80%, specify (approximately):

6.e) What type of food that the household can consume without buying them?
(check one or some options available below)
☐ *Roots, specify:* *(e.g: cassava, etc)*
☐ *Rice*
☐ *Meat (fish or beef), specify:*
☐ *Vegetables, specify:*
☐ *Fruits, specify:*
☐ *Other, jelaskan:*

6.f) Besides expenditure for food, on what purpose you spend the money for:
☐ *Housing (electricity, gas and/or kerosene), how much is the expense per month:*
☐ *Toilet, shower, and washing equipments, how much is the expense per month:*
☐ *Transportation, how much is the expense per month:*
☐ *Education (pocket money for the children), how much is the expense per month:*
☐ *Communication (mobile phone), how much is the expense per month:*
☐ *Other:* *(e.g: vacation, etc)*

6.h) How much do you pay for electrecity expense per month?
1) less than IDR 50,000 per month
2) IDR 50,000 till < 100,000
3) IDR 100,000 till < 200,000
4) IDR 200,000 or more, how much approximately:

7 Asset ownership profile

No	Type of Asset	Amount	Year of ownership	Buying Price	Prediction of current price	Paper (certificate) of ownership	Productivity status	Additional income derived from the asset *(as addition from previous reported income)*
1	General Asset							
	* Land			/m2	/m2			/(mth/year)
	* Gold			/gr	/gr			/(mth/year)
	* Other asset (house, time deposits, etc)							
	1)							/(mth/year)
	2)							/(mth/year)
2	Cattles/animals (coes, goat, avians, etc)							
	1)							/(mth/year)
	2)							/(mth/year)
	3)							/(mth/year)
3	Machinery/business equipment							
	1)							/(mth/year)
	2)							/(mth/year)
	3)							/(mth/year)
	4)							/(mth/year)
4	Transportation vehicle							
	1)							/(mth/year)
	2)							/(mth/year)
	3)							/(mth/year)
5	Housing valuable furnitures							
	1)							/(mth/year)
	2)							/(mth/year)
	3)							/(mth/year)

C. Respondent's credit awareness profile

8) Can you shortly describe the meaning of the term "credit"?
1) No
2) Yes, explain:

9.a) Based on your knowledge, what are the institutions that provide credit services?
Specify: 1) _ _ _ _ _ _ _ _ _ _ _ _ _ _
2) _ _ _ _ _ _ _ _ _ _ _ _ _ _
3) _ _ _ _ _ _ _ _ _ _ _ _ _ _

9.b) Are you now registered as customer in one of banks or cooperations?
1) No
2) Yes

10) Do you know what microcredit is?
1) No
2) Yes, (micro credit is:)

11) Please mention at least one formal institution that provides microcredit in the region.
1) No
2) Yes (specify the name of known institutions:)

12) Do you know how much the interest rate it (the mentioned MFI) charges
1) No
2) Yes (specify the interest rate:)

13) Do you know at least one of the procedures to apply for credit there (the mentioned MFI)?
1) No
2) Yes (specify one known requirement:)

14.a) Have you done any credit transaction (non-cash, with installment) before?
1) No
2) Yes (what did you buy:)

14.b) Do you have any credit (borrow some cash) history before?
1) No
2) Yes (for what purpose:)

If Yes, please fill out table below; if No, please continue to question 16

No	When (year)	credit information	Proposed amount & interest rate	Intended use	From (What or who)	Approved amount	Use of credit	Period of loan	impact on HH welfare (1 - 5)
1									
2									
3									
4									

Coding:

* credit information: 1 = self-searching; 2 = from friend/relatives; 3 = offered
* from: 1 = relatives or friends; 2 = local money lender; 3 = cooperation; 4 = bank;
* intended use *and* use of credit: 1 = consumption purpose (specify, eg: children school equipment, sickness, house renovation, etc); 2 = to start-up business; 3 = To expand existing business; 4 = working capital
* in approved amount: write "0" when application is rejected
* impact: 1 = very bad; 2 = bad; 3 = neutral (no significant impact); 4 = good; 5 = very good

15 Why haven't you ever applied any credit before?

1) because he/she doesn't know about available credit service
2) because he/she is sure that their credit application won't be approved
3) because he/she doesn't need it (still have their own capital or savings)
4) because the interest rate is considered too high, specify how much was the interest rate:
5) because he/she doesn't want it (fear of risk)
6) rejected

16 For respondent whose credit application is ever rejected, what was the reason from the credit institution at that time?

1) your business was considered as risky
2) you can't fulfil the collateral requirement
3) you don't have a stable and certain income
4) you considered the interest rate was too high, so you cancel the application
5) other, specify:

17 Do you have any business idea that is not yet implemented because of capital constraint?

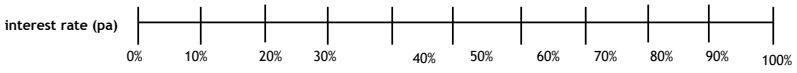
1) No
2) Yes (explain the plan:)

18 If the answer of question 17 is Yes, please answer the questions below:

* *Is the plan closely related to your daily activities so far?* .....
* *How much capital (approximately) do you need for starting the business?* .....
* *How long time do you need to reach break even point?* .....
* *How much the monthly omzet would be (approximately)?* .....
* *How much would be the share of the omzet that you can spare for paying the credit installment? (in case the business is financed by credit)?* .....

19 If credit service is available for you, will you borrow?

(Make a circle on your maximum interest rate. For example: If you make a circle on 50%, it means at 50% level of interest rate you will be no longer interested to utilize the credit; and if you make a circle on 0%, it means you don't have any interest to borrow at all)



20 Why do you want to borrow?

(give number based on your subjective rank of importance of the reasons)

☐ Because you are sure that credit can increase your household level of welfare
☐ Because you are sure that credit can increase your household quality of life (ex: use credit to buy TV or renovate house)
☐ Because you're sure you can pay it back
☐ other:

thank you very much :)

Appendix 2: Factor analysis result

Factor analysis result for BPS set of welfare variables

```
factor  edu1 hhhjob hsize hwall1 hfloor1 hroof1 toilet1 water firing1 elec  meals meatcons
> newcloth asset1, pcf(obs=104)


Factor analysis/correlation                       Number of obs    =      104
    Method: principal-component factors           Retained factors =        4
    Rotation: (unrotated)                         Number of params =       50

    --------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+------------------------------------------------------------
        Factor1  |      4.43522      3.04664            0.3168       0.3168
        Factor2  |      1.38858      0.22311            0.0992       0.4160
        Factor3  |      1.16547      0.06876            0.0832       0.4992
        Factor4  |      1.09671      0.12984            0.0783       0.5776
        Factor5  |      0.96687      0.07325            0.0691       0.6466
        Factor6  |      0.89362      0.17743            0.0638       0.7105
        Factor7  |      0.71619      0.06101            0.0512       0.7616
        Factor8  |      0.65518      0.01881            0.0468       0.8084
        Factor9  |      0.63637      0.09023            0.0455       0.8539
       Factor10  |      0.54614      0.06173            0.0390       0.8929
       Factor11  |      0.48441      0.10734            0.0346       0.9275
       Factor12  |      0.37707      0.02532            0.0269       0.9544
       Factor13  |      0.35176      0.06534            0.0251       0.9795
       Factor14  |      0.28642            .            0.0205       1.0000
    --------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(91) =  383.33 Prob>chi2 = 0.0000


. rotate

Rotated factor loadings (pattern matrix) and unique variances

    ---------------------------------------------------------------------
        Variable |  Factor1   Factor2   Factor3   Factor4 |   Uniqueness
    -------------+-------------------------------------+--------------
            edu1 |   0.5930   -0.0042    0.2077    0.3882 |      0.4545
          hhhjob |   0.6032    0.3615    0.0787    0.0176 |      0.4989
           hsize |  -0.0280   -0.0431   -0.1488    0.8047 |      0.3276
          hwall1 |   0.3830    0.1923    0.6114    0.1342 |      0.4244
         hfloor1 |   0.8004    0.0678    0.1367    0.0499 |      0.3336
          hroof1 |   0.0670    0.1831    0.7608    0.0493 |      0.3808
         toilet1 |   0.2898   -0.0278    0.6884   -0.0639 |      0.4374
           water |   0.0145    0.5355    0.0764    0.1401 |      0.6875
         firing1 |   0.6991    0.4074    0.1385   -0.0021 |      0.3260
            elec |  -0.1006    0.0732    0.5373   -0.1739 |      0.6656
           meals |   0.2558    0.7743   -0.0533   -0.1143 |      0.3191
        meatcons |   0.1000    0.7492    0.2940    0.1861 |      0.3076
        newcloth |   0.2743    0.2949    0.3859    0.5367 |      0.4007
          asset1 |   0.2435    0.4902    0.2774    0.5228 |      0.3501
    ---------------------------------------------------------------------


. predict welfare1 welfare2 welfare3 welfare4
(regression scoring assumed)

Scoring coefficients (method = regression; based on varimax rotated factors)

    ----------------------------------------------------
        Variable |  Factor1   Factor2   Factor3   Factor4
    -------------+--------------------------------------
            edu1 |   0.30539  -0.21384   0.00009   0.22025
          hhhjob |   0.29811   0.08748  -0.11857  -0.10561
           hsize |  -0.07885  -0.09609  -0.10535   0.63400
          hwall1 |   0.07265  -0.05847   0.27154   0.01480
         hfloor1 |   0.48188  -0.16533  -0.08339  -0.07260
          hroof1 |  -0.15352  -0.00101   0.42931  -0.01516
         toilet1 |   0.07151  -0.17034   0.37267  -0.10324
           water |  -0.14744   0.32637  -0.03156   0.04153
         firing1 |   0.34174   0.08999  -0.10609  -0.13988
            elec |  -0.16764   0.02074   0.34619  -0.14690
           meals |   0.01389   0.47594  -0.18274  -0.20840
        meatcons |  -0.18884   0.41418   0.05572   0.03482
        newcloth |  -0.02887   0.01831   0.12782   0.33386
          asset1 |  -0.07180   0.17146   0.04147   0.30756
    ----------------------------------------------------
```

Factor analysis result for Stylized-1 set of welfare variables

```
. factor  edu hhhjob hsize hwall hfloor hroof toilet water firing elec  meals meatcons newclo
> th asset, pcf (obs=104)


Factor analysis/correlation                       Number of obs    =      104
    Method: principal-component factors           Retained factors =        3
    Rotation: (unrotated)                         Number of params =       39

    --------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+------------------------------------------------------------
        Factor1  |      4.75358      3.33372            0.3395       0.3395
        Factor2  |      1.41985      0.31595            0.1014       0.4410
        Factor3  |      1.10390      0.13023            0.0789       0.5198
        Factor4  |      0.97367      0.05098            0.0695       0.5894
        Factor5  |      0.92270      0.03233            0.0659       0.6553
        Factor6  |      0.89036      0.11120            0.0636       0.7189
        Factor7  |      0.77917      0.08370            0.0557       0.7745
        Factor8  |      0.69546      0.08397            0.0497       0.8242
        Factor9  |      0.61149      0.06611            0.0437       0.8679
       Factor10  |      0.54538      0.08183            0.0390       0.9068
       Factor11  |      0.46355      0.12580            0.0331       0.9399
       Factor12  |      0.33775      0.05123            0.0241       0.9641
       Factor13  |      0.28652      0.06991            0.0205       0.9845
       Factor14  |      0.21661            .            0.0155       1.0000
    --------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(91) =  449.13 Prob>chi2 = 0.0000


. rotate


Rotated factor loadings (pattern matrix) and unique variances

    -------------------------------------------------------------
        Variable |  Factor1   Factor2   Factor3 |   Uniqueness
    -------------+------------------------------+--------------
             edu |   0.4886    0.4199   -0.0970 |      0.5756
          hhhjob |   0.2872    0.5782    0.0090 |      0.5831
           hsize |  -0.0637   -0.0062    0.8549 |      0.2651
           hwall |   0.6496    0.3623    0.1404 |      0.4271
          hfloor |   0.5134    0.2666    0.3839 |      0.5179
           hroof |   0.6859    0.1247   -0.1529 |      0.4906
          toilet |   0.7448    0.0180   -0.1200 |      0.4305
           water |   0.0523    0.5413   -0.0357 |      0.7029
          firing |   0.6422    0.4424    0.1672 |      0.3639
            elec |   0.4781   -0.1447   -0.1189 |      0.7364
           meals |   0.0168    0.7496   -0.0587 |      0.4344
        meatcons |   0.2266    0.7244   -0.0131 |      0.4237
        newcloth |   0.5217    0.3722    0.3827 |      0.4428
           asset |   0.2725    0.6924    0.3430 |      0.3287
    -------------------------------------------------------------


. predict welfare5 welfare6 welfare7
(regression scoring assumed)

Scoring coefficients (method = regression; based on varimax rotated factors)

    --------------------------------------------
        Variable |  Factor1   Factor2   Factor3
    -------------+------------------------------
             edu |   0.12167   0.09927  -0.14810
          hhhjob |  -0.01472   0.21689  -0.07345
           hsize |  -0.04789  -0.09690   0.73091
           hwall |   0.20558  -0.00148   0.05791
          hfloor |   0.16118  -0.04627   0.28093
           hroof |   0.29005  -0.09280  -0.16234
          toilet |   0.34386  -0.16584  -0.12199
           water |  -0.11325   0.26410  -0.10133
          firing |   0.18106   0.03734   0.07061
            elec |   0.26163  -0.17983  -0.09385
           meals |  -0.18247   0.38115  -0.14692
        meatcons |  -0.07973   0.30895  -0.10967
        newcloth |   0.13808   0.00498   0.26612
           asset |  -0.05851   0.23521   0.19687
    --------------------------------------------
```

Factor analysis result for Stylized-2 set of welfare variables

```
. factor  edu hhhjob hsize hwall hfloor hroof toilet water firing elecbil  meals meatcons new
> cloth asset, pcf (obs=104)

Factor analysis/correlation                       Number of obs    =      104
    Method: principal-component factors           Retained factors =        4
    Rotation: (unrotated)                         Number of params =       50

    --------------------------------------------------------------------------
         Factor  |   Eigenvalue   Difference        Proportion   Cumulative
    -------------+------------------------------------------------------------
        Factor1  |      5.04955      3.70859            0.3607       0.3607
        Factor2  |      1.34096      0.22323            0.0958       0.4565
        Factor3  |      1.11773      0.02970            0.0798       0.5363
        Factor4  |      1.08803      0.18942            0.0777       0.6140
        Factor5  |      0.89862      0.10121            0.0642       0.6782
        Factor6  |      0.79741      0.09169            0.0570       0.7352
        Factor7  |      0.70572      0.07340            0.0504       0.7856
        Factor8  |      0.63232      0.05021            0.0452       0.8307
        Factor9  |      0.58211      0.08017            0.0416       0.8723
       Factor10  |      0.50194      0.06054            0.0359       0.9082
       Factor11  |      0.44140      0.09078            0.0315       0.9397
       Factor12  |      0.35062      0.07244            0.0250       0.9647
       Factor13  |      0.27818      0.06274            0.0199       0.9846
       Factor14  |      0.21543            .            0.0154       1.0000
    --------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(91) =  486.85 Prob>chi2 = 0.0000


. rotate


Rotated factor loadings (pattern matrix) and unique variances

    -------------------------------------------------------------------------
        Variable |  Factor1   Factor2   Factor3   Factor4 |   Uniqueness
    -------------+-----------------------------------------+---------------
             edu |   0.1326    0.5107    0.5758   -0.0313 |      0.3890
          hhhjob |   0.4791    0.2687    0.3131    0.0145 |      0.6000
           hsize |  -0.0325   -0.0711    0.0507    0.8831 |      0.2114
           hwall |   0.2689    0.6575    0.2782    0.1520 |      0.3949
          hfloor |   0.3849    0.4929   -0.0672    0.3461 |      0.4846
           hroof |   0.0930    0.7091    0.1354   -0.1576 |      0.4453
          toilet |   0.0358    0.7656   -0.0078   -0.1310 |      0.3954
           water |   0.1304    0.0219    0.8321    0.0880 |      0.2824
          firing |   0.5543    0.5873    0.0387    0.1358 |      0.3279
         elecbil |   0.6850    0.3529   -0.1981   -0.0374 |      0.3656
           meals |   0.8049   -0.0580    0.1653   -0.1003 |      0.3115
        meatcons |   0.6598    0.1705    0.3559   -0.0169 |      0.4087
        newcloth |   0.3677    0.5042    0.1494    0.3757 |      0.4470
           asset |   0.6622    0.2522    0.2384    0.3179 |      0.3400
    -------------------------------------------------------------------------


. predict welfare8 welfare9 welfare10 welfare11
(regression scoring assumed)

Scoring coefficients (method = regression; based on varimax rotated factors)

    ------------------------------------------------------
        Variable |  Factor1   Factor2   Factor3   Factor4
    -------------+----------------------------------------
             edu | -0.15127   0.16401   0.39948  -0.08575
          hhhjob |  0.14034  -0.01936   0.14734  -0.06027
           hsize | -0.09687  -0.05488   0.00400   0.75697
           hwall | -0.08146   0.23656   0.09981   0.07150
          hfloor |  0.06319   0.15815  -0.20019   0.25006
           hroof | -0.13589   0.33192   0.02271  -0.16830
          toilet | -0.15998   0.39203  -0.09530  -0.13272
           water | -0.08407  -0.12206   0.66452   0.01248
          firing |  0.13535   0.15650  -0.13928   0.04486
         elecbil |  0.32410   0.03369  -0.32111  -0.09697
           meals |  0.43870  -0.25137   0.01403  -0.17483
        meatcons |  0.26039  -0.12049   0.16581  -0.10549
        newcloth |  0.01114   0.14210  -0.01960   0.26404
           asset |  0.22740  -0.07250   0.03793   0.18563
    ------------------------------------------------------
```

Appendix 3: Probit model and OLS result

Correlation matrix

```
. corr hhhsex age hhsize cw1 depratio presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset lland land
> assetr offfarm telephon elecbil  workerfm workerm bplan
(obs=87)
```

	hhhsex	age	hhsize	cw1	depratio	presence	distance	welfare1	welfare2	welfare3	welfare4
hhhsex	1.0000										
age	0.2374	1.0000									
hhsize	-0.1557	0.0322	1.0000								
cw1	-0.0794	-0.1342	0.2889	1.0000							
depratio	-0.1541	-0.2485	0.4854	0.8741	1.0000						
presence	0.0734	0.2945	0.1094	0.1240	0.1058	1.0000					
distance	-0.1875	-0.0336	-0.0450	-0.0552	-0.0353	-0.0177	1.0000				
welfare1	-0.2853	-0.1306	-0.0731	0.0648	0.0577	-0.1065	-0.2350	1.0000			
welfare2	-0.0450	-0.0036	0.0972	-0.1075	-0.0223	-0.1536	0.2505	0.0071	1.0000		
welfare3	0.0146	0.1045	0.2014	0.2992	0.3433	0.1518	-0.2736	0.0094	-0.0288	1.0000	
welfare4	0.0066	-0.4275	0.0360	-0.1794	-0.1018	-0.3939	0.1141	0.1041	0.0469	0.0010	1.0000
mfiknowl	-0.2723	-0.2463	0.1050	0.0586	0.2135	-0.1772	0.0870	0.2235	0.3406	0.2943	0.2675
ltotasset	-0.0866	0.1499	-0.0481	-0.1369	-0.0895	-0.2201	0.1590	0.3785	0.4227	0.1597	0.1945
lland	-0.1374	0.1911	-0.0844	-0.1797	-0.1117	-0.1519	0.1411	0.2869	0.2635	0.0957	0.0820
landassetr	-0.1336	0.1255	-0.1519	-0.0733	-0.0295	0.1414	0.0186	-0.2070	-0.3979	-0.1869	-0.3414
offfarm	-0.2000	-0.1113	0.1709	0.2321	0.2572	0.0947	-0.3394	0.3708	0.0812	0.2996	-0.0207
telephon	-0.0439	0.0491	0.0927	-0.0935	0.0370	-0.1518	-0.1219	0.3711	0.4741	0.1139	0.0045
elecbil	-0.1761	-0.1215	0.1484	0.0411	0.1805	-0.0238	-0.2508	0.3379	0.3387	0.3602	-0.0010
workerfm	0.1722	0.1501	0.1212	-0.5566	-0.4647	0.0044	0.0349	-0.1787	0.1046	-0.1145	0.0580
workerm	-0.2066	0.0840	0.4552	-0.2624	-0.1322	0.0048	0.0847	0.0075	0.1818	-0.0556	0.1233
bplan	-0.1029	-0.1758	0.2007	-0.0133	0.0530	0.0085	0.0189	-0.0603	-0.0137	0.0009	0.3574

	mfiknowl	ltotas~t	lland	landas~r	offfarm	telephon	elecbil	workerfm	workerm	bplan
mfiknowl	1.0000									
ltotasset	0.4544	1.0000								
lland	0.3815	0.9145	1.0000							
landassetr	-0.1860	-0.1506	0.2398	1.0000						
offfarm	0.3177	0.1172	0.0354	-0.2214	1.0000					
telephon	0.3450	0.4329	0.2920	-0.3087	0.2429	1.0000				
elecbil	0.4503	0.3626	0.3085	-0.1739	0.3840	0.4669	1.0000			
workerfm	-0.1234	0.0944	0.1558	0.1248	-0.1884	0.0971	-0.0267	1.0000		
workerm	0.1312	0.0777	-0.0060	-0.2531	0.1768	0.0687	0.0673	-0.0479	1.0000	
bplan	0.2061	0.0089	-0.0129	-0.1586	0.1304	-0.0694	0.1106	0.0565	0.1659	1.0000

Probit result for credit participation

The comparison of *full models* that alternately use *hhsize, depratio, lland, landassetr, and ltotasset.* Model including *hhsize* and *ltotasset* is chosen, then the same set of explanatory variables are used for credit demand model.

```
. probit creditprop1 hhhsex age depratio presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset offfarm
>  telephon elecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -65.437865
Iteration 1:   log pseudolikelihood =   -46.640315
Iteration 2:   log pseudolikelihood =   -44.332329
Iteration 3:   log pseudolikelihood =    -44.00082
Iteration 4:   log pseudolikelihood =   -43.993414
Iteration 5:   log pseudolikelihood =   -43.993408

Probit regression                                 Number of obs   =             98
                                                  Wald chi2(17)   =          29.89
                                                  Prob > chi2     =         0.0271
Log pseudolikelihood =  -43.993408                Pseudo R2       =         0.3277
```

creditprop1	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhhsex	.3798047	.5073558	0.75	0.454	-.6145944	1.374204
age	.0069842	.0233302	0.30	0.765	-.0387422	.0527106
depratio	1.250665	1.039311	1.20	0.229	-.7863476	3.287678
presence	-.0022877	.0116909	-0.20	0.845	-.0252015	.0206262
distance	.193945	.0994038	1.95	0.051	-.0008829	.3887729
welfare1	.580746	.2171555	2.67	0.007	.1551291	1.006363
welfare2	.0509437	.1912696	0.27	0.790	-.3239379	.4258252
welfare3	.3588591	.1851689	1.94	0.053	-.0040652	.7217834
welfare4	.8533831	.3396313	2.51	0.012	.187718	1.519048
mfiknowl	.1942144	.1055338	1.84	0.066	-.0126281	.4010568
ltotasset	-.009315	.1834447	-0.05	0.960	-.36886	.35023
offfarm	-.2476022	.5040303	-0.49	0.623	-1.235483	.740279
telephon	.570111	.468304	1.22	0.223	-.3477479	1.48797
elecbil	-.5113637	.2144275	-2.38	0.017	-.9316339	-.0910935
workerfm	.3736617	.3154298	1.18	0.236	-.2445694	.9918928
workerm	-.0239189	.2725535	-0.09	0.930	-.558114	.5102762
bplan	.5143895	.3421598	1.50	0.133	-.1562314	1.18501
_cons	-2.250375	1.954264	-1.15	0.250	-6.080661	1.579912

```
. probit creditprop1 hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl landassetr offfarm
> telephon elecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -60.631338
Iteration 1:   log pseudolikelihood =   -43.139667
Iteration 2:   log pseudolikelihood =   -40.695595
Iteration 3:   log pseudolikelihood =   -40.231542
Iteration 4:   log pseudolikelihood =   -40.218701
Iteration 5:   log pseudolikelihood =   -40.218689

Probit regression                                 Number of obs   =             91
                                                  Wald chi2(17)   =          27.70
                                                  Prob > chi2     =         0.0485
Log pseudolikelihood =  -40.218689                Pseudo R2       =         0.3367

------------------------------------------------------------------------------
             |               Robust
  creditprop1|      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |    .7363582   .5463892     1.35   0.178    -.3345449    1.807261
         age |   -.0060592   .0195648    -0.31   0.757    -.0444055     .032287
      hhsize |    .1624842   .1143135     1.42   0.155    -.0615661    .3865345
    presence |   -.0053713   .0118208    -0.45   0.650    -.0285395     .017797
    distance |    .2307522    .105826     2.18   0.029     .0233372    .4381673
    welfare1 |    .6175507   .2035574     3.03   0.002     .2185856    1.016516
    welfare2 |    .1473069   .2095833     0.70   0.482    -.2634687    .5580825
    welfare3 |    .4938902   .1870462     2.64   0.008     .1272864     .860494
    welfare4 |    .9342644   .3763212     2.48   0.013     .1966884     1.67184
    mfiknowl |    .1659555    .110814     1.50   0.134    -.0512359    .3831469
  landassetr |    .9486336   .7092408     1.34   0.181    -.4414528    2.338872
     offfarm |   -.1779105   .5240408    -0.34   0.734    -1.205012    .8491906
    telephon |    .6467476   .5224844     1.24   0.216     -.377303    1.670798
     elecbil |   -.4868204   .2280972    -2.13   0.033    -.9338827   -.0397581
    workerfm |    .0916211   .2946102     0.31   0.756    -.4858043    .6690465
     workerm |   -.1235594   .2646547    -0.47   0.641     -.642273    .3951543
       bplan |    .4993106   .3461828     1.44   0.149    -.1791952    1.177816
       _cons |   -2.221889   1.366792    -1.63   0.104    -4.900752    .4569728
------------------------------------------------------------------------------

Note: 1 failure and 0 successes completely determined.

. probit creditprop1 hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl lland offfarm telep
> hon elecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -58.632151
Iteration 1:   log pseudolikelihood =    -42.08097
Iteration 2:   log pseudolikelihood =   -40.066242
Iteration 3:   log pseudolikelihood =   -39.727847
Iteration 4:   log pseudolikelihood =   -39.720833
Iteration 5:   log pseudolikelihood =   -39.720829

Probit regression                                 Number of obs   =             87
                                                  Wald chi2(17)   =          28.87
                                                  Prob > chi2     =         0.0358
Log pseudolikelihood =  -39.720829                Pseudo R2       =         0.3225

------------------------------------------------------------------------------
             |               Robust
  creditprop1|      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |    .4469385   .4950473     0.90   0.367    -.5233363    1.417213
         age |   -.0085803   .0211046    -0.41   0.684    -.0499445    .0327839
      hhsize |     .137972   .1145907     1.20   0.229    -.0866216    .3625656
    presence |   -.0037678   .0121113    -0.31   0.756    -.0275056     .01997
    distance |    .2009157   .1009696     1.99   0.047     .0030189    .3988124
    welfare1 |    .5156218   .2182917     2.36   0.018      .087778    .9434657
    welfare2 |    .0281127   .2032952     0.14   0.890    -.3703385    .4265639
    welfare3 |    .4321518   .1829806     2.36   0.018     .0735164    .7907872
    welfare4 |    .8014107   .3397024     2.36   0.018     .1356062    1.467215
    mfiknowl |    .1659263   .1161728     1.43   0.153    -.0617682    .3936208
       lland |   -.0101332     .16813    -0.06   0.952    -.3396619    .3193955
     offfarm |   -.2675771   .5098242    -0.52   0.600    -1.266814    .7316601
    telephon |    .6586992   .5386596     1.22   0.221    -.3970543    1.714453
     elecbil |   -.3892801   .2261948    -1.72   0.085    -.8326138    .0540537
    workerfm |    .1693901   .2938037     0.58   0.564    -.4064545    .7452347
     workerm |   -.1516062   .2620125    -0.58   0.563    -.6651413    .3619289
       bplan |    .3681477   .3512375     1.05   0.295    -.3202651     1.05656
       _cons |   -1.144205   1.734658    -0.66   0.510    -4.544072    2.255662
------------------------------------------------------------------------------

. probit creditprop1 hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset offfarm t
> elephon elecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -65.437865
Iteration 1:   log pseudolikelihood =   -46.526769
Iteration 2:   log pseudolikelihood =   -44.227019
Iteration 3:   log pseudolikelihood =   -43.912641
Iteration 4:   log pseudolikelihood =   -43.907079
Iteration 5:   log pseudolikelihood =   -43.907076

Probit regression                                 Number of obs   =             98
                                                  Wald chi2(17)   =          29.91
                                                  Prob > chi2     =         0.0270
Log pseudolikelihood =  -43.907076                Pseudo R2       =         0.3290

------------------------------------------------------------------------------
             |               Robust
  creditprop1|      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |    .4885602   .5038822     0.97   0.332    -.4990308    1.476151
         age |    .0002676   .0222109     0.01   0.990     -.043265    .0438002
      hhsize |    .1560271   .1069527     1.46   0.145    -.0535964    .3656505
    presence |    -.002383   .0116538    -0.20   0.838     -.025224    .0204579
    distance |    .2066566   .1015766     2.03   0.042     .0075701    .4057431
    welfare1 |    .5908388   .2161349     2.73   0.006     .1672221    1.014456
    welfare2 |     .031697   .1932271     0.16   0.870    -.3470211    .4104152
    welfare3 |     .38827   .1821998     2.13   0.033     .0311649    .7453751
    welfare4 |    .7748144   .3150048     2.46   0.014     .1574162    1.392213
    mfiknowl |    .2032476   .1066627     1.91   0.057    -.0058074    .4123026
   ltotasset |    .0090486    .186274     0.05   0.961    -.3560417     .374139
     offfarm |   -.2361146   .5004965    -0.47   0.637     -1.21707    .7448406
    telephon |    .6052431   .4787455     1.26   0.206    -.3330809    1.543567
     elecbil |     -.5374    .214047    -2.51   0.012    -.9569245   -.1178756
    workerfm |    .1296618   .2763608     0.47   0.639    -.4119954     .671319
     workerm |   -.2370125   .2560953    -0.93   0.355      -.73895     .264925
       bplan |    .5424979   .3399705     1.60   0.111    -.1238321    1.208828
       _cons |   -1.798768   1.742624    -1.03   0.302    -5.214249    1.616713
------------------------------------------------------------------------------
```

```
. estat clas

Probit model for creditprop1

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |        25             8  |         33
     -     |        13            52  |         65
-----------+--------------------------+-----------
   Total   |        38            60  |         98

Classified + if predicted Pr(D) >= .5
True D defined as creditprop1 != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   65.79%
Specificity                     Pr( -|~D)   86.67%
Positive predictive value       Pr( D| +)   75.76%
Negative predictive value       Pr(~D| -)   80.00%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   13.33%
False - rate for true D         Pr( -| D)   34.21%
False + rate for classified +   Pr(~D| +)   24.24%
False - rate for classified -   Pr( D| -)   20.00%
--------------------------------------------------
Correctly classified                        78.57%
--------------------------------------------------
```

Results when *ltotasset* and *elecbil* are excluded (alternately)

```
. probit creditprop1 hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl offfarm telephon el
> ecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -69.742711
Iteration 1:   log pseudolikelihood =   -50.497511
Iteration 2:   log pseudolikelihood =   -48.592964
Iteration 3:   log pseudolikelihood =    -48.38636
Iteration 4:   log pseudolikelihood =   -48.383831
Iteration 5:   log pseudolikelihood =   -48.383831

Probit regression                                 Number of obs   =        104
                                                  Wald chi2(16)   =      28.86
                                                  Prob > chi2     =     0.0249
Log pseudolikelihood =  -48.383831                Pseudo R2       =     0.3063

------------------------------------------------------------------------------
             |               Robust
creditprop1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |   .1268651    .483774     0.26   0.793    -.8213146    1.075045
         age |   .0030406   .0182224     0.17   0.867    -.0326746    .0387557
      hhsize |    .071202   .0981665     0.73   0.468    -.1212008    .2636048
    presence |  -.0003796    .010463    -0.04   0.971    -.0208868    .0201276
    distance |   .1488713   .0904246     1.65   0.100    -.0283576    .3261003
    welfare1 |   .5372308   .1841058     2.92   0.004       .17639    .8980716
    welfare2 |   .0449744   .1895536     0.24   0.812    -.3265439    .4164926
    welfare3 |   .4676644   .1799364     2.60   0.009     .1149955    .8203333
    welfare4 |   .6377233   .2854496     2.23   0.025     .0782524    1.197194
    mfiknowl |   .1765314   .0967334     1.82   0.068    -.0130626    .3661253
     offfarm |  -.2013535   .4673804    -0.43   0.667    -1.117402    .7146953
    telephon |   .6396899   .4862252     1.32   0.188     -.313294    1.592674
     elecbil |  -.6409966   .2257862    -2.84   0.005    -1.083529   -.1984638
    workerfm |   .2030572   .2640658     0.77   0.442    -.3145023    .7206167
     workerm |  -.2591567    .255449    -1.01   0.310    -.7598275    .2415141
       bplan |   .6190217   .3232734     1.91   0.056    -.0145825    1.252626
       _cons |  -1.064815    1.17437    -0.91   0.365    -3.366538    1.236909
------------------------------------------------------------------------------
```

```
. estat clas

Probit model for creditprop1

             ──────── True ────────
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |        25            11  |         36
     -     |        16            52  |         68
-----------+--------------------------+-----------
   Total   |        41            63  |        104

Classified + if predicted Pr(D) >= .5
True D defined as creditprop1 != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   60.98%
Specificity                     Pr( -|~D)   82.54%
Positive predictive value       Pr( D| +)   69.44%
Negative predictive value       Pr(~D| -)   76.47%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   17.46%
False - rate for true D         Pr( -| D)   39.02%
False + rate for classified +   Pr(~D| +)   30.56%
False - rate for classified -   Pr( D| -)   23.53%
--------------------------------------------------
Correctly classified                        74.04%
--------------------------------------------------
```

```
. probit creditprop1 hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset offfarm t
> elephon  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -65.437865
Iteration 1:   log pseudolikelihood =   -49.476873
Iteration 2:   log pseudolikelihood =   -47.034163
Iteration 3:   log pseudolikelihood =    -46.65718
Iteration 4:   log pseudolikelihood =   -46.651038
Iteration 5:   log pseudolikelihood =   -46.651036

Probit regression                                 Number of obs   =             98
                                                  Wald chi2(16)   =          25.78
                                                  Prob > chi2     =         0.0572
Log pseudolikelihood =  -46.651036                Pseudo R2       =         0.2871

------------------------------------------------------------------------------
             |               Robust
  creditprop1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |   .7895252   .5464057     1.44   0.148    -.2814103    1.860461
         age |   .0045612   .0218499     0.21   0.835    -.0382638    .0473862
      hhsize |   .1570144   .1063793     1.48   0.140    -.0514853     .365514
    presence |  -.0051023   .0112803    -0.45   0.651    -.0272112    .0170066
    distance |   .2664077   .0996058     2.67   0.007     .0711839    .4616316
    welfare1 |   .5811785   .2196707     2.65   0.008     .1506319    1.011725
    welfare2 |  -.0519036   .1873681    -0.28   0.782    -.4191383     .315331
    welfare3 |   .2914639   .1726664     1.69   0.091     -.046956    .6298837
    welfare4 |   .8698505   .3103517     2.80   0.005     .2615724    1.478129
    mfiknowl |   .1752611   .1015532     1.73   0.084    -.0237795    .3743017
   ltotasset |  -.0463187   .1806541    -0.26   0.798    -.4003942    .3077569
     offfarm |  -.2788945   .4830202    -0.58   0.564    -1.225597    .6678076
    telephon |   .2207577   .4340338     0.51   0.611    -.6299328    1.071448
    workerfm |   .0790715   .2703403     0.29   0.770    -.4507858    .6089288
     workerm |  -.2112462   .2592245    -0.81   0.415    -.7193168    .2968244
       bplan |   .5194908   .3500256     1.48   0.138    -.1665466    1.205528
       _cons |  -2.192362    1.67021    -1.31   0.189    -5.465914     1.08119
------------------------------------------------------------------------------

. estat clas

Probit model for creditprop1

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |        25             9  |         34
     -     |        13            51  |         64
-----------+--------------------------+-----------
   Total   |        38            60  |         98

Classified + if predicted Pr(D) >= .5
True D defined as creditprop1 != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   65.79%
Specificity                     Pr( -|~D)   85.00%
Positive predictive value       Pr( D| +)   73.53%
Negative predictive value       Pr(~D| -)   79.69%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   15.00%
False - rate for true D         Pr( -| D)   34.21%
False + rate for classified +   Pr(~D| +)   26.47%
False - rate for classified -   Pr( D| -)   20.31%
--------------------------------------------------
Correctly classified                        77.55%
--------------------------------------------------
```

Probit result for credit demand

Full model, without *ltotasset,* and without *elecbil*

```
. probit willingness hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset offfarm t
> elephon elecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -63.872143
Iteration 1:   log pseudolikelihood =   -26.492211
Iteration 2:   log pseudolikelihood =    -21.4769
Iteration 3:   log pseudolikelihood =   -20.085527
Iteration 4:   log pseudolikelihood =   -19.797246
Iteration 5:   log pseudolikelihood =    -19.77781
Iteration 6:   log pseudolikelihood =   -19.777696

Probit regression                                 Number of obs   =             98
                                                  Wald chi2(17)   =          79.20
                                                  Prob > chi2     =         0.0000
Log pseudolikelihood =  -19.777696                Pseudo R2       =         0.6904

------------------------------------------------------------------------------
             |               Robust
 willingness |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |    .610347   .5815568     1.05   0.294    -.5294834    1.750177
         age |  -.064878    .031632    -2.05   0.040    -.1268756   -.0028804
      hhsize |  -.1381276   .1421069    -0.97   0.331     -.416652    .1403969
    presence |   -.012479   .0156941    -0.80   0.427     -.043239    .018281
    distance |  -.0460112   .0850513    -0.54   0.589    -.2127087    .1206863
    welfare1 |  -.0336607    .26874    -0.13   0.900    -.5603814     .49306
    welfare2 |  -.1534148   .2498618    -0.61   0.539    -.6431349    .3363053
    welfare3 |   .5601846   .2997355     1.87   0.062    -.0272862    1.147655
    welfare4 |  -.7862717   .2783457    -2.82   0.005    -1.331819   -.2407241
    mfiknowl |   .0859259   .1480515     0.58   0.562    -.2042498    .3761015
   ltotasset |   .1490118   .1955421     0.76   0.446    -.2342437    .5322672
     offfarm |   .3930268    .562695     0.70   0.485    -.7098351    1.495889
    telephon |   1.564708   .5966072     2.62   0.009     .3953798    2.734037
    elecbil  |  -.5144497   .2882873    -1.78   0.074    -1.079482     .050583
    workerfm |    .784259   .5081797     1.54   0.123    -.2117548    1.780273
     workerm |   1.502298   .4682339     3.21   0.001     .5845761    2.420019
       bplan |   4.277326   .8060209     5.31   0.000     2.697553    5.857098
       _cons |  -1.784524   1.689074    -1.06   0.291    -5.095049       1.526
------------------------------------------------------------------------------

.
```

```
. estat clas

Probit model for willingness

                 ---------- True ----------
Classified |         D            ~D      |      Total
-----------+--------------------------------+-----------
     +     |        60             3      |         63
     -     |         3            32      |         35
-----------+--------------------------------+-----------
   Total   |        63            35      |         98

Classified + if predicted Pr(D) >= .5
True D defined as willingness != 0
--------------------------------------------------------------------------
Sensitivity                     Pr( +| D)      95.24%
Specificity                     Pr( -|~D)      91.43%
Positive predictive value       Pr( D| +)      95.24%
Negative predictive value       Pr(~D| -)      91.43%
--------------------------------------------------------------------------
False + rate for true ~D        Pr( +|~D)       8.57%
False - rate for true D         Pr( -| D)       4.76%
False + rate for classified +   Pr(~D| +)       4.76%
False - rate for classified -   Pr( D| -)       8.57%
--------------------------------------------------------------------------
Correctly classified                           93.88%
--------------------------------------------------------------------------

.

. probit willingness hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl offfarm telephon el
> ecbil  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -67.083448
Iteration 1:   log pseudolikelihood =   -27.513992
Iteration 2:   log pseudolikelihood =   -22.443778
Iteration 3:   log pseudolikelihood =   -21.040081
Iteration 4:   log pseudolikelihood =   -20.780766
Iteration 5:   log pseudolikelihood =   -20.767967
Iteration 6:   log pseudolikelihood =   -20.767921

Probit regression                                 Number of obs   =        104
                                                  Wald chi2(16)   =      90.99
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood =  -20.767921                Pseudo R2       =     0.6904

------------------------------------------------------------------------------
             |               Robust
willingness |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |   .5808962   .6045711     0.96   0.337    -.6040413    1.765834
         age |  -.0494956    .025076    -1.97   0.048    -.0986437   -.0003475
      hhsize |  -.1400753   .1195975    -1.17   0.242    -.3744821    .0943315
    presence |   -.010971   .0153656    -0.71   0.475    -.0410871    .0191451
    distance |   .0306099   .0952714     0.32   0.748    -.1561186    .2173385
    welfare1 |  -.0105382   .2773408    -0.04   0.970    -.5541163    .5330399
    welfare2 |  -.2337846   .2427196    -0.96   0.335    -.7095063    .2419371
    welfare3 |   .5850191   .3136975     1.86   0.062    -.0298166    1.199855
    welfare4 |   -.426696   .1762746    -2.42   0.015    -.7721878   -.0812041
    mfiknowl |   .0655994   .1312279     0.50   0.617    -.1916027    .3228014
     offfarm |   .4014645   .5545422     0.72   0.469    -.6854183    1.488347
    telephon |   1.802031   .5972514     3.02   0.003     .6314402    2.972623
     elecbil |  -.4373639   .2882407    -1.52   0.129    -1.002305    .1275776
    workerfm |   .7543057   .4951988     1.52   0.128    -.2162661    1.724877
     workerm |   1.461061   .4786016     3.05   0.002     .5230186    2.399103
       bplan |    4.14167   .7173228     5.77   0.000     2.735743    5.547596
       _cons |  -1.290658   1.129642    -1.14   0.253    -3.504715    .9233987
------------------------------------------------------------------------------

. estat clas

Probit model for willingness

                 ---------- True ----------
Classified |         D            ~D      |      Total
-----------+--------------------------------+-----------
     +     |        65             4      |         69
     -     |         3            32      |         35
-----------+--------------------------------+-----------
   Total   |        68            36      |        104

Classified + if predicted Pr(D) >= .5
True D defined as willingness != 0
--------------------------------------------------------------------------
Sensitivity                     Pr( +| D)      95.59%
Specificity                     Pr( -|~D)      88.89%
Positive predictive value       Pr( D| +)      94.20%
Negative predictive value       Pr(~D| -)      91.43%
--------------------------------------------------------------------------
False + rate for true ~D        Pr( +|~D)      11.11%
False - rate for true D         Pr( -| D)       4.41%
False + rate for classified +   Pr(~D| +)       5.80%
False - rate for classified -   Pr( D| -)       8.57%
--------------------------------------------------------------------------
Correctly classified                           93.27%
--------------------------------------------------------------------------
```

```
. probit willingness hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset offfarm t
> elephon  workerfm workerm bplan,r

Iteration 0:   log pseudolikelihood =   -63.872143
Iteration 1:   log pseudolikelihood =   -26.676332
Iteration 2:   log pseudolikelihood =   -22.040766
Iteration 3:   log pseudolikelihood =   -21.005085
Iteration 4:   log pseudolikelihood =   -20.858736
Iteration 5:   log pseudolikelihood =   -20.853871
Iteration 6:   log pseudolikelihood =   -20.853864

Probit regression                                 Number of obs   =         98
                                                  Wald chi2(16)   =      97.81
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood =  -20.853864                Pseudo R2       =     0.6735

------------------------------------------------------------------------------
             |               Robust
willingness |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |   .7312531   .5834302     1.25   0.210    -.4122491    1.874755
         age |  -.0445026   .0272567    -1.63   0.103    -.0979248    .0089196
      hhsize |  -.0896334   .1387329    -0.65   0.518    -.3615449    .1822781
    presence |  -.0168981   .0153127    -1.10   0.270    -.0469103    .0131141
    distance |   .0124155   .0851029     0.15   0.884    -.1543832    .1792141
    welfare1 |  -.0247223   .2897291    -0.09   0.932    -.5925808    .5431363
    welfare2 |  -.1020501   .2567215    -0.40   0.691    -.6052149    .4011148
    welfare3 |   .4250071   .2505901     1.70   0.090    -.0661405    .9161546
    welfare4 |   -.595072   .2490872    -2.39   0.017    -1.083274     -.10687
    mfiknowl |   .0474047   .1467845     0.32   0.747    -.2402877     .335097
   ltotasset |   .0754802   .1952461     0.39   0.699    -.3071953    .4581556
     offfarm |   .3094974   .5063198     0.61   0.541    -.6828712    1.301866
   telephon  |   .9075173    .583301     1.56   0.120    -.2357317    2.050766
    workerfm |   .5549875   .4455285     1.25   0.213    -.3182323    1.428207
     workerm |   1.272384   .3938903     3.23   0.001     .5003732    2.044395
       bplan |   3.829037   .6083241     6.29   0.000     2.636744     5.02133
       _cons |  -2.094047   1.586221    -1.32   0.187    -5.202982    1.014889
------------------------------------------------------------------------------


. estat clas

Probit model for willingness

                 -------- True --------
Classified |         D             ~D  |      Total
-----------+--------------------------+-----------
     +     |        60              4  |         64
     -     |         3             31  |         34
-----------+--------------------------+-----------
   Total   |        63             35  |         98

Classified + if predicted Pr(D) >= .5
True D defined as willingness != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   95.24%
Specificity                     Pr( -|~D)   88.57%
Positive predictive value       Pr( D| +)   93.75%
Negative predictive value       Pr(~D| -)   91.18%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   11.43%
False - rate for true D         Pr( -| D)    4.76%
False + rate for classified +   Pr(~D| +)    6.25%
False - rate for classified -   Pr( D| -)    8.82%
--------------------------------------------------
Correctly classified                        92.86%
--------------------------------------------------
```

OLS result

```
. reg rlimit hhhsex age hhsize presence distance welfare1 welfare2 welfare3 welfare4 mfiknowl ltotasset offfarm telephon
> elecbil  workerfm workerm bplan,r

Linear regression                               Number of obs =         63
                                                F( 17,    45) =       3.20
                                                Prob > F      =     0.0009
                                                R-squared     =     0.3425
                                                Root MSE      =     8.3181

------------------------------------------------------------------------------
             |               Robust
      rlimit |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      hhhsex |  -1.482115   3.625592    -0.41   0.685    -8.784433    5.820204
         age |  -.1870661    .165739    -1.13   0.265    -.5208816    .1467493
      hhsize |   .2448996   .7088968     0.35   0.731    -1.182892    1.672691
    presence |   .0069141   .0653734     0.11   0.916    -.1247546    .1385828
    distance |   .0238425   .5798555     0.04   0.967    -1.144047    1.191731
    welfare1 |  -.9512611   1.291308    -0.74   0.465     -3.55209    1.649568
    welfare2 |   -.345469   1.543675    -0.22   0.824    -3.454591    2.763653
    welfare3 |   3.484564   1.188067     2.93   0.005     1.091673    5.877454
    welfare4 |    2.86691   2.482007     1.16   0.254    -2.132108    7.865928
    mfiknowl |    .779687   .8176101     0.95   0.345    -.8670642    2.426438
   ltotasset |  -.0158366    1.44249    -0.01   0.991    -2.921162    2.889488
     offfarm |   2.318551   4.200754     0.55   0.584    -6.142203     10.7793
    telephon |  -1.003575   2.927036    -0.34   0.733    -6.898927    4.891778
     elecbil |  -2.144968   1.401454    -1.53   0.133    -4.967642    .6777047
    workerfm |   .9611013   1.931391     0.50   0.621    -2.928919    4.851122
     workerm |  -.0357848   1.889907    -0.02   0.985    -3.842252    3.770683
       bplan |   3.160021   3.473772     0.91   0.368    -3.836515    10.15656
       _cons |   17.40893   10.66059     1.63   0.109    -4.062603    38.88047
------------------------------------------------------------------------------
```

```
. reg rlimit age hhsize welfare1 welfare2 welfare3 welfare4 mfiknowl elecbil bplan,r

Linear regression                               Number of obs =         68
                                                F(  9,    58) =       7.07
                                                Prob > F      =     0.0000
                                                R-squared     =     0.3075
                                                Root MSE      =     7.7501
```

rlimit	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	-.1939194	.0890056	-2.18	0.033	-.3720835	-.0157553
hhsize	.356135	.4783376	0.74	0.460	-.6013617	1.313632
welfare1	-.7570681	.999362	-0.76	0.452	-2.757509	1.243372
welfare2	-.4312209	.9980942	-0.43	0.667	-2.429123	1.566682
welfare3	3.755342	1.131368	3.32	0.002	1.490663	6.020021
welfare4	2.010418	2.111694	0.95	0.345	-2.216596	6.237433
mfiknowl	.8441998	.6468315	1.31	0.197	-.4505741	2.138974
elecbil	-2.346066	.9785333	-2.40	0.020	-4.304813	-.3873184
bplan	3.916821	2.339981	1.67	0.100	-.7671602	8.600803
_cons	19.28889	5.156651	3.74	0.000	8.966733	29.61105

Summary of the resulted model

Credit participation model:

$$P(cp=1) = 0.59\,jobedu + 0.39\,housing + 0.775\,clothasset + 0.207\,distance + 0.203\,mfi\_know - 0.537\,elecbil$$

Credit demand model:

$$P(wtb=1) = 0.56\,housing - 0.786\,clothasset - 0.065\,age + 1.565\,telephon - 0.514\,elecbil + 1.502\,worker + 4.278\,bplan$$

Willingness to pay model:

$$wtp = 19.3 + 3.755\,housing - 0.194\,age - 2.346\,elecbil + 3.917\,bplan$$

Appendix 4: BPS welfare indicators dataset

obs	Water and nutrition			Housing				Clothing and asset			Job and education			
	Water	**Meals**	**Meatcons**	**Wall**	**Roof**	**Toilet**	**Elec**	**Hsize**	**Newcloth**	**Asset**	**Edu**	**Job**	**Floor**	**Firing**
1	0	0	0	0	1	1	1	1	0	0	0	0	0	0
2	0	0	0	0	0	0	**1**	1	0	0	0	0	0	0
3	0	0	0	0	0	1	**1**	1	0	0	0	0	0	0
4	0	0	0	1	1	1	1	1	0	1	1	1	1	1
5	0	0	0	1	1	1	1	1	0	0	0	0	0	0
6	0	0	0	1	1	1	1	1	0	0	1	0	0	0
7	0	0	0	0	0	1	**1**	1	0	0	0	0	0	0
8	0	0	0	1	1	1	1	1	0	1	1	0	0	0
9	0	0	0	1	0	1	1	1	0	0	0	0	0	0
10	0	0	0	0	1	1	0	1	0	0	1	1	0	0
11	0	0	0	0	1	1	1	1	0	0	0	0	0	0
12	0	0	0	0	0	0	**1**	1	0	0	0	0	0	0
13	0	0	0	1	1	1	1	1	0	1	0	0	0	0
14	0	0	0	0	0	0	0	1	0	1	0	0	0	0
15	0	0	0	1	1	1	1	1	0	1	1	1	0	0
16	0	0	0	1	1	1	1	0	0	0	0	0	0	0
17	0	0	0	0	0	1	1	1	0	0	1	1	0	0
18	0	0	0	1	1	1	1	1	0	0	1	0	1	0
19	0	0	0	1	1	0	1	1	0	1	1	1	0	0
20	0	0	0	0	0	1	1	1	0	0	0	0	0	0
21	0	0	0	0	1	1	1	0	0	0	0	0	0	0
22	0	0	0	1	1	1	1	0	0	0	1	1	0	1
23	0	0	0	1	1	1	1	1	0	1	1	1	1	1
24	0	0	0	0	1	1	1	1	0	0	0	0	0	0
25	0	0	0	0	0	1	1	1	0	1	1	0	0	0
26	0	0	0	1	1	1	1	1	0	0	0	0	0	0
27	0	0	0	1	1	1	1	1	0	0	1	0	0	0
28	0	0	0	0	1	1	1	1	0	1	0	0	0	0
29	0	0	0	0	1	1	1	1	0	0	0	0	0	0
30	0	0	0	1	1	1	1	1	0	1	1	1	1	0
31	0	0	0	0	1	1	1	1	0	0	0	0	0	0
32	0	0	0	0	0	0	1	1	0	0	0	0	0	0
33	0	0	0	0	0	0	0	1	0	0	1	0	0	0
34	0	0	0	1	0	1	1	1	0	1	1	1	1	1
35	0	0	0	0	0	0	1	1	0	1	0	0	0	0
36	0	0	0	1	1	0	1	1	0	0	1	0	0	0
37	0	0	0	1	1	1	1	1	0	0	0	0	0	0
38	0	0	0	0	1	0	1	1	0	0	0	0	0	0
39	0	0	0	1	1	1	1	1	0	1	0	1	0	0
40	0	0	0	1	1	1	1	1	0	0	0	0	0	0
41	0	0	0	0	1	1	1	1	0	1	1	0	0	0
42	0	0	0	1	1	1	1	1	0	0	1	1	0	0
43	0	0	0	1	1	1	1	1	0	1	0	1	0	0
44	0	0	0	1	1	0	1	1	0	1	0	0	0	0
45	0	0	0	0	1	1	1	1	0	1	0	0	0	0
46	0	0	0	0	0	0	1	1	0	0	0	1	0	0
47	0	0	0	0	1	0	1	1	0	0	0	0	0	0
48	0	1	0	1	1	1	1	1	1	1	1	1	1	1
49	0	1	0	1	1	1	1	1	1	1	1	1	0	1
50	0	1	0	1	1	1	1	1	1	1	1	1	1	1
51	0	1	0	1	1	1	1	1	1	1	1	1	1	1
52	0	0	1	1	1	1	1	1	1	1	1	1	1	1
53	0	0	1	1	1	1	1	1	1	1	1	1	0	1
54	0	0	1	0	1	1	1	1	1	1	1	1	0	1

55	0	0	1	1	1	1	1	1	1	1	1	1	1	1
56	0	0	1	1	1	1	1	1	1	1	1	1	1	1
57	0	0	1	1	1	1	1	1	1	1	0	0	0	0
58	0	0	1	1	1	1	1	1	1	1	1	1	1	1
59	0	1	0	1	1	1	1	1	1	1	1	0	0	1
60	0	0	1	0	0	0	1	1	1	0	1	0	0	0
61	1	0	0	0	1	1	1	1	1	0	1	0	0	0
62	0	0	1	0	1	0	1	1	1	1	0	0	0	0
63	0	0	1	1	1	1	1	1	1	1	0	0	0	0
64	0	0	1	1	1	1	1	1	1	1	1	1	0	0
65	0	0	1	1	1	1	1	1	1	1	1	1	0	0
66	0	0	1	0	1	1	1	1	1	0	1	0	0	0
67	0	0	1	0	0	1	1	1	1	1	0	0	0	0
68	0	0	1	1	1	1	1	1	1	1	1	1	1	0
69	0	0	1	1	1	1	1	1	1	1	1	0	1	1
70	0	0	1	1	1	1	1	1	1	0	1	0	1	0
71	0	0	1	1	1	1	1	1	1	0	1	0	1	0
72	0	0	1	1	1	1	1	1	1	1	1	0	1	1
73	0	0	1	1	1	1	1	1	1	1	1	1	1	1
74	0	1	1	1	1	1	1	1	1	1	1	0	0	1
75	0	1	1	1	1	1	1	1	1	1	1	0	0	0
76	0	1	1	1	1	1	1	1	1	1	1	0	0	1
77	1	0	1	1	1	1	1	1	1	1	1	1	0	0
78	0	1	1	0	1	1	1	1	1	0	1	0	0	0
79	0	1	1	1	1	1	1	1	1	1	1	1	1	1
80	0	1	1	1	1	1	1	1	1	1	1	0	1	1
81	0	1	1	1	1	1	1	1	1	1	1	1	1	1
82	0	1	1	1	1	1	1	1	1	1	1	0	1	1
83	0	1	1	1	1	1	1	1	1	1	0	0	0	1
84	0	1	1	0	1	1	1	1	1	1	1	1	0	1
85	0	1	1	1	1	1	1	1	1	1	0	0	0	0
86	1	0	1	1	1	1	1	1	1	1	1	0	0	0
87	0	1	1	1	1	1	1	1	1	1	1	0	0	0
88	0	1	1	1	1	1	1	1	1	1	1	0	0	0
89	0	1	1	1	1	1	0	1	1	1	1	0	0	0
90	0	1	1	1	1	1	1	1	1	1	0	1	1	0
91	0	1	1	1	1	1	1	1	1	1	0	1	1	1
92	0	1	1	1	1	1	1	1	1	1	1	1	1	0
93	0	1	1	1	1	1	1	1	1	1	1	1	0	0
94	1	0	1	1	1	1	1	1	1	1	1	1	0	0
95	0	1	1	0	1	1	1	1	1	1	0	1	0	0
96	0	1	1	1	1	1	1	1	1	1	1	1	0	1
97	0	1	1	1	1	1	1	1	1	1	0	0	0	0
98	0	1	1	1	1	1	1	1	1	1	1	0	0	1
99	1	1	1	1	1	1	1	1	1	1	1	1	0	1
100	1	1	1	1	1	1	1	1	1	1	1	1	0	0
101	1	1	1	1	1	1	1	1	1	1	1	1	1	0
102	1	1	1	1	1	1	1	1	1	1	0	1	1	1
103	1	1	1	1	0	1	1	1	1	1	1	0	0	0
104	1	1	1	1	1	1	1	1	1	1	1	0	0	0
Total	**10**	**33**	51	71	87	**90**	**100**	**101**	57	68	64	42	**27**	**31**