การพัฒนาช่องทางการเข้าถึงแหล่งเงินกู้ของผู้มีรายได้น้อย กรณีชุมชนเมืองผ่านเงื่อนไขความสัมพันธ์ของครอบครัว

นายกวินทร์ ภู่พกสกุล

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเศรษฐศาสตรดุษฎีบัณฑิต
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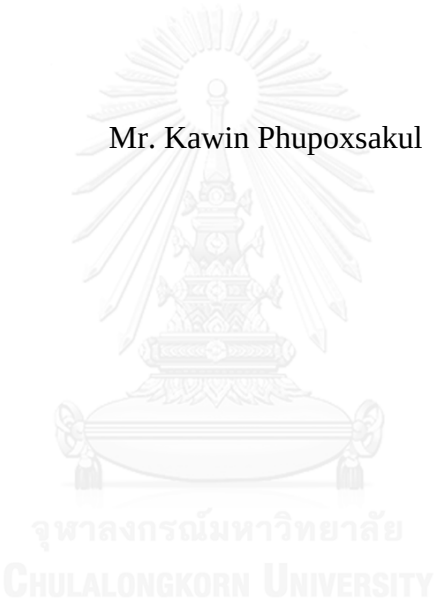
DEVELOPING MICROFINANCE OUTREACH IN URBAN COMMUNITIES THR OUGH FAMILY TIES

Mr. Kawin Phupoxsakul



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กวินทร์ ภู่พกสกุล : การพัฒนาช่องทางการเข้าถึงแหล่งเงินกู้ของผู้มีรายได้น้อย กรณีชุมชนเมืองผ่านเงื่อนไขความสัมพันธ์ของครอบครัว (DEVELOPING MICROFINANCE OUTREACH IN URBAN COMMUNITIES THROUGH FAMILY TIES) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร.สุกานดา เหลืองอ่อน, 77 หน้า.

โดยปกติแล้วการให้สินเชื่อในรูปแบบกลุ่มไม่สามารถสร้างประสิทธิภาพได้ภายใต้พื้นที่ชุมชนเมือง งานศึกษานี้ต้องการจะศึกษาถึงการเพิ่มศักยภาพในการให้สินเชื่อรูปแบบกลุ่มภายใต้พื้นที่ดังกล่าว ในผลการศึกษาพบว่าความสัมพันธ์ระหว่างสมาชิกในครอบครัวสามารถช่วยแก้ปัญหาดังกล่าวได้ การให้สินเชื่อรูปแบบโดยมีข้อกำหนดให้สมาชิกภายในกลุ่มมาจากครอบครัวเดียวกันนั้นจะสามารถลดการผิดนัดชำระหนี้ได้ผ่านการติดตามทวงหนี้ที่มีประสิทธิภาพจากความใกล้ชิดระหว่างสมาชิกภายในครอบครัว อย่างไรก็ตามจุดอ่อนของกลุ่มในรูปแบบดังกล่าวอยู่ตรงที่กลุ่มดังกล่าวมีความอ่อนไหวต่อสถานการณ์ที่ไม่คาดคิด (Shock) ในข้อสรุปจากแบบจำลองพบว่า ภายใต้พื้นที่ชนบทที่กลุ่มคนมีความสัมพันธ์ที่เข้มแข็ง การให้สินเชื่อในรูปแบบกลุ่มนั้นมีประสิทธิภาพทั้งในเรื่องของการชำระคืนเงินกู้รวมถึงการป้องกันกลุ่มจากเหตุการณ์ที่ไม่คาดคิด (Shock)

เพื่อยืนยันผลจากแบบจำลอง งานศึกษานี้สร้างเกมการทดลองในพื้นที่ศึกษา (Field Experiment Game) เพื่อทดสอบถึงการชำระคืนเงินของการให้สินเชื่อในรูปแบบกลุ่ม โดยแบ่งกลุ่มตัวอย่างออกเป็นทั้งหมด 3 กลุ่ม 1. กลุ่มที่ประกอบด้วยสมาชิกในรูปแบบสุ่ม 2.กลุ่มที่สมาชิกเลือกจับกันเอง และ 3. กลุ่มที่ประกอบด้วยสมาชิกภายในครอบครัว และเมื่อการทดลองสิ้นสุดลงกลุ่มตัวอย่างแต่ละคนจะถูกเก็บข้อมูลพื้นฐานเพื่อนำไปทดสอบในแบบจำลอง ordered logit model. ในผลการศึกษานั้นยืนยันผลการศึกษาจากแบบจำลองว่าภายใต้พื้นที่ชุมชนเมือง การให้สินเชื่อในรูปแบบกลุ่มที่ประกอบด้วยสมาชิกในครอบครัวมีประสิทธิภาพในการชำระคืนหนี้ที่สูงกว่ากลุ่มในรูปแบบอื่นๆ แต่เมื่อเกิดเหตุการณ์ที่ไม่คาดคิด (Shock) กลุ่มในลักษณะของครอบครัวนั้นกลับมีการส่งผ่านผลของเหตุการณ์ไม่คาดคิด (Shock) ไปยังสมาชิกรายอื่น ๆ ในกลุ่มได้ซึ่งส่งผลให้กลุ่มในรูปแบบของครอบครัวมีแนวโน้มที่จะเกิดการผิดนัดชำระหนี้ได้สูงกว่า ในส่วนของปัจจัยที่ส่งผลกระทบต่อการชำระคืนหนี้ให้มีประสิทธิภาพมากขึ้นคือ การมีภาระต้องส่งเงินกลับบ้านที่ต่างจังหวัดหรือการเป็นรายได้หลักเพียงคนเดียวในครอบครัว ส่วนปัจจัยที่ส่งผลทางลบต่อการชำระคืนหนี้คือการที่กลุ่มตัวอย่างเข้าถึงแหล่งเงินกู้มากกว่า 1 แหล่ง

ในท้ายที่สุด งานศึกษาสร้างเกมการทดลองในพื้นที่ศึกษาเพื่อทดสอบถึงปัญหาการคัดเลือกที่ขัดผลประโยชน์ (Adverse selection) โดยพบว่ากลุ่มในรูปแบบครอบครัวยังสามารถช่วยบรรเทาปัญหาการคัดเลือกที่ขัดผลประโยชน์ผ่านการเข้าถึงข้อมูลเกี่ยวกับความเสี่ยงของผู้ขอกู้ได้อย่างมีประสิทธิภาพมากกว่า รวมถึงมีระบบการตรวจสอบระหว่างสมาชิกก่อนการขอกู้จะเริ่มต้น

สาขาวิชา เศรษฐศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2557 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

5285902729 : MAJOR ECONOMICS
KEYWORDS: MICROFINANCE, FAMILY TIES, FIELD EXPERIMENT GAME, REPEATED GAME

KAWIN PHUPOXSAKUL: DEVELOPING MICROFINANCE OUTREACH IN URBAN COMMUNITIES THROUGH FAMILY TIES. ADVISOR: ASST. PROF. SUKANDA LUANGON, Ph.D., 77 pp.

Normally, the group lending with joint liability will not perform efficiently under the weak social bondage such as in an urban area. This paper aims to study the mechanism to improve the efficiency of group lending transition in such a circumstance. From the results, we find out that the family ties can help solve group lending problems. The group lending with family ties can reduce the default on the loan and increase the efficiency of loan tracking via strong bonds between each members in the group. However, the weakness of groups with family ties comes from the fact that they are more sensitive to shock than the other groups with no family ties. In conclusion, In the strong social bondage situation like in the rural areas, group lending is efficient; while in the city, group lending with family ties can perform better than other forms of group lending even with the shocks.

To confirm the prediction from the model, this study will study the repayment rates of several types of groups through the method of field experiment game. The experiment subjects were be divided into 3 groups: 1) Random matching groups 2) Self-selected groups and 3) Family ties groups. When the experiment ended, individual information were collected and the results were tested by ordered logit model. The conclusion of the experiment game confirms the prediction from the model that in the urban area the group lending with family ties gives a good outcome with the high efficiency of repayment rate, compared to the rates of repayment in random matching group lending and self selected group lending. When considering the effect of shocks on the loan default, the family ties group is the most effective type in transferring the shock among group members. Therefore, the family ties group can be more sensitive with loan default and tends to have higher chances of group loan default under shocks. The other factors that also affect the repayment rate of low income groups in the urban areas are remittance and multiple loan sources.

Finally the field experiment game was used to test the adverse selection problem. The family ties can help ease the adverse selection problem due to the effective borrower's information sharing before the loan application.

Field of Study: Economics Student's Signature .....

Academic Year: 2014 Advisor's Signature .....

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Chapter 1

Introduction

1.1 Statement of the problem

The individual loans problem generally is the result of the inability of the low-income sector of society to provide collateral for a loan guarantee. A solution to the problem is the notion of group lending, which is a popular way to provide finance support to people with low incomes, with the basic concept developed from the "Muhammed Yunus" loan service. Group lending applies the concept of joint liability, which allows low-income people to replace financial collateral with social collateral.

Microfinance institutes (MFIs) such as Grameen Bank by Muhammed Yunus make use of the strong bonds among members in rural areas to build their success in group lending and loan monitoring. The default rate in rural area group lending also decreases dramatically.

When we have a close look at the process of the Grameen Bank group lending, we find the process has four stages:

1. Five members are selected to form group lending. All members must know and trust each other.

2. The group lending members must participate in a 5-day financial training session before the loan is granted.

3. MFIs approve the loan.

4. One week after the loan approval and the initiation of the investment, every member in the group must participate in a loan meeting with the bank staff to share any problems they are facing concerning the loan.

The success of group lending by Grameen Bank has led many countries to apply group lending in their loan systems, including Thailand. The Government Savings Bank (GSB) in Thailand started group lending in rural areas and adjusted the process by:

1. Including three members in one group, with every member having the same occupation.

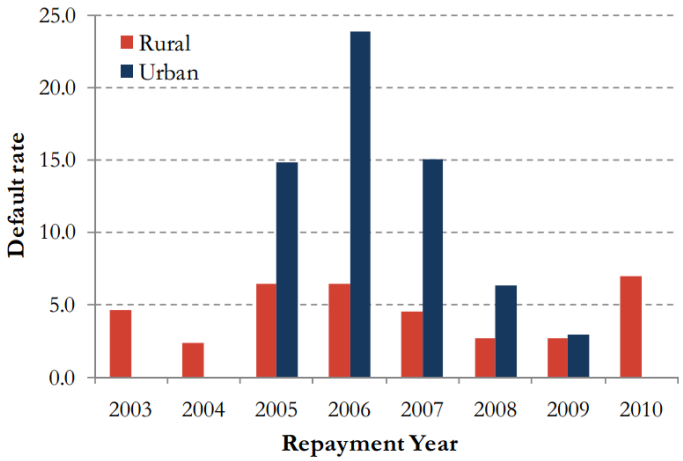
2. Having the GSB approve the group lending.

GSB does not include the financial training and weekly group meeting in the process. Therefore, the efficiency of the group lending will depend to a great extent on the strength of the group relationship, which leads to the important question of whether group lending is suitable for every area. The efficiency of group lending depends on cross collaterality among group members and the strength of the relationship in their community, both of which help create higher social capital. With high social capital in the form of social sanctions or negative social reputation, members tend to avoid defaulting on the loan.

One of the main objectives of this group lending is to reduce the adverse selection and moral hazard problems. In order to do that, group lending allows banks to assure the repayment of the loan at a certain level. When one person cannot repay the loan, the other members of the group will have to pay instead. The commitment among people to the group's debt will automatically monitor and track the behavior of each individual group member. However, the success of group lending often depends on the intimacy of the group.

In urban areas, individuals are very independent, and the bond in a group is frequently weak. In such an areas, group lending cannot create high social capital as in rural areas (Hofferth & Iceland, 1998). De la Huerta (2010) found higher loan default rates in urban areas than in rural areas.

Figure 1- 1: Default rates by borrowing year in rural and urban areas of Thailand.



Source: de la Huerta (2010)

To reduce the loan default rate in weak-tie urban areas, this study proposes to raise the efficiency of group lending by using the benefit of strong ties among family members. Carrillo (2010) found that group lending in the form of family ties helps reduce the investment in risky projects. MFIs projects such as Cashpor microcredit in India allow collateral from families for group lending, if the borrower lives in an isolated area and cannot join the training program (Puhazhendhi, 2013).

In Thailand, there are no financial services that use family ties as the basis for lending for low-income groups. Even the Government Saving Bank (GSB), which has the low-income group as the target clients, still launches loan services that use personal or financial liabilities as collateral but that do not use family ties (Table 1-1).

Table 1- 1: GSB's financial products for low-income groups.

Items	Financial product for low-income group/ Informal sector			
	People's Bank (Loan for people)	**The Happy Saving-Loan**	**The Happy Life Loan**	**The Happy Client Loan**
Target group	Retailers, freelancers, and low-income group who work in factories or have an apparent establishment	GSB's clients who have no salary but have good saving discipline	Low-income group	GSB clients who have good financial discipline
Maximum credit	<=200,000 Baht	<= 5 times of their saving account and <= 200,000 Baht	<=200,000 Baht	15,000-40,000 Baht (<=20% of their previous loan)
Repayment years	<= 8 years	5-8 years	5-8 years	3-5 years
Interest rate	0.5-0.75% per month	1% per month	0.75% per month	0.75% per month
Collateral	Properties/Groups	Saving account	Clean loan	Clean loan

Source: GSB

In this study, we examine how to improve the conditions of group lending with low intimacy targets for a more efficient outcome. This study focuses on an alternative type of lending for microfinance groups.

To solve the weak social ties problem in urban areas, this study uses the benefit of family ties to strengthen the bonds among members in the group. Alesina and Ferrara (2002) found that each individual has more reliability if the partners share similarities, for example family members. Ermisch and Gambetta (2010) reported similar results. They also found that people who come from families with strong family ties tend to trust strangers less than people from families with weaker family ties. In urban areas, family-ties group lending with mutual collateral may help increase the efficiency in group lending due to the stronger ties among members.

This dissertation has six chapters. Chapter 2 summarizes the problem for low-income people using a role-play study. Chapter 3 and Chapter 4 examine how the family ties group can raise group lending efficiency in urban areas where ties among members are weak and can reduce the moral hazard problem. Chapter 5 shows the efficiency of

the family ties group to reduce the adverse selection problem. Lastly, Chapter 6 includes the conclusion and policy implications.

1.2 Objectives of the study

1. To establish additional requirements for new types of borrowing and group lending to improve the repay power for low-income groups with no intimacy.
2. To study the effectiveness of the additional requirements added.
3. To study how we can apply the additional requirements to loan systems in Thailand and improve low-income loans in Thailand.

1.3 Definitions

1. Rural areas: The areas outside Muang District.
2. Urban areas: The area in Muang District.
3. Low-income people: In this study, low-income people refers to experimental subjects who have unreliable income and have no access to formal financial services.
4. Social capital: In this study, social capital means the social sanctions or any social reputation in a community in which low-income borrowers are living.

1.4 Scope of study

Since the objective of the study is to reduce the adverse selection and moral hazard problems, we will compare the ability to reduce adverse selection and moral hazard for several types of group lending and the Government Savings Bank's group lending.

1.5 Limitations of study

This study focuses only on the ability of family ties group lending to reduce adverse selection and moral hazard problems. We did not study the impact of group lending with family ties such as;

1. Since family ties group lending members are from the same family share the same family wealth, if one member decides to make the loan default, total family wealth reduces and the efficiency of the group lending decreases.

2. If low income people face the shock when they are in group lending with family ties, the shock can create the covariance risk through the close relationship in the group and lenders have tendency to take double risk from group lending loan.

Chapter 2

Overall Problem from an In-Depth Interview

This study conducts a role-play at the Wong-wain-yai market for 6 months by opening a bubble milk teashop to observe the behavior of vendors in the local market together with in-depth interviews with vendors in several local markets. The study aims to elucidate the problems that vendors face such as the reasons they become involved with loan sharks or the obstacles to borrowing from formal credit sources. The main issues are presented below.

2.1 Supply side of informal loans

2.1.1 Pattern for informal lending model

Interviews with several loan sharks revealed several topics in lending models and lending rates. The following models are frequently applied to lend money for low income peoples:

1. The lending rate is 1% per day (the rates are different in different areas: 2% - 3% per day in some areas). The repayment method is called floating interest. Borrowers are allowed to pay back only the interest portion in a given period as specified in the contract. If daily interest is not paid to the lenders, borrowers will be penalized by a greater daily interest rate. Suppose that the borrowing amount is 100 Baht with 10% per 10 days lending rate. The borrower has to pay back 1 Baht for daily interest for 10 days but after that has the chance to get out of debt by paying 100 Baht. If the borrower cannot pay the daily interest, he or she will be punished by having to pay 2 more days' daily interest. The debt collector will collect the daily interest until the total amount of the loan of 100 Baht is paid.

2. In another type of repayment method, loan sharks set the lending rate more than 1% per day. Each installment is composed of principal and interest. Suppose that the borrowed amount is 100 Baht with the lending rate at 40% per 10 days. The borrower has to pay back 4 Baht for interest and 10 Baht for the amount of the principal, say, 14 Baht for a daily installment. The daily installment is repeated until the principal is zero. If the borrower cannot afford the repayment, the daily installment amount is added to the principal balance. For example, when 14 Baht (4 Baht for interest and the other 10 Baht for principal) is paid back for the first installment, the remaining debt is 90 Baht. If the borrower cannot afford the second installment, which is 14 Baht, the loan shark will add the unpaid amount to the principal balance, and, therefore, the new debt balance is 104 Baht.

Considering a decrease in lending rate, loan sharks state that the rate reduction is impossible, even though they do not aim for maximum interest. If the rate decreases, it is possible to have more customers and a higher income. However, a borrower tends

to repay a debt to a loan shark whose lending rate is the highest before other loan sharks whose lending rates are lower; hence, the loan shark who sets the lowest rate among others will be the last person who gets paid. Therefore, loan sharks mostly set nearly the same lending rate and debt collection method. However, the installment patterns can be different.

2.1.2 **Debt collector**

A borrower has to pay a daily installment in person at the loan shark's office. If a daily installment is not paid, more interest will be added to the daily interest. If collectors press for payment, borrowers have to be responsible for the claim fee, which is from 50 to 100 Baht. Presently, collectors assigned by a loan shark collect a daily installment without an additional fee. Within a day, collectors may visit borrowers several times until a daily repayment is paid in full. Suppose that the daily installment is 200 Baht. Each day, collectors normally visit a borrower to collect money in the morning. If the borrower has only 100 Baht, the collectors collect that money and will visit the borrowers again later in that day until the total amount, 200 Baht, is fully paid.

When a borrower borrows from more than one loan shark, he or she will confront more than one collector. Each collector is responsible for his or her own debt.

2.2 Borrower side

2.2.1 **Reasons for borrowing of low-income people**

The major reasons low-income people seek funds from loan sharks are (a) lack of capital from an unstable income and (b) no discipline in consumption.

a. Lack of capital from an unstable income

Almost all investments of low-income people in large cities are limited to retail businesses, especially very small restaurants and groceries, since starting up the business requires low capital (from 7,000 to 10,000 Baht). Running the business, low-income investors have to bear the risk of food spoilage when the food product is not sold within a day (some goods can be stored for 2 or 3 days depending on their properties). Due to the spoilage, the owners of the food business have to buy new food products everyday even if the old product cannot be sold; the unsold product is then consumed by the owners or discarded.

Example 2.1: When low-income people do not overinvest, the risk of funding is reduced.

An ice cream trader invests 150 Baht for three flavors of ice cream for daily sales. If the ice cream is sold out, he will gain 400 Baht. During a day, if any flavors of the ice cream are sold out, he can buy more ice cream. The ice cream trader says that he wants to reduce the risk of daily discard by purchasing a smaller quantity of ice cream. If the ice cream is sold out early in a day, he is willing to travel to the ice cream factory to buy more ice cream even though the factory is very far, more than 20

kilometers. When there is profit, the ice cream trader will save part of the profit and invest the rest in the next day's product.

When a setback occurs, such as a rainy day or being sick, he will use the saved money for consumption and investment in the next day. If there are several setbacks in a row, for instance, he cannot work for a week, his savings will not be enough for the ice cream purchase, and therefore, he will need external funding.

The number of customers in a day is an external factor. From an observation of sales within 6 months, it was found that there are between 4 and 40 customers per day. In the initial period, the exact number of customers is nearly impossible to estimate. However, the number of customers can be predicted after the business has continued for a certain period.

b. Unexpected expenditures and no discipline in consumption

Overconsumption is an important factor that causes the persistent poorness of low-income people. Consumption is classified into two types:

1. Unplanned expenditure: This type of consumption is an unexpected expenditure such as medical expenses or a payment for car repair. This expenditure shock can be solved by cultivating savings for spending in difficult times.

Example 2.2: A vegetable vendor has borrowed money for education for 5 years. Currently, the vendor repays the debt completely and states that she will not be in debt anymore. After having no debt obligations, she spends more on consumption. Later, she has to again borrow money from a loan shark because she needs money for her son's wedding,

2. Consumption to enhance social status of street vendors in local markets: In daily life, street vendors talk to other venders in the same market. When a vendor buys a new luxury item, other vendors tend to buy the same thing because they do not want to be perceived as being in a lower social class.

From the role play observation, when a street vendor buys new luxury goods such as a television or Tablet, other vendors also buy these goods. Considering the source of the funds for spending on luxury goods, 9 of 10 vendors use both savings and loans from loan sharks.

Overconsumption is one of the biggest problems of low-income people. If consumption is well managed and saving discipline is cultivated, low-income people will have sufficient funds as a buffer against unanticipated expenditures in the future. To solve the overconsumption problem, good consumption behavior should be fostered. Also, medium-term-saving financial products with withdraw conditions should be created for low-income people.

2.3 Lottery and investment

Lottery gambling is very popular among street vendors in local markets. Reasons for playing the lottery are different between two groups of low-income people. For street vendors who borrow from loan sharks, the reason is that they want money

from the lottery to repay loan sharks and loans from financial institutions. Therefore, playing the lottery is considered high-risk investment. The type of gambling is not important; instead, the most important factors are the frequency and speed of obtaining rewards because street vendors who have debt obligations should have a daily income, otherwise, they cannot repay daily installment loans. The maximum amount of money for lottery payout is 5,000 Baht per round.

For street vendors who do not have debt obligations, the amount of money earmarked for lottery gambling is much lower. The maximum amount is 2,000 Baht per round. Betting on the lottery for these vendors is for amusement.

2.4 Family relationships and borrowing problem

From observations from street vendors whose family members help to run their businesses (husband and wife or mother and son) in five markets, it was found that the vendors have better discipline in terms of consumption and repayment. For example, a fruit vendor borrows money from the Bank for Agriculture and Agricultural Cooperatives in order to support his son's education. He and his wife apply for a joint loan, for which they must repay 2,000 Baht monthly. When the vendor has collected 2,000 Baht, he gives the money to his wife. The other income greater than 2,000 Baht sometimes is spent for consumption (hanging out with friends). Although overconsumption is not reduced significantly, saving discipline improves. Asked for his intention to repay the debt, the vendor states that the debt is paid because his co-borrower or his wife will be impacted negatively if he defaults.

Another example helps to explain that the family can support the debt repayment. A food vendor has borrowed 30,000 Baht without notifying her family members. She wanted the money for personal consumption. She missed payments and after a year her debt increased sharply to 200,000 Baht. She states that she planned to commit suicide because of her inability to repay the debt. When her family members noticed the debt problem, they helped to negotiate with loan sharks and they helped her control unimportant expenditures. They will have to repay the debt if she cannot to pay it back.

2.5 Saving

Saving for low-income people who have loans from loan sharks is nearly impossible. They have no incentive to save because the amount of savings is not enough to pay back the loan. .

Suppose that a low-income person borrows from a loan shark with a high daily interest (1,000 Baht a day). When his income is less than 1,000 Baht, the loan is built up. In the opinion of low-income people, saving is not a good way to be free from debt. Instead, they always gamble in the lottery and hope for a big reward that is sufficient to pay back all of their debt. From interviews with low-income people who have debt obligations, they all state that the only solution is that there should be a low enough interest rate on loans to enable them to repay the entire amount to the loan sharks.

Among low-income people without debt obligations, daily income is mostly used for consumption since the benefit of saving is not attractive. In addition, they do not recognize the benefits of saving.

2.6 Debt services demanded by low-income borrowers

Several debt services are demanded by low-income borrowers, primarily speed of credit approval. Because the credit approval process of financial institutions takes at least 2 weeks, many low-income people choose to borrow from loan sharks (even only 1,000 - 5,000 Baht) when unfortunate events occur. If financial institutions approve credit quickly, low-income people do not borrow from loan sharks. Relaxation of debt covenants is the second most demanded service. Loans for accidents are also desired by low-income people. When they want money for spending on unexpected events such as medical expenses of family members, it is very difficult to get money promptly from financial institutions because they require warrantors. Therefore, the low-income people borrow from loan sharks.

2.7 Possibility of missing debt repayment

The interesting question is why low-income borrowers, who have a very high amount of debt (more than 500,000 Baht), still repay their debts.

Example 2.3: A food vendor at Sam Yan market has borrowed an initial 80,000 Baht from loan sharks. After 4 years, her debt is built up to 400,000 Baht. The rise of debt makes her so stressed that once she wanted to commit suicide in order to be free from the debt. When asked why she still repays on time, she replies that she already knew all the debt covenants and interest rate before she borrowed; therefore, she has to be responsible for the debt.

Example 2.4: A fish seller at Rod-fi market in Bangkok has a total debt of 700,000 Baht. She decided to move to Chiangmai province because she did not want to repay the debt. However, she came back to the Rod-fi market because her business is more profitable there.

When asked about the default of borrowers, loan sharks state that default borrowers, who do not want to repay their debt, may move to other regions. However, it is difficult because debt collectors visit the borrowers every day both at their stalls and houses. Although default borrowers move to other areas, they have to face officers of the loan sharks who are present throughout Thailand. Because the network of a loan shark is widespread, when the default borrowers want to borrow from loan sharks in the new area, they surely will encounter the network of the original loan shark.

Chapter 3

Family Ties: The Potential Role of Microfinance in Urban Areas

3.1 Introduction

The main objective of loans for low-income groups is to allow such groups to access funds for investment with the expectation that one day they can escape poverty. However, banks have to handle the much higher cost in the microfinance case when compared to normal loans. Therefore, financial institutions tend to avoid microfinance loans (Maurer, 1999). The main risk that financial institutions must face is that from loan default. Banks have to contact borrowers constantly to avoid default.

Since low-income groups have no collateral for loans, their access to loans is limited. Grameen Bank has built a loan system for microfinance loans for the target group by using joint liability among members in the group. The character of joint liability is that financial institutions will allow the members in the group to guarantee each other. If one member decides to default on the loan, other members in the group must repay the leftover debt for him or her. The next term is approved only when the former loan has been repaid.

Following the success of group lending, several studies have examined the efficiency of group lending, the group lending moral hazard problem (Stiglitz, 1990), adverse selection (Ghatak, 1999), the peer monitoring system (Besley & Coate, 1995; Stiglitz, 1990), and the usage of local information.

However, there is a question whether the system will work efficiently in both rural areas and urban areas. With the difference in social structure in rural areas and urban areas, one study has shown that rural areas have a higher social capital (Hofferth & Iceland, 1998). This social capital affects the efficiency of group lending. Beatriz Armendáriz de Aghion and Morduch (2005) and Giné and Karlan (2007) found that group lending in city areas is normally less effective than in rural areas.

To reduce the problem of the low social capital of low-income group lending, this paper presents optional ties, such as family ties, to help relieve the weak bond among members in group lending. These strong family ties can help solve the cooperation problem since family members will help monitor the behavior of one another in the family and also help punish the one who tends to want a free ride or avoid the repayment of the debt efficiently. Many studies have shown that family ties help monitor the usage of the loan and guarantee that the loan will not be used for high-risk investments, which will reduce the chance of missing the loan payment (Carrillo, 2010).

The rest of this chapter is organized as follows: Section 3.1 is the literature review, which shows the moral hazard and adverse selection problems in group lending. However, this study is based on urban area ideas. Section 3.2 discusses the repeated game model based on the study by Holmstrom and Tirole (1997). Under repeated game

model, each member has weak ties, but this study will extends to the hypothesis of group lending with family ties. Section 3.3 presents concluding remarks.

3.1 Literature review

The important feature of group lending is that it can mitigate the moral hazard and adverse selection problems. Under the assumption of asymmetric information between lender and borrowers that increases the cost of the screening process of the potential applicant, the lender cannot really determine who the safe borrower is. As a result, financial institutions give the same loan interest rate to all borrowers even though the payback potential is different. If the interest rate that the lender announced is too high, the borrower with payback potential will leave the loan market (Tassel, 1999). To reduce the cost of the borrower selection process for financial institutions, low-income individuals can group voluntarily and apply for group lending under the mutual collateral condition. Therefore, each group member must carefully choose reliable individuals to be their loan partners (Ghatak (1999); Natarajan (2004)), which helps shorten the financial institution's screening procedure and also reduces the adverse selection problem from the mutual inspection among group members.

The moral hazard problem stems primarily from a lack of borrower financial information and whether the low income borrower will invest according to the plan they proposed to the financial institution or not. To ensure that group members will invest in a saving project, they need to monitor each other (peer monitoring), and the punishment will apply to the member who is prone to find profit in a business with high risk (Banerjee, Besley, & Guinnane, 1994; Stiglitz, 1990). Stiglitz (1990) had success in dealing with the moral hazard problem in group lending with joint liability as group lending can reduce the moral hazard to the community and be responsible for liabilities in the group, the so-called joint responsibility. ,

Moral hazard problems can also occur in another form: members profit but they still do not want to repay the debt. The decision to repay is personal (strategic default) (Besley & Coate, 1995). In such cases, the lender may not know that the default of the borrower is intentional or if the borrower is unable to earn enough money to pay back the loan. Group lending can resolve this issue by the principles of the monitoring cost, with the assumption that the group members know each other well and can monitor each other's behavior, which allows each member to keep track and know the circumstances in the group. Therefore, each member of the group will be an individual who can say why the default occurred. (Beatriz Armendáriz de Aghion & Morduch, 2005). Ghatak and Guinnane (1999) found out that low-income groups will make a repayment upon the gap between the benefit of defaulting and the net benefit of continued access to credit (as cited in Simtowe and Zeller (2006). Simtowe and Zeller (2006) also found that the opportunity to receive future funding can help reduce the moral hazard problem.

Group lending with joint liability by itself is not sufficient to provide mutual insurance (Chowdhury (2005); Rai and Sjöström (2004). The success of group lending

depends on several variables, the first of which is peer monitoring (Karlan, 2005). Karlan compared borrowers grouped together with a control group he set up. The results showed that those who are closer have a higher payback ratio. The results are consistent with those of Ghatak (1999). In an empirical study, Ahlin and Townsend (2007) found group lending with strong social ties in Thailand does not have a high payback ratio, which contradicts the previous study.

Chowdhury (2005) found another variable that promotes group lending success: the additional sequential financing (or dynamic incentive) condition apart from the joint liability condition. Chowdhury's study grouped five individuals, with the first person receiving the loan. The second person received a loan only when the first person had paid back all the debt, and the third person received a loan when the first and second individuals had paid back all the debt and so on. With this system, the next person who waits for the loan will automatically be forced to monitor the rest of the members to make sure they will behave in a way that ensures they will pay back the debt. This is a form of a sequential financing. There is another form of lending for the low-income target group, which is a progressive loan that starts with a small loan and grants more loans when borrowers pay back the debt consistently. Beatriz Armendáriz de Aghion and Morduch (2005) argued that progressive loans might not work well because when the loan increases, borrowers will tend to default on the loan.

From the study of the difference of structures in rural areas and urban areas in Cambodia, Sen (2012) found that in rural areas, individuals have a high level of trust only with family members, relatives, friends, and neighbors, but in urban areas they have a high level of trust within the circle of family members and relatives only. The difference in social capital affects the group lending with joint liabilities in urban areas. Beatriz Armendáriz de Aghion and Morduch (2005) found that in an environment where people are not familiar with each other, a single borrower is more effective.

Apart from the role of social ties in society, Alesina and Giuliano (2007) conducted a study in 70 countries and found that a strong family bond will help promote the overall productivity of labor in the household and reduce the number of migrant workers. Ermisch and Gambetta (2010) also found that people who come from families with strong family ties tend to trust strangers less than those who are from families with weaker family ties.

We found that very few studies have addressed the scope of weak social ties among members in group lending, such as the group loan in urban areas. Many papers have focused on the moral hazard problem and adverse selection problem, finding additional support for approving the loan to reduce the risk of debt default. The assumption of this study is based on the strong social ties among members. However, these papers are conducted under the assumption of weak social bonds among members in group lending.

3.2 Model

3.2.1 Basic idea

Group lending by the Grameen Bank set the condition that all the group members must bear the same responsibility for loan default. For simplicity, this study used two members: first member and second member. Financial institutions will give the loan to both members under the condition that with loan default of one member, the other member must repay the loan on behalf of the one who defaults. Future access to loans will depend on the possibility to repay. With loan default, the member will be punished by having no credit for future loans.

With microfinance in the form of game theory, borrowers can choose to repay or default. Under the prisoner's dilemma, both members will receive the best outcome if both decide to repay the loan. However, with the default motivation, the second best outcome will replace the best decision. The decision to default on the loan or repay it will also depend on external factors and the borrower's trigger strategies.

This paper is based on the work of Holmstrom and Tirole (1997). This study will set the borrower's initial asset before the loan decision. According to the conditions for a low-income loan from the Government Saving Bank (GSB) in Thailand, borrowers must have had a savings account for at least 2 months in a GSB account before applying for the loan. However, this study has simplified the model by ignoring the investment risk and considering only the repayment possibility.

The model has been divided into two parts. The first part of the model compares the behavior of a low-income group after obtaining access to a group lending loan whether the benefit of repayment is bigger than the benefit of loan default or not. The second part of the model uses the result we get from the first part to analyze the effect of exogenous variables on the decision to default.

In order to study the incentive and behavior of low-income group lending, we set the fixed rate of return of investor as Π [1] from the investment I [2], which consists of a low-income individual's assets (nondepreciated asset and highly liquidated[3]) W_t and the rest of the fund is the loan B_t from a financial institution.

$$B_t \equiv I - W_t \tag{1}$$

The low-income individual will need a loan for the investment when $I > W_t > 0$, which will limit the study only to the case that this individual needs loan support (or $B_t > 0$). At the beginning of the investment project, the budget of the low-income individual at the beginning of time t is

$$I = B_t + W_t \tag{2}$$

[1] To avoid the loan default from unsuccessful investment.
[2] As long as the size of the investment project is the same, the rate of return will be constant.

[3] This condition is to simplify the analysis. This condition means the asset price will not depreciate even in a fire sale.

Normally, the cost of the transaction of the low-income customer is higher because the financial institution must consider the risk of loan default, If we set R as the interest rate of the low-income customer, which is higher than the market loan interest rate (γ)

$$R \geq \gamma \tag{3}$$

Equation (3) shows the incentive for the financial institution loan approval that they will not accept the rate of return that is lower than their opportunity cost. At the end of time t, investors will have the cost for their capital as $RB_t + (R-1)W_t$ where RB_t stands for the cost of a loan from a financial institute and $(R-1)W_t$ [4] is the cost of investing their own money. At time $t+1$, the net return after deducting financial cost will be

$$\begin{aligned} W_{t+1} &= \Pi - RB_t - (R-1)W_t \\ &= (\Pi - RI) + W_t \end{aligned} \tag{4}$$

After period t, if the investment has profit return, this return from asset will be used in the next period investment as $W_{t+t} \geq 0$ [5]. Since this return on asset will be reinvested in the next project, the total asset will increase (decrease) from profit (lost) accumulation.

In each time period, the benefits that investors will receive from the investment can be divided into two parts: consumption $(R-1)W_t$ and savings W_{t+1}. These benefits can be reflected through the low-income individual's utilities. For simplicity, we set the total benefit to be equal to the intertemporal utility, which is:

$$U_{t+1} = (R-1)W_t + W_{t+1} \tag{5}$$

After we iterate (5), we obtain the total utility of the low-income individual at time t as:

$$U_t = R^t W_0 + \sum_{k=0}^{t-1} R^k (\Pi - RI)$$

If we rewrite it in the present value form, the accumulated utility from the beginning (t=0) to the end of time t will be:

[4] In reality, there is little return from initial wealth for low-income people. We assume that in each period, low-income people will use all the return from initial wealth to consume so wealth accumulation in this model came from investment profit only.

[5] Under the assumption that the lenders must have enough assets to repay the whole debt; therefore, W_{t+1} is always greater than 0.

$$\begin{aligned}\delta^t U_t &= W_0 + \delta\sum_{k=0}^{t-1}\delta^k\left(\Pi - RI\right)\\ &= W_0 + \delta\left(\Pi - RI\right)\frac{1-\delta^t}{1-\delta}\end{aligned} \tag{6}$$

Equation (6) shows the total utility from the beginning to period time t. If investors decide to stop the investment project before period time t (given as time τ), they will lose some benefit from a future investment ($\tau \to t$). Therefore, to stop investing, investors must have enough incentive to do so. We will study such incentives in the next section.

3.2.2 Group loan

Group loan is a type of specific loan for a group of low-income individuals with the condition that all members share the burden of loan guarantee. When one member cannot repay his or her loan, the other members in the group must bear the responsibility to repay the debt to the financial institution.

For simplicity, this study assumes that the group loan consists of two investors ($i = \{1,2\}$). Each investor has two choices: (a) invest continuously from the beginning (t=0) to the end of time t or (b) start investing from t=0 but stop the investment at time τ where $t > \tau > 0$. When one member decides to stop the investment before period of time t and does not repay debt, the other member will automatically have to repay the debt on behalf of the individual who defaults with the risk of ruining the relationship in the group. Therefore, the reason each member will choose to stop the investment and stop repaying the debt when the benefit from future utility is less than benefit from stop the investment in the present.

$$\delta^\tau U_{i\tau} + \delta^\tau B_{i\tau} - C_\tau = W_{i0} + \delta\left(\Pi - RI\right)\frac{1-\delta^{\tau+1}}{1-\delta} + \delta^\tau B_{i\tau} - C_\tau \tag{7}$$

Equation (7) shows that the investor who stops investing will gain the profit from the investment and the debt he does not have to pay back ($\delta^\tau B_{i\tau}$), but he will lose the trust of the other investors in the group or the other investors in the nearby area (his total cost of relationship break down is $-C_\tau \equiv -\sum_{k=\tau}^{t+1}\delta^{k-\tau}C$). Also, he will lose his credit bureau and will bear the cost of future investment to substitute the debt that he does not want to repay from period time $t-\tau$.

With the group loan guarantee condition, when one member stops the investment and does not repay debt, the other investors still have to continue the repayment with the utility of:

$$\delta^t U_{it} - \delta^\tau B_{\neg i\tau} = W_{i0} + \delta\left(\Pi - RI\right)\frac{1-\delta^{t+1}}{1-\delta} - \delta^\tau B_{\neg i\tau} \tag{8}$$

If one member has a demand for future funds or future returns in investment ($\pi^\tau \to \pi^t$), he must return the other member's debt equal to $\delta^\tau B_{\neg i\tau}$ to protect his right to future capital. He must decide to carry on repaying the debt with the amount of

$-\delta^{\tau} B_{\neg i\tau}$ instead of the other member to exchange with the profit he will receive in the future period of $t-\tau$.

We can conclude the situation of this group investment as:

Figure 3- 1: Payoff matrix for group lending.

1st member \ 2nd member	Continue investment	Stop investment
Continue investment	$\delta^t U_{1t}$ $\delta^t U_{2t}$	$\delta^t U_{1t} - \delta^{\tau} B_{2\tau}$ $\delta^{\tau} U_{2\tau} + \delta^{\tau} B_{2\tau} - C_{\tau}$
Stop investment	$\delta^{\tau} U_{1\tau} + \delta^{\tau} B_{1\tau} - C_{\tau}$ $\delta^t U_{2t} - \delta^{\tau} B_{1\tau}$	$\delta^{\tau} U_{1\tau} + \delta^{\tau} B_{1\tau} - C_{\tau}$ $\delta^{\tau} U_{2\tau} + \delta^{\tau} B_{2\tau} - C_{\tau}$

The payoff matrix shows the decision path comparing the benefit from repayment and the benefit for loan default in low-income group lending. If the members decide to repay the debt, both members will get the utility of $\delta^t U_{it}$ each, and in the loan default case, the member who decides to default will get the extra utility of $\delta^{\tau} B_{\neg i\tau}$ with the social capital (C).

The low-income individual who can continue his loyalty to invest must have enough incentives in the future (or high utility in long-term investment) to cover the cost of losing his credit bureau and the investment trust from his group (short-term utility). If the investment project is pending at the end of time τ where $0 < \tau < t$, the total utility lost from the beginning of time $\tau + 1$ to the end of time t is:

$$\delta^t U_t - \delta^{\tau} U_{\tau} = \delta\left(\Pi - RI\right)\phi_{\tau}^t \tag{9}$$

$$\text{where } \phi_{\tau}^t \equiv \delta^{\tau}\left(1-\delta^{t-\tau}/1-\delta\right) > 0$$

Equation (9) shows the benefit in the future from time $\tau \to t$ when the low-income borrower decides to repay all his member's debt to the financial institution. We can group the trust of investors into two levels. First, an individual investor will keep his credibility as long as the other investors can be trusted. Second, an individual investor will keep his credibility even when other investors are not trustworthy. The decision to make a repayment for the group lending depends on the following conditions:

In the case that the other member in the group also decides to repay the debt, the investor will decide to repay his debt when:

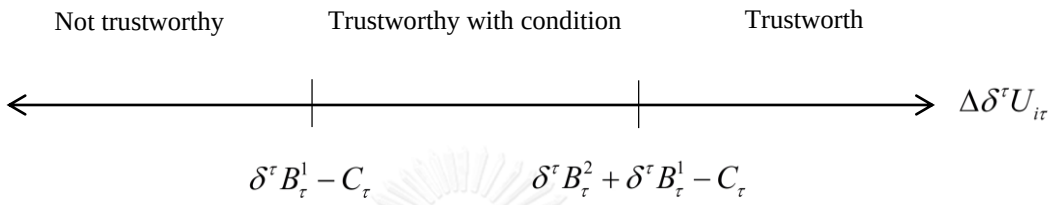
$$\Delta\delta^{\tau} U_{i\tau} \geq \delta^{\tau} B_{i\tau} - C_{\tau} \tag{10}$$

The investor will repay the debt when his utility from long-term investment is higher than the amount of his leftover debt including the social capital of credit bureau (his short-term utility). In the case of one member in the group deciding to default on the loan, the investor will repay the group's loan only when:

$$\Delta\delta^{\tau}U_{i\tau} \geq \delta^{\tau}B_{\neg i\tau} + \delta^{\tau}B_{i\tau} - C_{\tau} \quad (11)$$

The conclusion for equation (11) is that investor will repay the debt regardless of whether other investors will make their payment or not when his long- term utility is higher than the leftover amount of his own debt, the group debt, and the social capital of the credit bureau (short-term utility).

When assuming $\Delta\delta^{\tau}U_{i\tau} \equiv \delta\left(\Pi - RI\right)\phi_{\tau}^{t}$, the conditions to keep their creditability can be displayed in the form of long-term utility lost as follows:



The area on the left-hand side of the diagram shows that the expected future utility of debt repayment is lower than the utility of debt default ($\delta^{\tau}B_{\tau}^{1} - C_{\tau}$); therefore, the borrower tends to default on the debt whether the other group member will repay the debt or not. This situation will occur when low-income investors lose their profit or they expect that their future return on investment is lower than the amount of unreturned debt.

The area in the middle of the diagram shows the situation in which low-income investors gain some profit from their first investment, and they also expect to gain more profit than the amount of debt default. However, the sum of the future profit is still less than the sum of the future debt repayment, which causes them to consider repayment only when the other member also continues the repayment.

The right-hand side of the diagram displays the situation in which low- income borrowers are successful in their investment. Their expected income in the future is also higher than the amount of debt when other members in the group decide not to repay the debt. Therefore, they are willing to repay not only their own debt but also the debt of other members in the group in exchange for the opportunity to access another source of funding in the future. When we compare group lending and personal lending, financial institutions find that group lending provides better collateral. When one member defaults on a debt, the other members will make a payment ($\delta^{\tau}B_{i\tau}$) instead. However, in the case of low-income group lending, the financial institution must carefully screen the group member before approving the loan.

3.2.3 Role of initial asset

The financial institution will need to consider the payment ability of every member to guarantee the group loan. If the financial institution decides that the investment project is successful ($\Pi \geq RI$), the bank can be sure that the investor can pay the debt but in the case that the project turns out to be unsuccessful ($\Pi < RI$), the financial institution must forecast the chance that some investors might stop paying back the loan. If the project does not go well but the investors are still able to pay the

loan (solvency ability), this project will be considered a low-risk project. On the other hand, in the case of insolvency, the project is a high risk one; therefore, in this case, the financial institution will not grant a loan to the individual.

In the case of a personal loan (no loan guarantee among group members), at the end of time t, investor capital cost will be $RB_{it} + (R-1)W_{it}$, where RB_t is the cost of lending from financial institutions and $(R-1)W_{it}$ is the cost of the personal asset (e.g., the opportunity cost of future consumption) share in the investment. Therefore, the ability to repay the debt of the low-income group depends on the future performance of the investment and the initial wealth.

When low-income borrowers demonstrate their success in investment ($\Pi \geq RI$) to the financial institution, the financial institution will not decline the loan. However, if the financial institution doubts the future return ($\Pi < RI$), it has the right to ask the borrower to own some minimum wealth as collateral to guarantee the loan, where the minimum wealth for collateral ($\underline{W}$) will be

$$\underline{W} \equiv -(\Pi - RI) \leq W_{it} \tag{12}$$

In the case of group lending, apart from the performance and the personal asset cost of the project, other investors' asset costs must be calculated to find the minimum asset for lending approval. Therefore, if investors can repay all their debt plus the money they guarantee as

$$\Pi \geq RB_{it} + (R-1)W_{it} + RB_{\neg it}, \tag{13}$$

the minimum wealth of the investor for the bank to approve the loan will equal zero ($\underline{W}$ =0). However, when the expected profit in the future is not enough to repay the debt for the whole group, the low-income borrower will be forced to own some minimum wealth as collateral for the loan in the amount of:

$$\underline{W} \equiv RB_{\neg it} - (\Pi - RI) \leq W_{it} \tag{14}$$

When comparing group lending with personal lending, the future success of the project cannot guarantee that investors will have no credit constraints because of the risk of other investors in the group. Therefore, if the project is so successful that it can cover all the capital cost of the group, then the minimum asset guarantee will not be needed for loan approval as $\underline{W} = RB_{\neg it} - (\Pi - RI)$. However, the success of the project will create $\Pi - RI \geq RB_{\neg it}$ and the real minimum asset required for the approval is equal to 0 as shown in figure 3-2.

Figure 3- 2: Payoff matrix for minimum asset required.

	Personal loan	Group loan
Successful project ($\Pi \geq RI$)	$\underline{W} = 0$	If $RB_{\neg it} \leq (\Pi - RI)$, then $\underline{W} = 0$ If $RB_{\neg it} > (\Pi - RI)$, then $\underline{W} = RB_{\neg it} - (\Pi - RI) > 0$
Unsuccessful project ($\Pi < RI$)	No loan	$\underline{W} = RB_{\neg it} - (\Pi - RI) > 0$

However, with a successful project but without assets adequate to cover the whole group guarantee, the minimum asset for loan approval will play an important role again since $0 \leq \Pi - RI < RB_{\neg it}$. The minimum asset will be $\underline{W} > 0$.

There are two benefits to having collateral as minimum wealth for a loan in a low-income lending group.

1, For a low-income group member, it is much easier for him or her to access the loan when applying through group lending than individual lending, especially in the case when the expected amount of return in the future is less than the loan default amount and the member cannot obtain enough minimum wealth ($\underline{W} < -(\Pi - RI)$). In such a case, the chance that the low-income individual borrower will receive loan approval from financial institution is very low.

2. From the financial institution point of view, the group lending member's bond will help reduce default risk, especially when the group leader has good financial status.

3.2.4 Relationship between members in group lending

After screening the member in the group, the group relationship is very important for group lending. An advance payment guarantee among the group members is necessary. When one member misses the repayment, the others must bear the responsibility. However, in reality, when the default happens, the financial institution can hardly force some members to repay the debt caused by other members. Some members may try to claim the reimbursement from default investors. This process needs the close bond between the members to raise the possibility to get the money back, which increases the effectiveness of group lending.

In urban areas where the bond among individuals is weak, the study set the relationship as $\lambda \in [0,1]$ where $\lambda \to 1$ stands for the strong bond (such as family ties). On the other hand, $\lambda \to 0$ is when the members hardly know each other, or the normal relationship for the urban area. The relationship among members in the group will help claim some of the debt from loan default. We also found that the benefit from loan default is inversely proportional to the strength of the bond among the members. If the relationship between these two investors is strong, the benefit of investors $\neg i$ will be as low as $\lim_{\lambda \to 1}(1-\lambda)\delta^{\tau} B_{\neg i\tau} = 0$ since the loan collection system is effective. The more

intimate the group is, the higher the social capital from loan default ($\lim_{\lambda \to 1} \lambda C_\tau = C_\tau$) will be.

From a close relationship, after the default, investor i must repay debt for investor $\neg i$ so he can claim the loan from investor $\neg i$ and get the repayment amount of $\lambda \delta^\tau B_{\neg i\tau}$. The benefit and the cost of investor $\neg i$ is $(1-\lambda)\delta^\tau B_{\neg i\tau}$ and C_τ, respectively. If the relationship between these two investors is strong, the benefit of investor $\neg i$ will be as low as $\lim_{\lambda \to 1}(1-\lambda)\delta^\tau B_{\neg i\tau} = 0$ but the cost will be as high as $\lim_{\lambda \to 1} \lambda C_\tau = C_\tau$. The result of the claim from $\neg i$ is that investor i's burden on default is less or only $(1-\lambda)\delta^\tau B_{\neg i\tau}$. However, if both are in default, this compensation will not occur.

We can conclude that the benefit and the cost of the decision to stop the investment is as follows:

Figure 3- 3: Payoff matrix for relationship between two members.

1st member \ 2nd member	Continue investment	Stop investment
Continue investment	$\delta^t U_{1t}$ $\delta^t U_{2t}$	$\delta^t U_{1t} - (1-\lambda)\delta^\tau B_{2\tau}$ $\delta^\tau U_{2\tau} + (1-\lambda)\delta^\tau B_{2\tau} - \lambda C_\tau$
Stop investment	$\delta^\tau U_{1\tau} + (1-\lambda)\delta^\tau B_{1\tau} - \lambda C_\tau$ $\delta^t U_{2t} - (1-\lambda)\delta^\tau B_{1\tau}$	$\delta^\tau U_{1\tau} + \delta^\tau B_{1\tau} - \lambda C_\tau$ $\delta^\tau U_{2\tau} + \delta^\tau B_{2\tau} - \lambda C_\tau$

When investor $\neg i$ chooses to continue the investment, investor i will have two choices: (a) continue the investment and get the utility of $\delta^t U_t$ or (b) stop the investment and get the utility of $\delta^t U_t + (1-\lambda)\delta^\tau B_{i\tau} - \lambda C_\tau$. The condition that investor i can keep his credibility with respect to the financial institution is:

$$\Delta \delta^\tau U_{i\tau} > (1-\lambda)\delta^\tau B_{i\tau} - \lambda C_\tau \qquad (15)$$

On the other hand, if investor $\neg i$ chooses to stop the investment, i will have two choices: (a) continue the investment by paying back the other member's debt and get the utility of $\delta^t U_{it} - (1-\lambda)\delta^\tau B_{\neg i\tau}$ or (b) stop the investment and get the utility of $\delta^\tau U_{i\tau} + \delta^\tau B_{i\tau} - C_\tau$. The condition that investor i will maintain creditability with respect to the financial institution is:

$$\Delta \delta^\tau U_{i\tau} \geq (1-\lambda)\delta^\tau B_{\neg i\tau} + \delta^\tau B_{i\tau} - \lambda C_\tau \qquad (16)$$

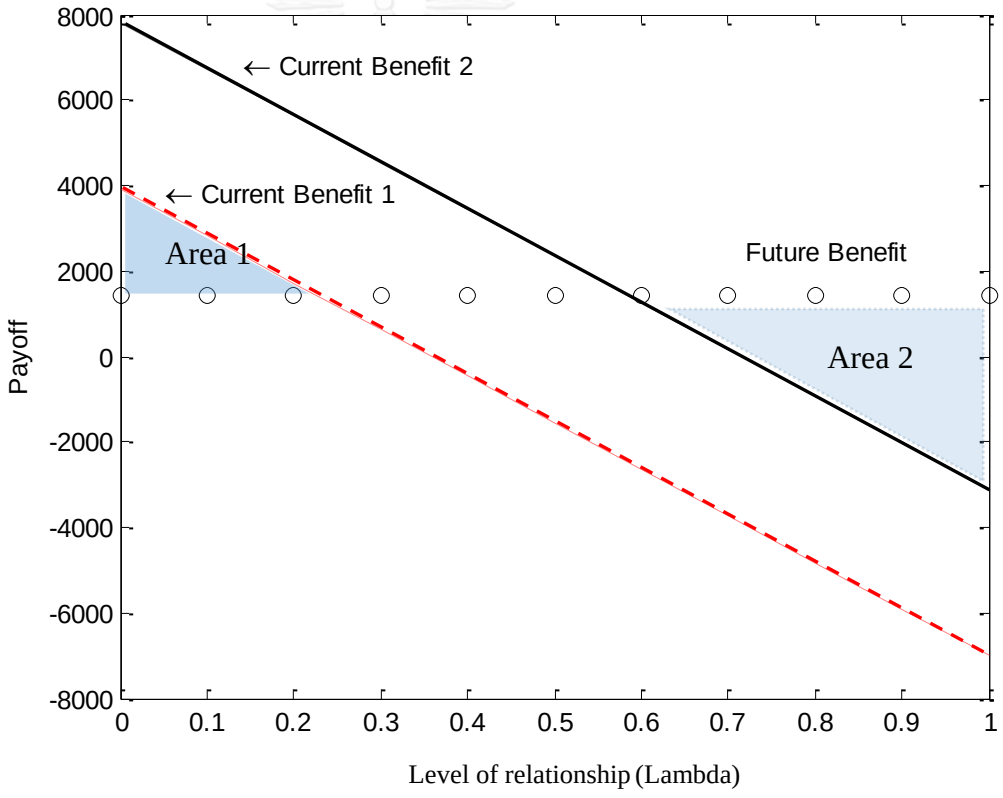
The pattern of group lending from microfinance in urban areas nowadays is not suitable because of the high variation in members' income. In urban areas, the group is normally formed to meet the loan condition of group lending member numbers. Therefore, as $\lambda \to 0$, the loan default probability increases. Moreover, the social

capital in urban areas is also very low, which makes it easier for members to decide to not to pay back the loan.

From equation (15), in the case that member $\neg i$ decides to pay back the loan, if the value of the bond strength is near zero, the social capital from loan default is very low and the benefit from the amount of money that the investor does not have to pay back will be comparatively high. Thus, the investor tends to choose not to repay his loan.

From equation (16), when investor $\neg i$ decides to default on the loan, investor i will have a choice between continuing paying the group's debt ($\delta^{\tau} B_{\neg i\tau}$) or deciding to default. As the bond between the group members is low, the benefit from the default decision is comparatively higher than the benefit they will get from future accessibility to capital. Equations (15) and (16) display the decision pattern of each member, as shown in Figure 3-4.

***Figure 3- 4*: Decision area of the first member.**



From figure 3-4, the bubble line shows the expectation of future benefit if members decide to repay the loan, and the dashed line displays the benefit when one of the members defaults on the loan. The dashed line shows the benefit when other members decide to repay the loan. Under the condition that their bond is weak, the area shows that groups will obtain more benefit from the loan default decision (Area 1) until the relationship over 0.2 of the current benefit will be less than the future benefit. Area 2 (relationship over 0.6) is the area in which the borrower tends to repay the debt whether the other group members will repay the debt or not because their future benefit

from future investment is higher than to default. Under the condition that the bond is strong (e.g., family ties), if investor $\neg i$ decides to default on the loan, the intimacy among the group will create two effects: (a) allowing member i to be able to collect the loan with the loan collecting ability of $\lambda\delta^{\tau}B_{\neg i\tau}$ that will reduce the benefit on the debt default of member I and (b) creating higher social capital (λC), which persuades investors to repay all the loan including the other member's (member $\neg i$) debt. Each member will make a decision to repay under:

Proposition 3.1:

I. Group lending where $\lambda < \frac{\delta^{\tau}B_{i\tau} - \Delta\delta^{\tau}U_{i\tau}}{\delta^{\tau}B_{i\tau} + C_{\tau}}$. This pattern makes all members decide on loan default.

II. Group lending where $\lambda \geq \frac{\delta^{\tau}B_{\neg i\tau} + \delta^{\tau}B_{i\tau} - \Delta\delta^{\tau}U_{i\tau}}{\delta^{\tau}B_{\neg i\tau} + C_{\tau}}$ this pattern makes all members decide on loan repayment.

We can conclude that the close relationship among the group members can help ease the claim process when default occurs and will increase the group credibility as a whole to financial institutions compared to the group with no relationship or the weak relationship group. Therefore, in the urban area where the relationship in the group is weak, group lending can be formed with special conditions, such as a family group. This type of bonding can help reduce the risk from loan default in group lending in urban areas.

3.2.5 The effects of exogenous shock to the group lending

Even though the formation of groups with family ties helps increase the bond in the group, it is more sensitive to exogenous shock when compared with the normal group lending with less group bond strength. When idiosyncratic shocks such as serious illness or individual shock occur, in the normal group lending case, the effect of the shock will not transfer to other members but in the family-ties group, the burden from the shock will also pass to other family members. The severity of the shock depends on the bond strength among group members (λ)

If idiosyncratic shocks occur to one member in group lending with family ties such as a serious accident with injuries, in which case investors cannot go to work, their income is automatically reduced. In such a case, in the normal group lending scenario, other members will bear the loan burden instead but in the family ties case, the expense from the shock will pass to the other members in the family in the form of family support. However, if we set the intention to help other members as α with the relationship of bond strength (λ) as:

$$\alpha = \lambda^2$$

The relationship among group members will increase the intention to repay for other members exponentially (see Appendix A). With the scenario that the second member faces the idiosyncratic shock (L), the first case is that he is still able to repay the group loan, meaning that his overall benefit from the investment and initial wealth

(W_0) can substitute the loss from the shock and there is no need for him to ask for help from the first member. The second case is that second member cannot repay his debt after the severe shock. Then, the second member will need help from the first member, and the first member will help the second member equal to the amount of αL as shown in the following payoff matrix:

Figure 3- 5: Payoff matrix in case of idiosyncratic shock occur.

1st member \ 2nd member	Continue investment	Stop investment
Continue investment	$\delta^t U_{1t}$ $\delta^t U_{2t} - L_2$	$\delta^t U_{1t} - (1-\lambda)\delta^\tau B_{2\tau} - \alpha L_2$ $\delta^\tau U_{2\tau} + (1-\lambda)\delta^\tau B_{2\tau} - \lambda C_\tau - (1-\alpha)L_2$
Stop investment	$\delta^\tau U'_{1\tau} + (1-\lambda)\delta^\tau B_{1\tau} - \lambda C_\tau$ $\delta^t U'_{2t} - (1+\lambda)\delta^\tau B_{1\tau} - L$	$\delta^\tau U_{1\tau} + \delta^\tau B_{1\tau} - \lambda C_\tau$ $\delta^\tau U_{2\tau} + \delta^\tau B_{2\tau} - \lambda C_\tau - L_2$

The left top of the payoff matrix shows that if the second member faces the shock and both members decide to repay their debt, the total utility of the second member will decrease equal to the size of the shock ($\delta^t U_{2t} - L_2$). The bottom left box displays the case in which the first member decides to default on the loan when the shock occurs to the second member. The first member will get a benefit equal to $(1-\lambda)\delta^\tau B_{1\tau}$ together with the social capital of λC_τ, where the second member decides to repay all the group debt. After pressing the claim from the first member in the amount of ($(1-\lambda)\delta^\tau B_{1\tau}$), the top right box is when the shock occurs to the second member, and the second member cannot repay the loan but the first member decides to help the second member when (a) the shock is equal to αL_2 and (b) the debt claim from the second member is equal to $(1-\lambda)\delta^\tau B_{2\tau}$.

The decision to repay the debt for the first member when the second member decides to repay is:

$$\Delta\delta^\tau U_{i\tau} > (1-\lambda)\delta^\tau B_{i\tau} - \lambda C_\tau \tag{17}$$

However, when shock occurs to the second member and he cannot repay the loan, the decision of the first member for loan repayment is:

$$\Delta\delta^\tau U_{i\tau} - \alpha L_{\neg i\tau} > (1-\lambda)\delta^\tau B_{\neg i\tau} + \delta^\tau B_{i\tau} - \lambda C_\tau \tag{18}$$

From equation (17), if the second member has a shock but is still able to handle the burden of the shock, the first member will decide to repay the loan upon what he expected to get from a future loan compared to the amount of loan default without consideration of the shock.

Equation (18) shows that the strength of the social ties in the group lending with family ties will affect the result of the shock. The loan burden will transfer to the other member if the bond is strong. When shock occurs to the second member, the burden from the shock that the second member has to take responsibility for will reduce the expected future return $(\Delta\delta^{\tau}U_{2\tau}-(1-\alpha)L_{2})$. This burden can be relieved if the first member decides to help with the amount of αL_{2}. However, with this help, the first member's utility will be reduced to $\Delta\delta^{t}U_{1t}-\alpha L_{2}$ which will affect the first member's decision on loan default.

We display the member's decision when shock occurs in equations (17) and (18) as shown in figure 3-6.

Figure 3- 6: Decision of first member during a small shock.

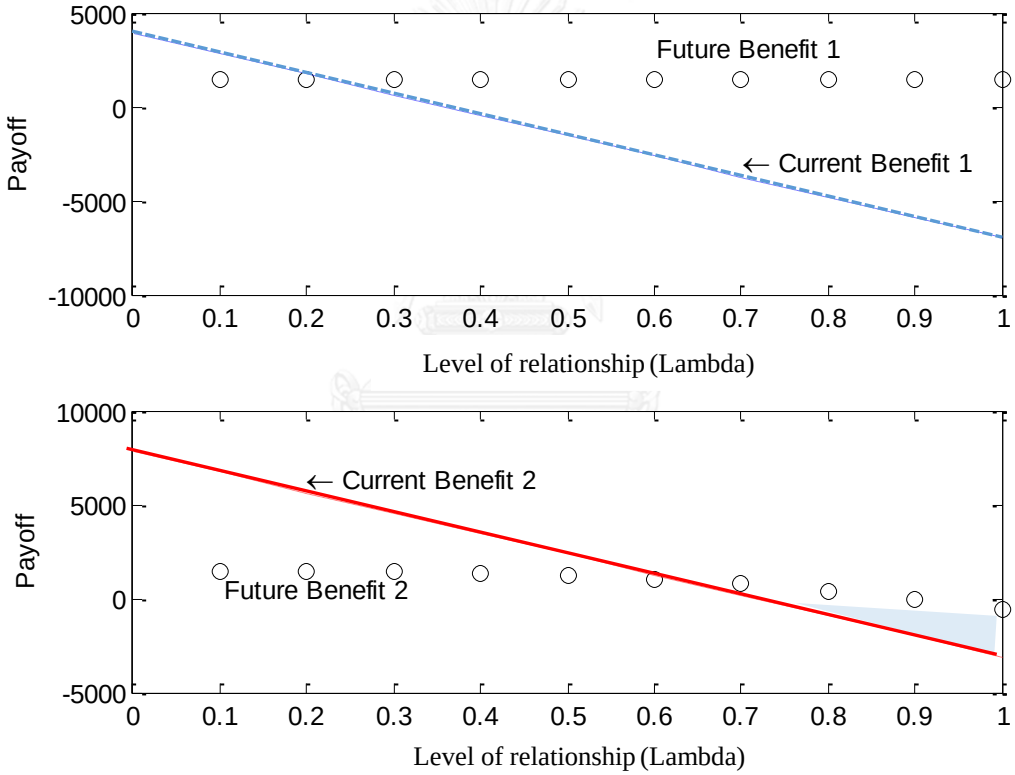


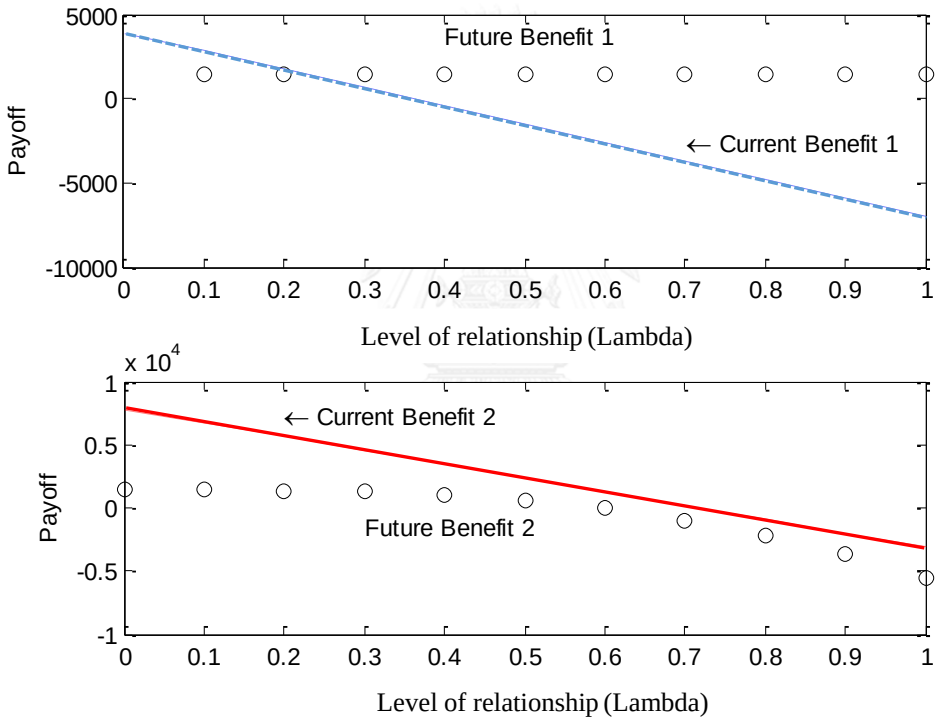
Figure 3-6 shows the effect of the shock on the family ties bond. The upper panel, the dashed line, and the bubble line display the situation when a member faces a shock and is still able to repay the debt with no side effects for the first member because there is no need for financial support.

However, considering only equation 18 (shown in figure 3-6 lower panel), when the second member faces so severe a shock that he or she cannot repay the debt and if this member has close ties to the first member, the first member must offer financial support. Therefore, their overall expected benefit will be greatly reduced according to the intimacy between the first member and second member (shown by the bubble line). If the size of the shock that the second member experiences is not too

large, the first member will still be able to support the repayment. This situation will occur only under group lending with family ties (shown in the blue region).

We found that in the case of group lending with family ties, the size of the shock experienced by one of the members will affect other members. If the size of the idiosyncratic shock is large enough, the possibility of the repayment region cannot be shown in the diagram because the default decision gives this member a greater benefit than the repayment decision (see figure 3-7). This case is different from the case of the weak-tie lending group where each member will bear responsibility only to their own loan accounts. The idiosyncratic shock that occurs is smaller and the effect of shock is also comparatively smaller. However, from proposition 3.2, we found that without shock, group lending in the weak social ties group will lead to default in any case.

Figure 3- 7: Decision of the first member during a large shock.



Proposition 3.2: If $\alpha L_{\neg i\tau} > \Delta\delta^{\tau}U_{i\tau} + \lambda(\delta^{\tau}B_{\neg i\tau} + C_{\tau}) - \delta^{\tau}B_{\neg i\tau} - \delta^{\tau}B_{i\tau}$, group lending with family ties will make a default decision in any case.

3.3 Conclusion

One of the main problems of group lending is that we use the same group lending pattern in urban area as in rural area group lending. When the financial environment is different, the financial instrument should be adjusted to increase efficiency. The purpose of this paper is to develop a new style of group lending to suit the weak-tie society found in urban areas. Besley and Coate (1995) stated that apart from the social capital of sanctions, low-income group members' decision to repay or not to repay also depends on the investor's future benefit. The member will also consider the next future loan in terms of his or her future utility. If the benefit in the

future is high, the investor will tend to repay the loan, including his or her partner's loan in the case of default.

For the weak social ties group, this study shows that the efficiency of group lending will decrease because of two factors: (a) the social capital of the one who defaults is low (since the members do not know each other well and so there is no embarrassment) and (b) the loan claim among members in this group is harder to do. This problem can be addressed by using the benefit of the family ties group to lower the risk of default; however, this type of group loan is more sensitive than the normal type of group loan because when a shock occurs, every member in the group will tend to get involved, and they will suffer together. This reaction will reduce the group's ability to repay the debt and if the shock is too harsh, the whole group has a high potential to have to decide on loan default. However, in the case of low social ties group lending, we found that the shock effect will not pass to other members in the group, but group lending with weak social ties will lead to loan default by itself. Therefore, in urban areas, group lending with family ties will help increase the chance of repayment.

Chapter 4

Microfinance and Family Ties: Challenge to Reduce Loan Default in Urban Areas in Thailand

4.1 Introduction

The microfinance system has evolved over the years since 1980, when the Grameen Bank of Bangladesh was set up to provide financial assistance to low-income people who could not access credit from the formal financial sector in the economy. One main reason that normal banks are not able to lend support to the low-income target group is that the low-income group cannot provide any collateral for the loan guarantee.

To reduce the problem of investing collateral in the low-income group, Grameen Bank has created a group lending program to help low-income borrowers access the investment fund under the condition that members must share the loan burden. The group lending applies the concept of joint liability, which reduces "adverse selection" (Abbink, Irlenbusch, and Renner (2006); Ghatak (1999)) and "moral hazard" (Beatriz Armendáriz de Aghion and Morduch (2005); Besley and Coate (1995); Cason, Gangadharan, and Maitra (2012); Stiglitz (1990)). The adverse selection problem occurs when a financial institution does not have enough information to evaluate a low-income group, and a moral hazard problem occurs when the borrower does not spend the loan as he or she declares to the financial institution.

To reduce the adverse selection problem, Ghatak (1999) used the benefit of local information because borrowers had more information about their group members and would choose another safe borrower as a new member for the group. To reduce the moral hazard problem, the commitment among people in the group's debt will automatically pressure people in the group to monitor and track the investment behavior of each individual among the group members. Moral hazard problems can also occur in another form. Some members succeed in investment, but they decide not to repay the debt (strategic default: Besley and Coate (1995). In such cases, the lender might not have known whether the default of the borrower was intentional or the borrower was actually unable to earn enough money to pay back the loan. Group lending can resolve this issue by the principles of the monitoring cost, with the assumption that the group members know each other well and can monitor each other's behavior, which allows each member to keep track and know the circumstances in the group. Therefore, each member of the group may be the one who reveals the reason for the default (Beatriz Armendáriz de Aghion & Morduch, 2005). However, the success of group lending often depends on the intimacy of the group. Differences in the levels of social capital such as the borrower's reputation in the community can reduce the efficiency of group lending

(Hofferth & Iceland, 1998). In the weak social ties society, the condition of loan collateral in the group can lead to a negative effect of group lending through the free-ride problem.

Group lending can mislead high-risk individuals to default on loans. This group lending will eventually have an additional risk for the individual (Fishcher, 2013). In some cases, group lending can create negative welfare situations, too. When one member defaults, the intention of other members in the group to repay is reduced. Even though other members are still willing to repay some individual debts, the whole repayment rate is still lower than the total group loan, which is still counted as a default (Besley & Coate, 1995). Therefore, the question is whether joint liability is still a good tool for microfinance loans when the relationship among members in the group is not strong.

In urban areas, the low-income population is migrating from rural areas in order to look for opportunities. This migration creates heterogeneous communities with various racial, ethnic, or even different income ranges. This kind of variety in societal characteristics can reduce the trust between individuals in the society (Alesina & Ferrara, 2002). With very few bonds among members in the society, the group usually makes decisions based on perceived benefits. Therefore, the efficiency of group lending in urban areas is not high when compared to group lending in rural areas (Beatriz Armendáriz de Aghion & Morduch, 2005).

To solve the weak social ties problem in urban areas, this study chooses the benefit of family ties to strengthen the bond between each member in the group. Alesina and Ferrara (2002) found that each individual has more reliability if the partner shares similarities with them, for example, family member's similarities. Ermisch and Gambetta (2010) found that people who come from families with strong family ties tend to trust strangers less than those from families with weaker family ties. Carrillo (2010) stated that family ties help reduce the risk in investment.

Therefore, this study considers whether strong family ties can help solve the group default problem in the weak social ties group since family members help monitor the behavior of one another and also help efficiently punish the one who tends to want a free ride or avoid the repayment of the debt even in urban areas with weak social ties.

The paper is organized as follows: Section 4.2, the literature review, shows the moral hazard and adverse selection problems in group lending. However, this study is based on urban area ideas. Section 4.3 exhibits the field experimental game based on the study by Abbink et al. (2006). Section 4.4 is the conclusion.

4.2 Literature review

Regarding the effectiveness of debt repayment in group lending, Gomez and Santor (2003) found that group lending has more efficiency than individual lending because of its relatively lower borrower default rates. In contrast, Kono (2006), who conducted a test on a Vietnamese low-income group to study the efficiency of low

income group lending, found that group lending with a dynamic incentives condition causes the free-ride problem that raises the chance for defaults on loans. Even peer monitoring and penalties among group members cannot solve the default problem. Therefore, individual lending gives a better result than group lending, especially for the rate of loan default. Similar to Kono (2006), Gine, Karlan, Jakiela, and Morduch (2009) conducted a field experiment to test the efficiency of group lending in Peru. They found that group lending members tended to invest in more high-risk projects. Bauer, Chytilová, and Morduch (2012) conducted a survey in South India and found that most of the low-income members value the present amount of consumption rather than the expected amount of consumption in the future, which means microfinance groups tend to choose to default on loans over repaying their debts.

Many studies have employed an experimental game to study microfinance group lending to understand the importance of social ties, and to determine the proper size of the group. Abbink et al. (2006) found that group lending with high degrees of solidarity lead to high willingness to repay. This willingness to pay is unstable over time but still comparatively high when compared to other kinds of group lending. Under the group lending scheme, Karlan (2005) found that the closer the group member, the stronger the group tie. He tested the study by letting the borrowers group choose its own members as opposed to the group set up by the researcher. The results showed that those who were closer had a higher payback ratio, which agrees with the results of Ghatak (1999). In the proper size of the group lending, Abbink et al. (2006) found that if the number of members was too high, a free-riding could occur. Carrillo (2010) studied the relationship between family ties and social ties by using a field experiment. In conclusion, Carrillo found that without communication among members and with enforcement of the repayment, the family ties group had less risky behavior than the nonfamily ties group.

Some empirical studies found that socioeconomic factors such as family size, distance from the fund source, total household income, and total household expenditure could affect fund accessibility. Kevane and Wydick (2001) tested the differences in gender and found that female entrepreneurs are more likely to have difficulties accessing investment funds due to maternal duties and maternity leave. Moreover, Mokhtar, Gilbert, and Gan (2012) studied a microfinance project in Malaysia and found that gender, age, and repayment schedule have an effect on the loan default. Bhatt and Tang (2002) found that education level has good relationship to repayment, but no relationship was shown between repayment rate and other factors such as gender, household income, or business type.

There are still very few studies about family ties, but family has an important role in the study of microfinance, as shown in the work of Pearlman (2012), who conducted a test of entrepreneurs in Peru and found that more than 60% of the sample group used informal networks to access funds, for example, borrowing from relatives or friends. Pearlman believes that this network can reduce negative shocks. Apart from

Pearlman, Okten and Osili (2004) stated that for the borrower who seeks a loan, family and community networks are good channels that provide effective and reliable loans. Yamagishi, Cook, and Watabe (1998) found that people who come from families with strong family ties tend to trust strangers less than do individuals who are from families with weaker family ties. In terms of monitoring and sanctioning, strong bond groups such as family ties increase the chances of monitoring and imposing sanctions compared to nonfamily ties groups. Ahlin and Townsend (2006) found that low-income groups in Thailand with family ties have an inverse relationship to repayment ability because their strong bond decreases their ability to impose penalties.

From the literature review, we found that the success of group lending is based on the strength of the bond in the group. In a time when society gradually urbanizes, the bonds within groups decrease; therefore, group lending tends to be less effective. This research will study whether family ties can strengthen the social bond in the case of a low intimacy society or not.

4.3 Method

4.3.1 Data collection

This study employed field experiments in five local morning markets, four of which are located in different areas in Bangkok: Thon Buri Train Market, Bangkhea Market, Talad Thai Market, and Wongwian Yai Market. The fifth market, located in a rural area, Bang RaKam district in Nakhon Pathom province, will be used as the benchmark for the experiment in this study.

We used a simple random sampling method to choose the experimental subjects in the urban area. Dense population areas such as Bangkae Market and Talad Tai Market were the main target. The time frame of the study could be different due to the market closing time; therefore, the field experiment has to be conducted many times in the same area. The areas above were far from and were inconvenient, so we decided to choose the similar size Bangkae Market, which was closer to us, and Wongwienyai Market and Thonburi Train Market in our study.

In this study, we used the financial institution of community in the Bang Rakam community as a benchmark. The financial institution in this community had performed well in the past 3 years, and it raised member numbers from 220 with a fund of 300,000 THB to 995 members with 7,200,00 THB (Saulphrued, 2009). The project was also chosen as the pilot project for the community learning center.

The sample groups are divided into three types of groups in two areas (rural area and urban area). Groups in the rural society will be the benchmark to study the differences in repayment behavior among rural and urban areas. The characteristics of each group will be (a) a random matching group of 30 persons, 10 subgroups with three members each where venders in random matching groups will be picked randomly by the game moderator; (b) self-selected group, 10 subgroups with three members each. In the second group, subjects are asked to group in threes with people they know from the experiment, either coming from the same area or knowing each other before. We will

call this the self-selected group; and (d) family ties group, 10 subgroups with three members each where members in the group must be related in some kind of family bond (such as parents, children, and other relatives). In total, 180 experimental subjects will be divided into 60 groups.

4.3.2 Field experiment game and ordered logistic regression

Normally, when questions about loans are asked of borrowers, no truthful answer is given. For example, a subject may reply that there was no loan default. To avoid bias from the interview, we use an experimental game based on an experiment by Abbink et al. (2006) to study the decisions on loan default. After the field experiment ends, we also employ the ordered logit model to study the factors that affect loan default.

4.3.3 Game introduction

Before the game starts, the game moderator will explain to all members how to play the game. Members may ask questions about the game until every member understands the rules and how to play the game. To prevent the information from leaking in the group, one assistant moderator will bring one member in the group to a different corner of the room, and to prevent information bias problems, each assistant moderator will ask questions according to the script. Each assistant game moderator is not allowed to say anything that is not included in the script. In total, the game will take 20 minutes and at the end, the game moderator will announce the value of the token. One hundred tokens will equal 5 Baht. At the end of the game, the maximum amount of money one member can earn is 365 Baht and the minimum is 0 Baht.

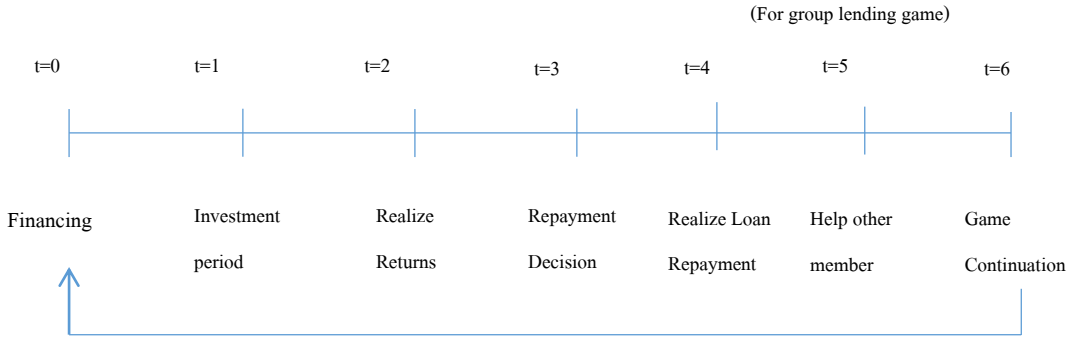
Each assistant moderator will pass the results of the member they are in charge of through an instant message tool in order to share the information with the other assistant moderators in the room. For example, if member no. 1 failed the investment or loan default decision, the result will be passed to the second and third assistant moderators to ask for their financial help from the second and third members. However, the second and third members will not know each other's decisions. All they will know is one of the members has financial problems.

4.3.4 Game procedure

The structure of the game in this paper is developed based on Abbink et al. (2006) where the game is divided into three categories: individual lending, group lending, and group lending with shock.

4.3.4.1 Individual lending game and group lending game

Figure 4- 1: Timing of events.



Individual lending game (see Appendix B for game answers sheet)

Stage 1: Game moderator will give each participant 300 tokens as his/her investment fund.

Stage 2: Game moderator will ask members to toss the dice to specify the investment result. If the dice shows 4-6 (probability of ½), we will assume that the investors succeed and receive the investment return of 300 token but if the dice shows 1-3 (probability of ½), 300 tokens will be taken from the investor.

Stage 3: Each member finds out the result.

Stage 4: The game moderator will ask all members whether they are willing to repay the debt or not.

Stage 5: Members will be asked to confirm their repayment decision. If the member decides to repay the debt to the game moderator, the member can continue to invest in the next round. However, if the member decides to default, the game will stop.

Group lending game

Once the members have participated in individual lending, each member will start the group lending game. Each member will form a group according to the form provided by the game (random matching group, self-selected group, and family ties group). For Stage 1 – Stage 5, the process of the group lending game is identical to that of the individual lending game.

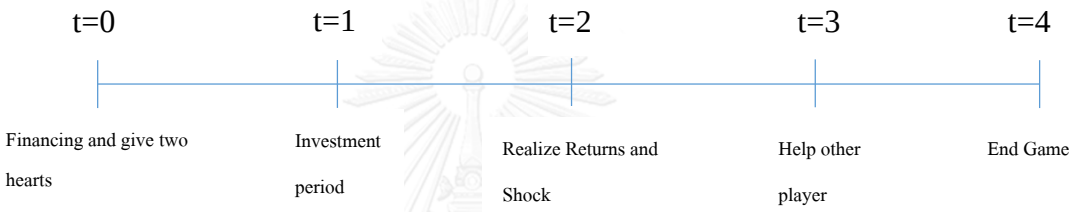
Stage 6: After every member repays the debt, the game moderator must count the total repayment and it must equal 900 tokens (300 for each member). If the total is fewer than 900 tokens, the moderator will ask each member to help other members who failed in their investment. In the search for help, each member will not know which member in the group is the one who did not repay the debt but will only know that the total repayment is fewer than 900 tokens. Therefore, no one in the

group will know other members' decisions whether they will help repay the leftover debt or not. In particular, the group lending can collect 900 tokens to repay the moderator. The whole group will have a chance to go for the next round. Otherwise the game will stop.

Stage 7: In the case of at least one member in the group deciding to not repay the debt, the game moderator will ask the other members, "How much do you want to pay for information regarding who in your group defaulted?" and "Can you guess who in your group defaulted?"

4.3.4.2 Group lending game with shock

Figure 4- 2: Timing of events.



Stage 1: The game moderator will give each member 300 tokens and 2 hearts. Each heart is worth 500 tokens.

Stage 2: Each member will choose one of three cards.

Stage 3: The result of the investment will be announced. Two of the three cards have the following message written on them: "Your investment is successful and you will receive 300 tokens." One of the three cards reads, "You lose 300 tokens and 2 hearts."

Stage 4: The member who succeeds in the investment will be informed that "one of the members in the group lost the investment money along with the 2 hearts" and he or she will be asked for a decision after the hearing.

This game will be played only one round. However, to reduce the loan default decision, in the case that the member knows there will be only one round, the moderator will not let any members know the number of rounds in the game. There will be more additional conditions to play in the game with shock. These conditions are:

1. When the game ends and the member holds 2 hearts, he/she will receive the return on investment plus 500 tokens for each heart left.

2. When the game ends and the member has one heart left, he/she will not receive any return on investment but will receive 500 tokens for a heart instead.

3. When the game ends but the member has no hearts left, he/she will not receive anything.

a. Assistance conditions

In the game with shock, if a member requests any assistance after the loss of a heart, assistance can be provided in two ways: members can assist with the tokens they

hold or they can assist with the hearts they possess. They can choose only one style. Tokens together with heart are not allowed.

If they choose the first option, the whole group except the member with shock can continue to the next round of the investment. If they choose the second option, the member with shock will finally gain a token as the amount of hearts they receive, but the whole group's investment chance in the next round will be zero, and the group cannot continue its future investment because it cannot repay the debt to the lender.

4.3.5 Ordered logistic regression analysis

After the field experiment ends, each member will complete the information on the survey: demography variables and family variables as shown in Appendix B. To test the effects of all control variables on debt default, this study applies a different approach to the dependent variable to eradicate some behaviors that affect the repayment decision but cannot be easily observed; for example, personalities, life styles, characters, or attitudes. The dependent variable data are transformed from the period that each member in the group decides to default in the group lending game minus the period that the individual decides to default in the individual lending game, and we get a new dependent variable in the form of the changes in debt repayment after group lending is formed. After the inquiry is completed, all data will be used for testing the Ordered Logit Model (see Appendix B for a description of the variables).

$$Y = \beta_1 \mathbf{X}_{\text{Remittance}} + \beta_2 \mathbf{X}_{\textit{More than one source of fund}} + \beta_3 \mathbf{X}_{sex} + \beta_4 \mathbf{X}_{child} + \beta_5 \mathbf{X}_{income} + \varepsilon \qquad (1)$$

4.4 Descriptive analysis

Physical characteristics of low-income experimental subjects include 51 years old on average with an average income of 836 Baht per day in the urban area, and 60 years old on average with an average income of 465 Baht per day in the rural area; both with a basic education level of lower than secondary school level and with almost every member married as show in table 4-1.

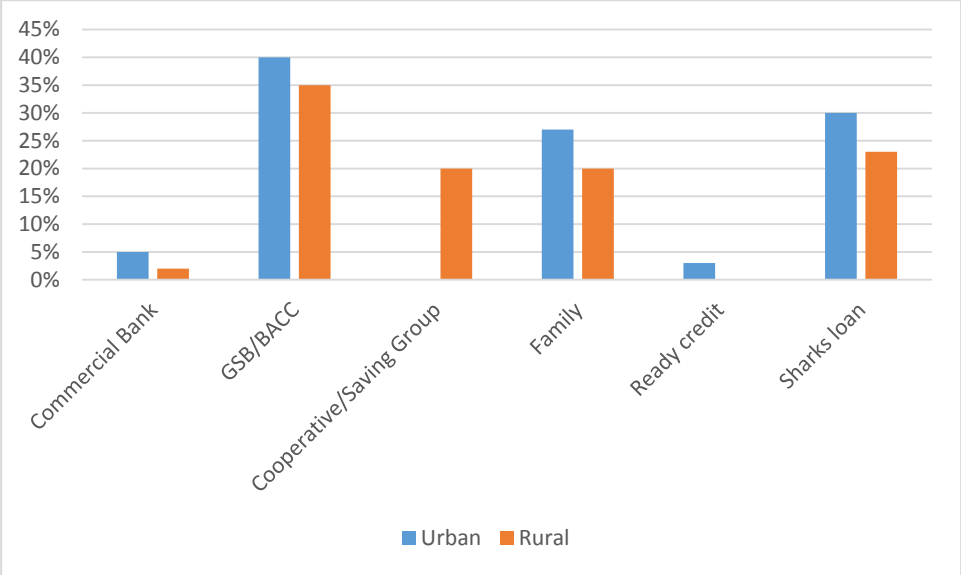
Table 4- 1: Physical characteristic of sample groups.

	Variable	Observation	Mean	Standard deviation
Urban	Age	60	51	4.7
	Children	60	2	1.93467
	Income	60	836	298.12
Rural	Age	60	59.92	3.15
	Children	60	4.6	1.08
	Income	60	465	205.01

4.4.1 Opinion on accessibility to credit

The most frequently used fund sources for the sample groups are loans with Government Savings Bank (GSB) followed by loan sharks as shown in figure 4-3.

Figure 4- 3: The loan sources.



Low-income subjects are more likely to choose loan sharks as their investment capital if the amount of money is not very high because the black market loan is easy to access and the loan will be approved in a very short time.

When it comes to the problem of accessibility of funds, low-income borrowers found that (a) the loan request is denied, (b) the loan process takes time, and (c) there is no loan guarantor for the experimental subjects from the urban area and not enough funding for the experimental subjects from the rural area (Table 4-2).

Table 4- 2: Problems in accessing formal financial institutions.

	Urban	Rural
Process is too slow	19%	24%
Loan approved is not enough	15%	21%
The approval of loan does not continue	13%	7%
Interest rate too high	4%	11%
Loan application is denied	32%	20%
Lack of guarantor	17%	10%

In the emergency case that causes borrowers to be unable to repay the loan, members will choose to borrow from (a) family, relatives, or friends and then (2) loan sharks. However, we found that members living in the urban area tend to migrate to avoid repayment, but no such decision is found among the members in the rural area as shown in table 4-3.

Table 4- 3: Decision after member has no money for repayment.

	Urban	Rural
No delay repayment	5%	12%
Loan negotiation	3%	6%
Migrate	15%	0%
Borrow from family or friends	45%	52%
Borrow from sources other than family	32%	30%

The objectives of the loan are normally (a) to consume and (b) to use as an investment fund as shown in table 4-4.

Table 4- 4: The objective of the loan.

	Urban	Rural
To invest	21%	36%
Daily consumption	54%	49%
Health-related issue	9%	5%
Family member's education	16%	10%

4.5 Results

From testing 180 field experimental subjects, 30 random matching groups in rural and urban areas (3 members/group), 30 self-selected groups in rural and urban areas (3 members/group), and 30 family ties groups in rural and urban areas (3 members/group), the results are as follows in Section 4.5.1.

4.5.1 Low-income groups in the form of the random matching group and the self-selected group living in urban areas have a greater tendency to flee the debt than the members living in rural areas.

To test the effectiveness of the repayment between subjects in the urban area and the rural area, this study compared the rate of repayment between the two groups

and found evidence of the difference in the repayment patterns between the random matching group and self-selected group in both areas as shown in table 4-5.

Table 4- 5: Average repayment rate in rural and urban areas.

Type of group lending	Rural area	Urban area
Random matching group	0.78	0.73
Self-selected group	0.87	0.72
Family ties group	0.83	0.81

From table 4-5, we saw that the average rate of return in the random matching group was 0.78 for the rural area and 0.73 for the urban area. In the self-selected group, the difference in the rates of return was 0.87 in the rural area and 0.72 in the urban area. In the family ties group, we found that the rates of return in rural areas and urban areas are 0.82 and 0.81, respectively. Even though the rate of return of family ties group in rural areas was lower than the data from the self-selected group, the finding showed that there was no difference in terms of repayment efficiency between the rural area and the urban area.

To test the differences in debt repayment between members living in the urban area and the rural area, we studied the repayment ability of the market vendors by using a Simple Regression Method as shown in table 4-6.

Table 4- 6: Simple regression on period of group default.

	Random matching group	Self-selected group	Group with family ties
Constant	2.4*** (0.159)	3.0*** (0.176)	2.6 *** (0.162)
Rural/Urban	-0.8** (0.225)	-1.3** (0.25)	0.3 (0.23)
R-squared	0.178	0.31	0.02

Standard errors in parentheses *, ** and *** indicates significance at the 10%, 5%, and 1%, levels, respectively

From table 4-6, we found that both random matching groups and self-selected groups in urban areas have significantly different repayment abilities. The study showed that periods of group lending in the urban area were shortened by 0.8 and 1.3 periods for random matching groups and self-selected groups, respectively, compared to those in the rural area. When we compared the result to the group in the rural area, members knew each other even in the random matching group, which was different from the random matching group in the urban area, possibly because of the difference between the size of markets in the rural and urban areas. In the self-selected group, the period of grouping was quite different due to the difference in strength of the social ties in both areas. In the rural area, most of the vendors know each other quite well whereas market vendors in the urban area have only superficial contacts. We discovered this from basic questions such as where other members in the group live or whether a

member had ever attended other members' ritual ceremonies (for example, a wedding or funeral). Urban group subjects hardly knew the exact location of other members in the same market or hardly ever attended their ceremonies. Instead of attending such ceremonies, they helped other members in the form of money. In the family ties group, there were no differences in terms of debt repayment when the area changes from rural to urban.

The results supported those from the study by de la Huerta (2010) that the effectiveness of the loan relies on the area of loan providing. However, we found no differences in the debt repayment ability of the family ties group in both rural area and urban area, which means that the family ties group might reduce the problem of weak bonding in urban areas.

Nowadays, the Government Savings Bank uses group lending as the main tool to help low-income people around the country regardless of the relationship between group members and the difference in geographic data. The results showed that lending does not perform well in urban areas, and the loan default rate was still high in the urban area group.

Based on the testing of 90 field experimental subjects only in urban areas, 30 random matching groups (3 members/group), 30 self-selected groups (3 members/group), and 30 family ties groups (3 members/group), the results are as follows:

4.5.2 In an urban society, the relationships among member are weak. Group lending with family ties can increase the repayment rate.

To test the ability of loan repayment in each group, this study calculated the rate of repayment of each group (Appendix C) to compare the repayment abilities as shown in figure 4-4.

Figure 4- 4: Average rate of repayment for all groups in the urban area.

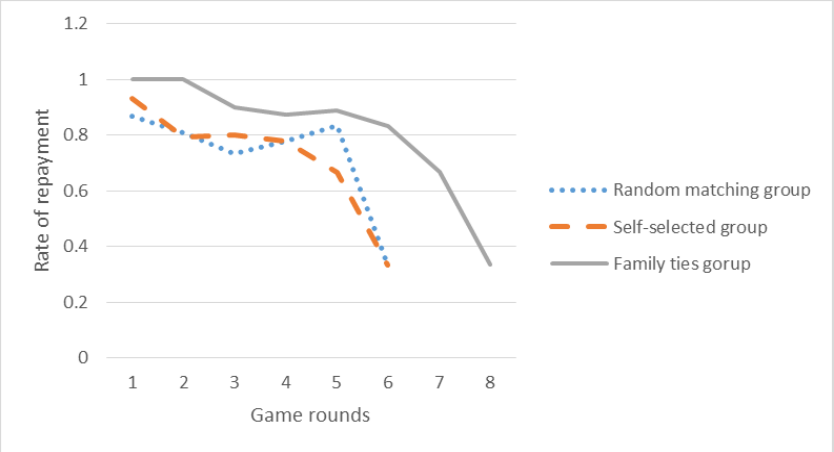


Figure 4-4 showed the average repayment rate in the urban area where social ties among group members are weak. The average rates of repayment were 0.72 (6

rounds), 0.71 (6 rounds), and 0.81 (8 rounds) for the random matching group, self-selected group, and family ties group, respectively.

In a comparison of the results between the random matching group and the self-selected group, the study showed that in the beginning of the game (rounds 1-3), the self-selected group had a better rate of repayment than the random matching group. The average rate of repayment for the self-selected group was 0.84 and 0.8 for the random matching group. However, when the first stage ended, loan default in the self-selected group increases exponentially compared to the random matching group, which had a better rate of repayment. The average rates of repayment of rounds 4-6 were 0.64 and 0.59 for the random matching group and the self-selected group, respectively.

However, the rate of repayment alone could not lead to the conclusion that one group had better repayment efficiency than the other group because loan default could be caused by unintentional default, in other words, the failure in investment resulting in not having enough money to make the repayment, or intentionally avoiding repayment (free-riding problem).

Therefore, if the repayment rate decreased because of the first reason, we could not conclude that the group with the low repayment rate had lower group efficiency. To study the result of the free-riding problem, we calculated the percentage of default occurring in stage 4 in the experiment game (section 4.4.1). The repayment decision in stage 4 of the experiment game determined the real repayment in the whole group without the effect of loan default from other members. The study also calculated the percentage of group assistance when other members in the group face a default problem. The result is shown in table 4-7.

Table 4- 7: Percentage of members who succeed in investment and no repayment of the debt.

Group	*Random matching group*	*Self-selected group*	*Group lending with family ties*
Members succeed and do not repay in rounds 1-3	12.03%	5.89%	1.19%
Members succeed and do not repay in rounds 4-6	17.77%	37.22%	3.73%
Members succeed and do not repay in rounds 7-8	-	-	33.33%
Members succeed and do not repay in rounds 1-6	14.9%	21.55%	10.18% (1-8 rounds)
Member assistance in all 6 rounds	0	0	33.33% (in all 8 rounds)

Table 4-7 showed the decision to not repay debt for the members who had successful investments. We found a high percentage of the free-riding problem in the random matching group in the beginning period (rounds 1-3). The percentage of the

experimental subjects who decided not to repay is 12.03%, very high when compared with 5.89% in the self-selected group and 1.19% in the family ties group. However, when we looked at the result of the latter half of the game (rounds 4-6), the result was reversed. The free-riding problem in the self-selected group increased rapidly. The free-riding problem in the self-selected group increased to 37.22% and 17.77% for the random matching group. The increased free-riding showed the lack of efficiency in the self-selected group in the long term. When considering the average result from the game, free-riding in the self-selected group is higher than that of the random matching group with percentages of 21.55% and 14.9%, respectively. This problem was one of the factors that influence the rate of repayment in the self-selected group that had the lowest rate of repayment among the three types of grouping. The result was compatible with the study by Besley and Coate (1995). They concluded that in the case of strategic default, areas with weak social ties have lower social capital, which increases the loan default problem.

Loan default rates in the urban area showed that the self-selected group in a weak tie society was no better than the random group type. This result contradicted the work by Abbink et al. (2006) and Gomez and Santor (2003), who found that the self-selected group has higher efficiency than the random matching group. However, when we looked at the family ties group, the free-riding problem is low, averaging only 10.18% even without any monitoring. Group assistance in the family ties group had the highest rate of assistance among the three groups, which was 33.33%. No assistance was found in both the random matching group and the self-selected group simulation.

a. Potential to monitoring

Even though this study omitted the monitoring topic because monitoring in the individualized society hardly ever occurs, the probability of monitoring in many types of groups through the willingness to pay for monitoring could occur. The chance that members would not repay the loan is shown in table 4-8.

Table 4- 8: Willingness to pay for monitoring.

Group Type	Willingness to pay for monitoring (Token)	The chance to detect loan default
Self-selected group	108.3	16.67%
Random matching group	72.2	11.11%
Family ties group	25	88.89%

When we interviewed experimental subjects about the amount of money they are willing to pay to help the member with the default problem, we found that the self-selected group has the highest willingness to pay for monitoring (Table 4-8) (108.3 tokens). The willingness to pay for the random matching and the family-ties group was 72.2 tokens and 25 tokens, respectively. High willingness to pay for monitoring showed the weak relationship in the self-selected group, and when we combined the analysis

with result of the potential to discriminate against the default member, the self-selected group had only a 16.67% chance of detecting default.

Even though the random matching group had a lower willingness to pay for monitoring than the self-selected group, the chance that a member can detect the default was only 11.11%. This number showed that members in the random matching group have no ability to monitor each other unlike in the family ties group where the monitoring system was more successful. Willingness to pay for monitoring in the family ties group was only 25 tokens, which showed the strong bond among members. This bond helped members detect who has the possibility of defaulting.

The results from Cheewatrakoolpong et al. (2011) showed that group lending that is grouped by occupation by the Government Savings Bank in urban areas gives a higher rate of loan default when compared with the same type of group lending in rural areas. However, the result showed that if we change the self-selected group lending type to the family ties type, we could increase the group lending efficiency and reduce the default rate.

4.5.3 Remittance is one of the factors that contribute to an increase in the ties in the group, but if the group is formed by a member who has more than one source for a loan, the strength in the group decreases.

Table 4- 9: Ordered logit regression of difference in repayment rounds against set of controls.

	Random matching group	Self-selected group	Group with family ties
Remittance	0.734*	1.7613**	1.774**
	(0.809)	(0.82)	(0.883)
More than one source of fund	-1.512	-1.643**	-1.799**
	(0.879)	(0.823)	(0.879)
Sex	0.710	0.1517	1.26
	(0.725)	(0.8572)	(0.117)
Child	-0.647	-1	-1.52
	(0.779)	(0.771)	(1.01)
Income	-0.001	0.0015	0.0021*
	(0.001)	(0.0012)	(0.0012)
Pseudo R-squared	0.107	0.1	0.32

Standard errors in parentheses, * , ** and *** indicates significance at the 10% ,5% and 1% levels, respectively

Table 4- 10: Odds ratio.

	Random matching group	Self-selected group	Group with family ties
Remittance	2.084 (1.687)	5.82** (4.776)	5.89** (5.206)
More than one source of fund	0.22 (0.193)	0.159** (0.159)	0.165** (0.145)
Sex	2.034 (1.475)	1.163 (0.9977)	3.545 (2.868)
Child	0.523 (0.407)	0.367 (0.283)	0.218 (0.22)
Income	0.998 (0.001)	1.001 (0.0012)	1.002* (0.001)
Pseudo R-squared	0.108	0.108	0.22

Standard errors in parentheses, *, ** and *** indicates significance at the 10%, 5% and 1% levels, respectively

From table 4-9, when we tested the factors that affect repayment, we found that remittance was one of the main factors that have a significant direct impact on group efficiency. The result showed that the group with the least members with remittance burdens had higher repayment discipline than the group with no remittance. The number of sources for funding was another important factor. If members had more than one funding source, repayment efficiency is reduced significantly in both the self-selected group and the family ties group. Apart from that, in the family ties group, we found that personal income is one of the factors affecting the efficiency of the group.

From table 4-10, when we looked at the odds ratio, we found that the group with a remittance burden had a 5.82 times longer group period in the self-selected group and a 5.89 times longer period in the family-ties group than the group without remittance. Carrillo (2010) also studied remittance. However, Carrillo (2010) studied subjects who received remittances and found that low-income people who received remittances and borrow money tend to have a higher loan default rate than those without remittances. Our study concentrates on the members with remittance instead. The member with a remittance burden showed discipline in spending and loan repayment. From the subject interview, we found one interesting issue shown in Example 4.1.

Example 4.1: Remittance burden or being the family's main source of income helps build spending discipline.

A fruit parlor owner in Talad Thai Market said that he currently has no default but he has a co-mortgage loan together with his wife; he used his land in the suburbs as collateral. They have 1 year to pay a 40,000 THB loan. When they have revenues, he will spare about 3,500 Baht per month for debt repayment and another THB 1,000

as remittance to send to their to hometown. They will use the rest of the revenue for private consumption such as socializing with his market fellows.

From the interview with the experimental subjects about accessibility to funding, household consumption was the main reason to get a loan. Another reason was an unpredictable event such as a family member's illness. However, when we asked further about the loan channel, the experimental subjects separated the loan channels by the amount of the expected loan. If the amount is huge and for future investment, they will choose Government Savings Bank as their loan source. If amount was small and for personal consumption, they would use loan shark services because it was faster to get money even if the interest rate was high. Most of the experimental subjects had confidence that they could repay when they decided to use loan shark services. This situation is shown in Example 4.2.

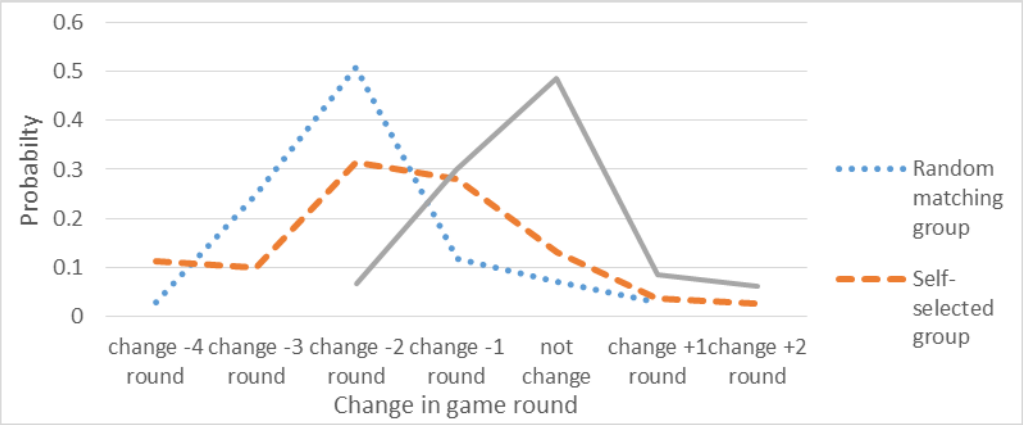
Example 4.2: Lack of discipline in spending is the main reason for loan default.

A food stall owner in the Wongwian Yai market said that she now has five sources of debt; four are loan sharks and one is the Government Savings Bank. She started borrowing from the Government Savings Banks to invest in the shop. Half a year later, she borrowed more from the loan shark to purchase new technology gadgets that the shop next door had installed. After borrowing from the loan shark and facing the daily interest on the loan, she finally could not repay the first debt and started to find more funding from other sources to recover the debt. The debts were getting more and more serious and she could not handle them anymore, which is when her family learned about them. Her family has helped to monitor her spending and eventually cleared the debt for her.

This study also used the number of fund sources as one of the factors to explain loan default behavior. We found that if the experimental subjects have more than one source of funding, the period of grouping decreased to 0.159 times in the self-selected group and 0.165 times in the family ties group compared with the group that has one loan source.

We checked the change in probability in different kinds of grouping methods (Figure 4-5). When we looked at the probability of the game round, we found that the random matching group has a 50% chance to reduce the grouping period by two rounds when compared to the rounds in the individual game. The self-selected group had a 31% chance to reduce the grouping period by two rounds compared to the rounds in the individual lending game. The family ties group had a 49% chance to keep the same number of rounds as in the individual lending game.

Figure 4- 5: The probability that the number of the game rounds will change in many different types of group formations.



Therefore, in the area with weak social bonds among members, the study found that the self-selected group has no efficiency in reducing the possibility of defaulting on the loan. We found that in the weak social ties environment, the self-selected group had a high rate of loan default. The repayment rate in the self-selected group was very close to the rate of repayment in the random matching group, and the default period in the random matching group was even closer than the default period in the self-selected group.

4.5.4 When faced with idiosyncratic shock in group lending with family ties, a member is more likely to pass the effect of the shock to other members than in other types of group lending.

When one member in a group lending experiences a severe shock, it could cause the member to loose his/her income, which sometimes included the member's savings. Under this situation, which one of the three groups is the best buffer for the shock?

In this study, idiosyncratic shocks, which most impact low-income people, include accidents, unemployment, or illness. The key characteristic of idiosyncratic shock was that the shock impacts the individual only, and its effect cannot be passed to the other members as show in table 4-11.

Table 4- 11: Number of members who contribute to group survival.

	Contribute to group (give a token)		Contribute to member (give a heart)	
	N	Percent	N	Percent
Random matching group	20	66.7%	10	33.3%
Self-selected group	22	73.3%	8	26.7%
Family ties group	11	36.67%	19	63.3%

The members who did not face the shock (still hold the hearts) would choose to give assistance in the form of either a token or a heart. A token would help the other member to continue investing, and the heart would help the member receive compensation when the game ended with the risk that the whole group would not be able to invest in the next round.

From table 4-11, we found that the random matching group and self-selected group had good protection from idiosyncratic shock because when one member faced the shock, the other members were interested only in their own chance of investment in the next round. They would choose to give some tokens to repay the group loan-- 900 tokens total-- and the group can continue their investment in the next round.

In the random matching group, the loan assistance rate is 66.7%; it is 73.3% for the self-selected group. These results are different from those for the family ties group. The family ties group members are not concerned about future investment, but they care for the other members. They choose to give out their hearts as their assistance decision with a rate as high as 63.3%. By giving out the heart, the group will automatically be in default status since their total repayment is lower than 900 tokens. The assistance rates in the random matching group and self-selected group are only 33.3% and 26.67%, respectively.

Therefore, when the shock occurred, the shock could pass to the other players in the family ties group, which was why the family ties group has a higher default rate than the random matching group and the self-selected group.

From the study, we could conclude that in strong social ties groups as in the rural area, self-selected group lending could efficiently decrease the loan default rate. This outcome was the same as the result from Abbink et al. (2006) and Floro and Yotopoulos (1991). However, with weak social ties, self-selected group lending reduced the efficiency of the group and increases the default rate. The reason for a higher loan default rate was that when members in the group were not close to each other, they felt no bond and tended to choose loan default even when they succeed in investment. They would not be likely to help other members financially. This result agreed with the work by Besley and Coate (1995) and Kono (2006) who found that the group with low social capital had a higher loan default rate.

Unlike other group lending studies, this study used family ties group lending. This kind of grouping yields a very interesting result. Family ties group lending was very efficient with respect to the default rate especially in a weak social ties society because the bond in the family was tighter than the bond in the self-selected group. Better efficiency was shown in the form of a higher repayment rate and a lower loan default rate than other types of group lending. Family ties group lending also had a better assistance rate among group members. Even though family ties group lending was better for a weak social ties society, this type of group lending was very sensitive to shock, which could increase the loan default rate.

4.6 Conclusion

From the difference in social capital between urban areas and rural areas, group lending in the form of the random matching and the self-selected groups will not perform well in the urban area. This study focuses on an alternative type of lending for microfinance (i.e., family ties group) to help the members increase the rate of repayment in a low social ties environment.

The study is divided into two parts. Firstly, the field experimental game, which is adapted from the work by Abbink et al. (2006), tests the ability to repay a loan in three types of group lending. Secondly, we utilized the data from the field experimental game to analyze the factors that affect the length of the grouping period by using the Ordered Logit Model. We can conclude that in a low social bonds environment, the efficiency of group lending is reduced.

The random matching group and self-selected group in urban areas have a lower rate of return than low-income groups from rural areas because group lending is formed under the weak social ties condition. As long as the social capital in group lending in urban areas is not high enough, the free-riding problem will exist and can become more severe than in the rural area.

In strong social ties areas such as rural areas, self-selected group lending is the most effective type of group lending in terms of both repayment and shock resistance. However, in weak social ties areas such as urban areas, self-selected group lending efficiency is reduced. The repayment rate result is not significantly different from the result for the random matching group, whereas the family ties group has a better repayment rate even in the weak social ties area. However, family ties group lending is very sensitive to shock compared to the other group lending types.

In an urban area, family-ties group lending with mutual collateral has a good outcome with a high repayment rate, compared to the rate of repayment in random group lending and self-selected group lending. When we tried to find the factor that impacts the length of grouping time through the ordered logit model, we found that remittance is an important factor that helps increase the grouping period. In the self-selected and family ties groups, more than one source of loan is also the main factor that leads to the lack of repayment discipline, which mostly results in loan default.

However, group lending with family ties is more sensitive to shock than the normal type of group loan (the random matching group and the self-selected group) because when shock occurs, every member in the group will tend to get involved and the members will suffer together, which will reduce the group's ability to repay the debt, and if the shock is too harsh, the whole group has a high potential to decide to default on the loan. However, in the case of the normal type group lending, we found that the shock effect will not be passed to other members in the group.

Chapter 5

Risk Matching and Group Formation in Urban Areas in Thailand

5.1 Introduction

The different characteristics and investment decisions of each borrower have an impact on successful investment. However, lenders are not able to access the information on borrowers' characteristics and investment behavior, so they try to select low-risk borrowers, which results in the adverse selection problem.

Therefore, the lenders' inability to identify borrowers' risk results in a high interest rate lending policy to cover the higher risk from the borrowers. High interest rate lending has an adverse effect on the financial lending market, reflected by safe borrowers' decisions to leave the financial lending market because of the lower expected return from the market. Nevertheless, group lending can reduce the information gap between lenders and borrowers by setting up joint liabilities conditions among group members. The joint liabilities conditions will help lenders to use local information through group borrowers in which each member has been carefully selected to join the group.

According to Ghatak (1999), under the full information hypothesis regarding each group member, the self-selection process will lead low-income borrowers to select members who have a similar risk type, in other words, a homogenous group. The homogenous group results from the lower benefit of a safe partner paired with a risky partner. Therefore, risky borrowers will not be able to cross-subsidies with a safe borrower (Beatriz Armendáriz de Aghion & Morduch, 2005). Even though the information of each group member falls under the asymmetric information assumption, group lending can create homogenous group borrowers through the joint liabilities effect (Beatriz Armendari de Aghion & Gollier, 2000). However, according to the missing insurance market (Sadoulet (1999)), group formation can be changed from a homogenous group to a heterogeneous group because each borrower will select other members who can potentially provide insurance for their partners. As such, safe borrowers will select members with a higher risk than themselves.

A rational perspective suggests that the group selection process or member coordination can occur when the relationship of future estimation of potential benefit and risk from member coordination is positive (Williamson (1993). Gambetta (1989) also stated that when one trusts another, one will believe that the other will act for one's benefit. However, such benefit should be high enough in order for one to make the decision to coordinate with other members (risk engaging). Gambetta explained that the estimation of trust and risk is based on historical information from each individual, which can be accessed through close relatives.

The co-guarantee conditions among group members will result in a group leader decision to choose low-risk members to join the group However, in practice, it is difficult to select low- risk members for several reasons, including disagreement on lending objectives (i.e., close friends may not have the same lending objectives) or imperfect information on the part of lenders to estimate investment risk (i.e., investment experience information from members' past investment decisions). Lenders will be able to access to such information via the close relationships of members.

Resulted from accessibility on risk information between the group, assortative matching has been created in close relationship societies together with groups based on kinship or friendship (Ghatak (1999)). Therefore, a homogenous group is a critical issue in environments where people have weak social bonds (i.e., urban areas group lending in self-selected groups). Such groups may or may not have the ability to access risk preference or borrower types for each member. The accessibility of borrowers' risks has two advantages. First, it is important information for group lending to create homogenous groups, which can help to minimize defaults in loan repayment. Additionally, lenders can utilize the borrowers' information pool to effectively reduce the adverse selection problem.

Therefore, to test the information accessibility problem on risk preference in urban areas, this study will present group formation from family ties compared with self-selected group lending because the close relationships of family members permit easy access to risk information. In addition, the guarantee from family members can create an effective investment evaluation. As such, the family ties group, compared with the self-selected group, will be able to access member information efficiently.

5.2 Literature

Because of a lender's inability to access information about a borrower, the lender cannot select the person to whom money should be lent. The solution of charging high interest rates to offset the risk must be removed from the market because of the high costs of low-risk borrowers.

The conditions of insurance among group members in group-based loans can help lenders reduce the problem of adverse selection by taking advantage of local information. The insurance among individuals in a group requires a group leader to select members carefully, resulting in the formation of typically homogenous groups.

Previous theories about the formation of typically homogenous groups are based primarily on the hypothesis of perfect information among individual members. For example, Ghatak (1999) demonstrated the advantage of using local information among members in the group, which can lead to positive assortative matching in group formation. For the results of the increased borrowing cost of safe borrower-type members, group formation with risky borrowers would cause the safe borrower-type members to opt to group together and separate risky borrowers from the group. This findings are consistent those in the studies of Natarajan (2004) and Guttman (2006). From another viewpoint, Beatriz Armendari de Aghion and Gollier (2000), Beatriz

Armendariz de Aghion (1999), and Aniket (2007) showed that, despite the form of the random matching group, the conditions of insurance in the group also result in mutual monitoring of members in the group. Consequently, the individual members cannot choose risky investments. Thus, the problem of adverse selection is reduced, and the monitoring cost of lender is also decreased. Under the conditions of the missing insurance market, Sadoulet (1999) found that group formation can take the form of a heterogeneous group because the borrower invests in a risky situation. Therefore, the borrower must establish insurance between members in the case of investment failure.

As a result, safe borrowers tend to select members at higher risk than themselves. The middle-type borrower can group together with safe borrowers in a heterogeneous group or group together with risky borrowers in a homogeneous group. Finally, risky borrowers form homogenous groups with other risky borrowers.

Very few empirical studies on group formation are available. The Gine et al. (2009) study in Lima, Peru showed that a representative sample selects members based on risk-aversion if participants are allowed to choose members to join the group based on the cost and benefit of group-based contracts. Such results are consistent with the study by Carrillo (2010) on the relationship between family ties and social ties relating to the issue of group formation. Carrillo (2010) found that if the representative sample was allowed to choose partners, the sample tended to mainly choose partners who were safe borrowers. However, both tests were based on the hypothesis of perfect information under the circumstances of imperfect information. Gine et al. (2009) found that the typically homogenous group could be formed through observing the behavior of group members over a period of time. Ahlin (2009) studied group formation of low-income earners in rural Thailand and found evidence that the sample selected members to join the group from sorting risk in two dimensions: similar risk-types and partners exposed to the same risk. As a result, the resultant homogenous group is characterized by anti-diversification risk between members of the group, which may have a negative effect on group formation.

However, Sadoulet and Carpenter (2001) found that group formation in low-income earners in Guatemala was typical of heterogeneous groups. Such group formation is described in Sadoulet (1999), who explained that low-income earners grouped together in the form of a heterogeneous group because of the need to create insurance to repay debts between group members in case an investment fails. Lensink and Mehrteab (2003) surveyed microfinance customers in Eritrea and concluded that the representative sample formed a typically heterogeneous group. However, such studies could not explain group formation of that type.

Alesina and Ferrara (2002), Yamagishi et al. (1998) found that each individual has more reliability with a similar partner, for example, family members, which is similar to the results from Ermisch and Gambetta (2010). Alesian and Ferrara also found that people who come from families with strong family ties tend to trust strangers less than those who are from families with weaker family ties. Okten and Osili (2004)

stated that for borrowers who seek a loan, family and community networks are a good channel that provides effective and reliable loans. According to the viewpoint of monitoring and sanctioning, strong bond groups such as those based on family ties provide more opportunities for monitoring and sanctions than nonfamily type groups.

There have been relatively few studies of group formation. However, the problem of forming such homogeneous groups is a major tool to help reduce the likelihood of default in repayment. Previous studies mainly focused on testing in areas where people have strong affinities, such as rural communities. According to the results of the studies, group-based loans are effective for forming model homogeneous groups, which can mitigate the problem of adverse selection. However, this study aims to test group formation in areas where interpersonal relationships are not strong, such as urban communities, to see whether group-based loans remain effective for forming a typically homogeneous group or not.

5.3 Methodology

5.3.1Search for players

The game moderator will allow the experimental subjects to choose three co-players. The member of the group who chooses the team members will automatically be the group leader. For the family ties group, the study added the condition that two of the players will be family members and the others will come from outside the family. This study examines two types of groups: self-selected group (10 groups with 4 members each) and family ties group (10 groups with 4 members each).

5.3.2 Attitudinal test

When the group leader forms the group, each member has to take a test concerning attitude towards other members on the team to discern the sense of helpfulness as well as fairness and trust among members. The test uses the General Social Survey (GSS) with the following questions:

1. Would you say that most of the time people try to be helpful, or that they are mostly just look out for themselves? (helping)
   Answer a. Try to be helpful b. Just look out for themselves
2. The people I work with can be relied upon when I need help. (helping between co-workers)
   Answer a. Very true b. Not at all true
3. Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair? (fairness)
   Answer a. Would take advantage of you b. Would try to be fair

Moreover, the questions to test trust and closeness are as follows:

1 Mr. A gave his door key to his neighbor so that when he cannot open the door, he can ask for help immediately. Do you agree with this situation?
   Answer a. Yes b. No

2 Have you ever let another member take products from your shop by credit payment? (Trust)
Answer a. Yes b. No

3 If members in your group would like to borrow money from you, would you let them? (trust)
Answer a. Yes b. No

4 Have you ever joined any group activities together? (closeness for self-selected group)
Answer a. Yes b. No

5 Have you ever visited other members' houses? (closeness for self-selected group)
Answer a. Yes b. No

6 In a week, will all family members gather for dinner more than once? (closeness for family ties group)
Answer a. Yes b. No

7 Have you ever listened to problems of other members in the family or have you ever told them your problem? (closeness for family ties group)
Answer a. Yes b. No

5.3.3 Investment choice

After the experimental subjects have answered all the questions in the GSS questionnaire, they must choose their investment type. Every type of investment will have two types of return, A and B. We will toss the dice to decide whether an experimental subject will receive return A or return B as show in table 5-1. If the dice shows 1 to 3, return B will be applied and if the dice shows 4 to 6, return A will be applied. The probability of rate of return in both A and B is 50% each. Both types of investment have the same expected return. The only difference is the variance of the choice. The higher the value of the choice is, the higher the variance will be, which can be used as an indicator of the risk-seeking behavior of each member.

Table 5- 1: Investment choices.

	A	B
Choice 1	150	150
Choice 2	350	-50

To avoid the leaking of information between members, members will be separated in different corners of the room where they will fill out the investment choice paper accompanied by a game moderator assistant. The group leader will have to fill out an investment choice paper to guess the type of investment the other team members may choose.

5.3.4 Group formation

The game moderator will let the group leader choose one of their three members to play the group lending game. The two members who are not chosen will receive 100 token and their game ends.

5.3.5 Screening and approving the loan from the group members

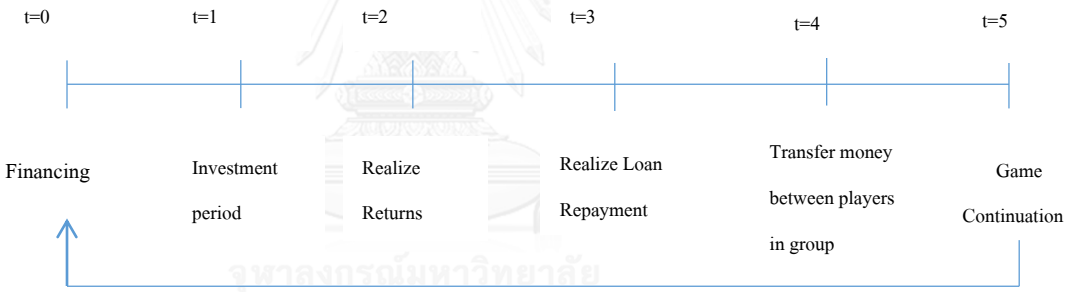
To study the monitoring skills of the members before starting the loan, we give the members two choices:

Case 1: Decide to end the game and receive 100 tokens (we will let the member continue playing the group lending game to see the end result, but when the game ends, the member will receive only 100 tokens regardless of the real outcome).

Case 2: Choose to play the game and receive the number of tokens from the real outcome of the game.

5.3.6 Group lending game procedure

Figure 5- 1: Timing of game procedure.



Financing

Before the game starts, each member will receive 100 tokens that stand for the money they borrowed for their investment, and members must repay the debt to the game moderator when the game ends.

Investment period

A game moderator assistant will let the experimental subjects toss the dice to decide the investment plan. If the dice shows 4 to 6, we will assume that the investment is successful. On the other hand, if the dice shows 1 to 3, we will assume the failure of their investment. If the dice indicates success, the game moderator assistant will pay their investment return A (members chose before the game) and if the dice shows failure, members must repay the amount of panel B that was determined before the game by the member.

Loan repayment

To address the free-riding problem, this study has an extra assumption about debt repayment that if during the game the players have enough money to pay the initial debt of 100 tokens, the money will be taken from the members automatically.

Transfer money

In the case that some members in the group fail, a game moderator assistant will announce the money that is missing in each group and will force other members in the group to contribute their profit to repay the debt on behalf of the failed members.

5.4 Descriptive Analysis

General Social Survey (GSS)

To test the group attitude toward other members, we set up four topics: helping attitude, helping between co-workers, fairness and trust, and closeness among members in the group as show in table 5-2.

Table 5- 2: Result for GSS question in self-selected and family ties groups.

	self-selected group		family ties members		member outside family	
Helping	Try to be helpful	Just look out for themselves	Try to be helpful	Just look out for themselves	Try to be helpful	Just look out for themselves
Most of the time people try to be helpful	45.0%	55.0%	86.7%	13.3%	40.0%	60.0%
Helping between co-workers	TRUE	Not at all true	TRUE	Not at all true	TRUE	Not at all true
The people I work with can be relied on when I need help	80.0%	20.0%	83.3%	16.7%	76.7%	23.3%
Fairness	Would take advantage of you	Would try to be fair	Would take advantage of you	Would try to be fair	Would take advantage of you	Would try to be fair
Members would try to take advantage of you if they got a chance	65.0%	35.0%	26.7%	73.3%	63.3%	36.70%

Trust	Yes	No	Yes	No	Yes	No
Left the door key with neighbor	75%	25%	x	x	86.7%	13.3%
Credit payment	72.50%	27.50%	x	x	70%	30%
Borrowing money from members	5%	95%	87.50%	12.50%	10%	90%
Lending money to members	10%	90%	85%	15%	6.7%	93.3%

Regarding helping attitude, we found that both the self-selected group and the family ties group had a negative attitude toward other people outside their group. Of the self-selected group, 45% would offer help to an outsider, but the data showed that only 40% of the family ties group would offer help to other members outside their group, which lower than the percentage for the self-selected group. However, when we examined the data for the helping rate between family members, the percentage of helping was higher at 86.7%. However, for results for the helping rate between co-workers (Table 5-2), the percentage of help offered increased in both groups: 80% for the self-selected group, 83% for the family ties group, and 76.7% for family members helping a stranger.

When we tested the fairness attitude, we found that 65% of self-selected members were willing to take advantage of their group members if they had a chance, 63% would offer help to a stranger, but among family members, only 27.5% were selfish.

For the trusting issue, the self-selected group had a high percentage of trust in general (75%), but after we added money as one of the trusting factors, such as the money lending, we found that the trust level drops drastically. Only 5% of the members thought that another member would let them borrow money, and only 10% of members would be willing to lend their money to other members in the group. Regarding the attitude of family members to a stranger, only 10% of members thought that another member would let them borrow money, and 6.7% of members would be willing to lend their money to other members in the group. However, the borrowing and lending rate in family ties was much higher, with 87.5% for the chance of borrowing and 85% for the chance of lending.

Table 5- 3: Results for closeness in self-selected and family ties groups.

	Closeness	Yes	No
Self-selected group	Have you ever visited other members' houses?	17.50 %	82.50 %
	Have you ever attended other members' ritual ceremonies?	22.50 %	77.50 %
Family ties group	Does your family gather together to join in a meal at least once a week?	76.70 %	23.30 %
	Does your family know your problems?	63%	37%

For the closeness test (Table 5-3), members in the self-selected group mostly met each other during their business time in the market. In their spare time, they chose to relax at home or conducted private business rather than hanging out with friends from the market. This behavior resulted in a low percentage of home visits. The data showed that only 17.5% of the members visit other members' homes. For the social activity attendance rate, only 22.5% of the members attended other members' private ceremonies. They gave the reason that they would not be able to join if the ceremony or life even was not held on a holiday. In the family ties group, the shop that was run by more than one member of the family tended to have a higher closeness rate than the shop that was run by only one member of the family. When more than one member of the family help run the business, the members stick together, listen to each other's problems, and also had time to have a meal together. For the shop that was run by only one family member, members must wait until the shop closed at night and only have time for family in the evening. If the member had to clean the shop, he or she would return home late and other members in the family might not wait dinner for them, which reduced the time to talk and listen to each other's problems. However, the percentage of closeness in the family ties group was still very high: 76.70% of the group members eat together and 63% consult their family members if they had problems.

5.5 Result

5.5.1 Forecasting members' investment choices

When we asked members how they choose teammates, we found out that intimacy and experience were the most important factors. They chose the one they can trust the most. However, the group leaders forecast the final decision of the group and they thought their group members would choose as their investment.

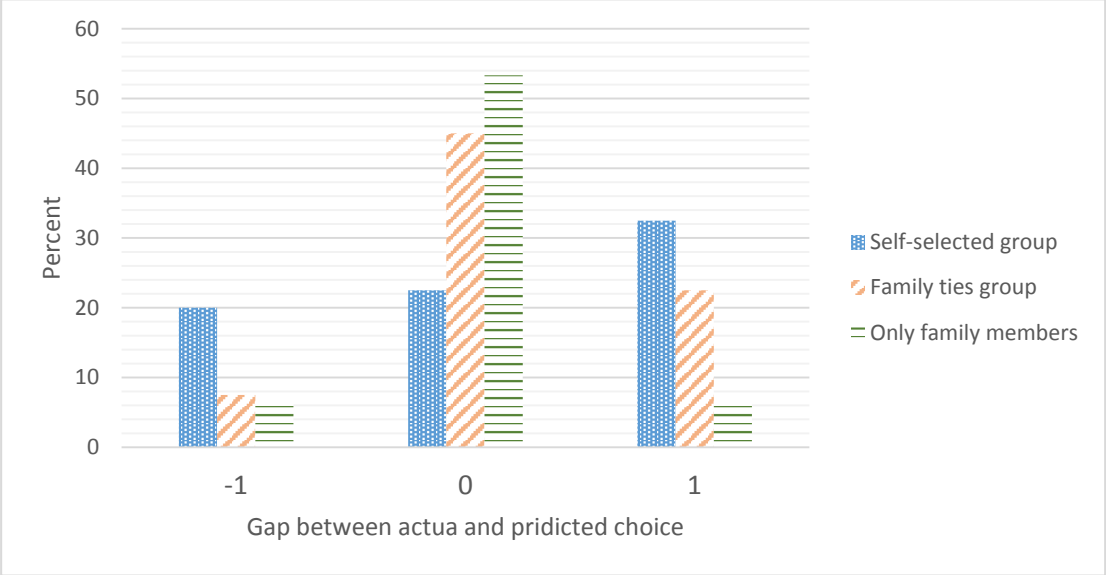
To test the accuracy of the risk level forecast in each type of group lending, we compared the forecast and the data for the real decision using the Root Mean Square Error (RMSE); results are shown in table 5-4.

Table 5- 4: Root Mean Square Error of three kinds of group lending.

	Self-selected	Family ties group	Only family members
RMSE	0.72	0.61	0.31

The closer RMSE was to zero, the more accurate the forecast was. The family ties group had a lower RMSE than the self-selected group, which showed that the family ties group forecast was more accurate. However, we found that the RMSE results from both groups are not very different, but when we focused only on family ties members, the group leader forecast error dropped to 0.31 (as shown in figure 5-2)

Figure 5- 2: Gap between actual and predicted choices.



From figure 5-2, The interesting outcome was that the self-selected group made more errors on the investment choice forecast in an upward bias error pattern, which means they tended to pick high-risk members (higher than the leader's risk level) to join the group.

Proposition 5.1: Members from the same family more accurately guess their members' risk levels than a member in a group of friends or colleagues.

5.5.2 Homogenous group

In normal group lending, the collateral condition would create a homogenous group in poor income group lending through two main processes:

1. Choosing the member with the characteristics of a safe borrower. A risky borrower would increase the cost of borrowing; therefore, the leader must carefully pick the safe borrower and avoid the risky borrower.

2) Rejecting risky borrowing lending. Since the risky borrower would increase the cost of borrowing, a safe borrower must learn to reject the request from a risky borrower.

However, this rejection learning process could cause an insufficient number of group members, which did not meet the requirement for a loan application.

The idea of building the homogenous group as collateral got support from many studies, for example research from Ghatak (1999) and Natarajan (2004) and research in the experimental field from Gine et al. (2009) and Carrillo (2010). These researchers found that if subjects were allowed to choose their own group members, they would tend to choose the safe borrower and stop the investment if they encounter a risky borrowing pattern. However, the moderator announced the choice of investment to every member before the game started in this study, and everyone knew who were risky borrowers and who were safe borrowers.

This study was different from the past study because we did not let the members know whether other members were safe borrowers or not. Therefore, the leader must guess the risk pattern of the group using his or her past experience. The risk taking behavior was shown after the investment game starts so no one knew the pattern of risk before the game, whether safe borrowing or not.

Member choice

We study how the experiment subjects chose the members through the decision of the group leader. The predicted choice the group leader makes would show whether the members chosen were safe borrowers or not. If the group leader picked a safe borrower, 1 point is awarded and if he or she chose a risky borrower, 0 points would be given. We calculated the mean in both groups (self-selected group and family ties group) to see whether it significantly deviated from 1 as shown in table 5-5.

Table 5- 5: Hypothesis testing for mean=1 in self-selected group and family ties group in member choosing decision using predicted choice data.

Variable	Count	sample mean	sample std. dev.	t-statistic (Prob.)
Member choosing in self-selected group member	10	0.8	0.4216	0.1679
Member choosing in family group member	10	0.9	0.3162	0.34

From the study results, we found that leaders in both groups would choose the safe borrower over the risky borrower even when the leader was the risky borrower himself.

From proposition 5.1, we found that the information access for risk type data did not function well, which means that every group would always consist of risky borrowers. To test the choice efficiency of the group, if the group leader picked the safe borrower as indicated in the predicted choice and got the safe borrower into the group lending (from the member actual choice), the point rewarded would be 1 and for other patterns, the point would be 0. We calculated the mean in both groups (self-selected

group and family ties groups) to see whether it significantly deviated from the mean equal to 1 as shown in table 5-6.

Table 5- 6: Hypothesis testing: Mean=1 in self-selected group and family ties group in member choosing decision using actual choice data.

Variable	count	sample mean	sample std. dev.	t-statistic (Prob.)
Minimum variance for self-selected group	10	0.4	0.516	0.0051
Minimum variance for family ties group	10	0.7	0.483	0.0811

From the results, we found that the self-selected group mean deviated significantly from the mean equal to 1, which means that this type of group had no ability to choose the safe borrower to join the group. Their predicted choice did not reflect the actual choice, and the group leader could not differentiate the low-risk member from the high-risk member. This result was different from the data for the family ties group. The predicted choice in the family ties group reflected the actual choice, which showed that the group leader could form a safe borrower team efficiently. This study also found out that the family ties group leader tends to choose members from his own family rather than outsiders. All 10 experimental leaders chose their group members from their families (100%). The result was the same in the study by Ermisch and Gambetta (2010). They stated that people from strong bond families tended to have a hard time trusting people who were not in their household.

Lemma 5.1: Even though most of the experiment subjects tend to choose the safe borrower, a lack of information on risk behavior leads the self-selected group to pick risky borrowers unlike the family ties group, which is more efficient in building the safe borrower group.

Lemma 5.2: The family ties group has a tendency to choose group members from their own household rather than people from outside their family.

5.5.3 Group leaving decision when the group pattern changes to risky borrower type

Apart from choosing the safe borrower to join the group, screening among group members was also a very important factor to form a homogenous group. Since every member must bind to make collateral for group lending, each member must screen one another for risk behavior and must make a decision on the loan together. For example, when the risk for one of the member was getting too high, the member would try to avoid the responsibility and leave the group. When the member quits, the number of members would not be enough to continue borrowing. If the other members notice the problem, they would quit before the default problem occurs. They could avoid the potential high-risk member by using a good screening process. If the screening process

was efficient, the lender would have higher confidence in group lending and could also help reduce the loan default rate in group lending.

When we calculated the rate of repayment of the experimental subjects in the screening process in both types of group lending (self-selected group and family ties group) and compare to the rate of repayment when one member decided to quit the investment game, the result was as shown in table 5-7.

Table 5- 7: Rate of repayment for whole sample group.

	Repayment rate	Number of groups
self-selected group	0.7	10
family ties group	0.8	10

From table 5-7, we could conclude that the self-selected group had a lower rate of repayment than the family ties group because the group leader in the self-selected group had a greater chance to choose the risky borrower to join his group. With this high-risk characteristic in the group, the self-selected group had less chance to repay their loan.

When we allowed each member to be able to reject the loan if they thought that their leader had a high risk of loan default, the data showed that the family ties group had a better screening process when compared to the self-selected group. Four groups of the family ties group decided to quit the game after they suspected high risk, but no group in the self-selected group decided to stop the game (Table 5-8).

Table 5- 8: Rate of repayment after some groups leave the group lending game.

	Repayment rate	Number of groups
self-selected group	0.7	10
family ties group	0.92	6

From table 5-8, we found that apart from the good internal information access, the family-ties group also had a better member screening process. The decision to quit playing the game was mainly caused by the risky borrower leader. The other members had homogenous characteristics of safe borrowers, which helps raise the rate of payment in the family ties group.

Lemma 5.3: The family ties group has a better member screening process than the self-selected group.

This study found that the collateral condition in the self-selected group could not help form the homogenous group. This result reflects those in the studies by Sadoulet (1999) and Lensink and Mehrteab (2003), but this study had a different group forming type. This study also found that it was difficult for members with relationships in the form of friends and colleagues to point out the risk level of group members,

unlike the family ties group, which could indicate the investment risk of members and help built the homogenous group that benefits group lending.

Proposition 5.2: In the self-selected group, the pattern of homogenous group or heterogeneous group is randomly formed because of the lack in information among group members, unlike the family-ties group in which members have knowledge and information about risk among members and have a better screening process before applying for a loan. Therefore, the family-ties group can form a homogenous group more efficiently.

5.6 Conclusion

Most of the theoretical studies were based on the assortative matching assumption to solve the adverse selection problem in group lending, and there were still few empirical studies on group formation, especially group formation in the area of weak ties societies, such as in urban areas.

This research started from the test of group member relationships using the General Social Survey (GSS) method and studied the decision choice of experimental subjects in a field experiment game. The results showed that in an urban area where the ties between members were weak, the self-selected group in such an area had no ability to form a homogeneous group. The main reason was the imperfect information between group leader and members in the self-selected group. The group lender did not have access to each member's borrowing type. In the family ties type where the bonds among members were stronger, the lender had better access to members' borrower type data. Apart from the information access, the screening process before applying for a loan was also important to increase the efficiency of group lending. For the screening process, we found that low-income people would choose members from their own family rather than people from outside their household.

Chapter 6

Conclusion and Policy Implications

6.1 Conclusion

The main objective of this study was to reduce adverse selection and moral hazard problems that affect the microfinance program. The efficiency of microfinance can be shown by a high repayment rate and good accessibility to loans. In a strong ties society, group lending with group collateral such as the pattern that the Grameen Bank is using now is very successful. However, in a weak bond society as in urban areas, the performance of the group loan drops and moral hazard and adverse selection problems occur.

In the first part of the study, we conducted experimental field research to answer three questions: (a) Why do low income people decide to borrow from loan sharks? (b) Why do low- income people not default on a loan even when the loan amount is very high? (c) Can people from the same family help build financial discipline? We found many interesting results from the field experiment, for example that no income can be predicted and there is no consumption discipline, key reasons low-income people seek loans. For the answers to the questions above, low-income people decide not to borrow from the Government Savings Banks because the application process takes too long. They prefer a short-term loan from a loan shark, which they can receive immediately. However, loan sharks make sure that their borrowers are still in the area and always have someone watch over them. Therefore, the decision to flee is difficult. Finally, we found that the family can help increase financial discipline.

In the group lending model, we based the study on an infinite repeated game model and found that members' decision to repay or not to repay their debt depends on the borrower's future benefit. Members in group lending will consider the future loan as future utility. If the benefit in the future is high, the borrower will tend to repay the loan including his or her partner's loan in the case of default. A strong bond among members as in the family ties group can help reduce the moral hazard from the loan default decision because of the efficient group monitoring system. If the bond is weak, the cost of default is low and the member will tend to make a default decision. The monitoring system in the family ties group can help reduce the cost of monitoring by the financial institution.

In the field experimental game, we tested the difference between the impact of social capital to loan default in an urban area and a rural area. Group lending simulation was executed, and we found out that for low-income people, the area has a significant impact on the default decision. In the rural area, we found that self-selected group

lending is the most effective type of group lending with respect to the repayment rate because the strong bonds among members can help create higher social capital, build a monitoring system, and mitigate the free-rider problem that eventually increases the repayment rate. This result is compatible with the studies of Beatriz Armendáriz de Aghion and Morduch (2005) and Abbink et al. (2006).

To solve the problem of weak social ties, Kono (2006) proposed loans in the form of individual lending. However, this pattern of lending will be appropriate only in some specific form of a microfinance lender as in the Bank Rakyat Indonesia (BRI program) or Grameen II, which allows individual loans to low-income people using their business as collateral. When we examined microfinance institutes in Thailand, we found that collateral for loans is one of the main obstacles to individual lending because Thailand has no secondary market to sell or buy the collateral in the form of occupational tools.

The prediction result using ordered logit showed that in the urban area, family-ties group lending with mutual collateral demonstrated a high repayment rate compared to the rate of repayment in individual lending, which is different from random group lending and self-selected group lending. Self-selected group lending has a shorter loan period than individual lending, which can be one of the financial choices for financial institutions to provide loans for low-income people in urban areas.

For weak social ties groups, this study shows that the efficiency of self-selected group lending is reduced for two reasons:

1. The social capital of the member who defaults on a loan is low, which creates the free- ride problem (moral hazard problem).

2. Access to local information is inefficient, and the group has a greater chance to attract high-risk members (adverse selection).

In an attempt to reduce the moral hazard problem, we focused on the weak social ties area. The free-ride problem in the self-selected group and random matching group occurs because group members cannot create high enough social capital to stop members from making the decision to default (Besley & Coate, 1995). However, the free-ride problem will increase if other members in the group also decide to default. because even when members repay their own debt, it may not be enough to repay the group loan and the simulation stops, which means low- income people cannot continue their loan in the next round; therefore, default is a better choice for them if other members already chose the default decision. The family ties group has the best repayment rate among the three group lending types.

However, willingness to repay their debt is not stable over time. Our study found that there is less willingness to repay as time passes in all three group lending types because of the reduction of their wealth from helping other members in case of debt default, which results in a lower chance for investment in the next round simulation if they do not have adequate funds.

To tackle the adverse selection problem, we utilized local information for group member selection. The group with safe borrowers can build a homogenous group. The study shows that even in the urban area, the leader of the self-selected group determined to choose safe borrowers as his group members. This result for the member screening process was similar to those in the studies Ghatak (1999), Gine et al. (2009), and Carrillo (2010). However, using imperfect information for low-income members in urban areas would create the difficulties in using local information, and might result in the leader being unable select a safe borrower.

In group lending with family ties, the close relationships among group members allowed the group leader to understand what kind of borrower types the others were so that he could pick the right member to join the group lending. The family ties group also had a better screening process by group members, which could eliminate selecting risky borrowers and reduce the loan default rate before loan approval.

Regarding the relationship strength among group members, we found that remittance was a very important factor that helps increase the grouping period. In the family ties group, more than one source of loan was the main factor that led to lack of repayment discipline, which mostly resulted in loan default.

Even though group lending with family ties had proven to have greater efficiency in reducing the adverse selection problem and moral hazard problem, group lending with family ties came with some other problems. From the financial institution perspective, family ties groups also had a disadvantage because they share the same family wealth. Therefore, they would have less wealth to compensate for future shocks. Moreover, the study showed that the family ties group was the most sensitive to shock. Family ties group loans were more sensitive than those for the self-selected group because when a shock occurs, every member in the group would tend to be involved, and they would suffer together because they share the same family wealth, which would reduce the family ties group's ability to repay the debt. If the shock was too great, the whole group was likely to default on the loan. From our experiments, there was evidence that when individual shock occurs in the family ties group, the shocks would transmit to other members in the group due to the sharing of economic resources in the family, which caused the whole family to suffer the impact together.

6.2 Policy implications

The change in group lending formation

Nowadays, GSB loans in urban areas are group lending for members from the same occupation only. This study found that the problem of group lending in urban areas is the weak ties among group members, which creates the adverse selection problem and moral hazard problem, leading to a high rate of default.

To reduce the low repayment rates problem, the purpose of this study was to show that the change in the type of group lending from the self-selected group to the family ties group can reduce the adverse selection and moral hazard problems caused by weak relationships among group members. Good relationships among members in the family ties group allow each member to offer help to other members when they face default. In Thailand, family ties group lending is still not very popular but the example of MFIs represents the family ties group. For example, Cashpor microcredit in India uses collateral from families in rural areas for group lending if the borrower lives in an isolated area and cannot join the training program (Puhazhendhi, 2013). Abazamukana (pilot project in Rawanda) allows family members' income to be combined with 20% of the loan deposit in a savings account to guarantee the loan (Wilson).

The public agency that is involved in policy implementation is Specific Financial Institutions (SFIs), such as The Government Savings Bank, which is responsible for helping poor people access financing sources.

6.3 Further study

This study aimed to study the efficiency of group lending with family ties to reduce the adverse selection and moral hazard problems. For the moral hazard problem, we proposed the solution of reducing the cost of monitoring using the close relationship in family ties group lending. However, the moral hazard problem in the family ties group can occur due to the marital law that says that spouses is share equal legal responsibility for debt. They may not put enough effort to run their business. However, group lending with family ties still has some defects such as the sensitivity to shock due to wealth sharing among group members and the joint risk. In a future study, we hope to be able to add the shared wealth factor in the simulation of family ties group lending as a tool to connect risk among members and to make the result reflect reality as much as possible.

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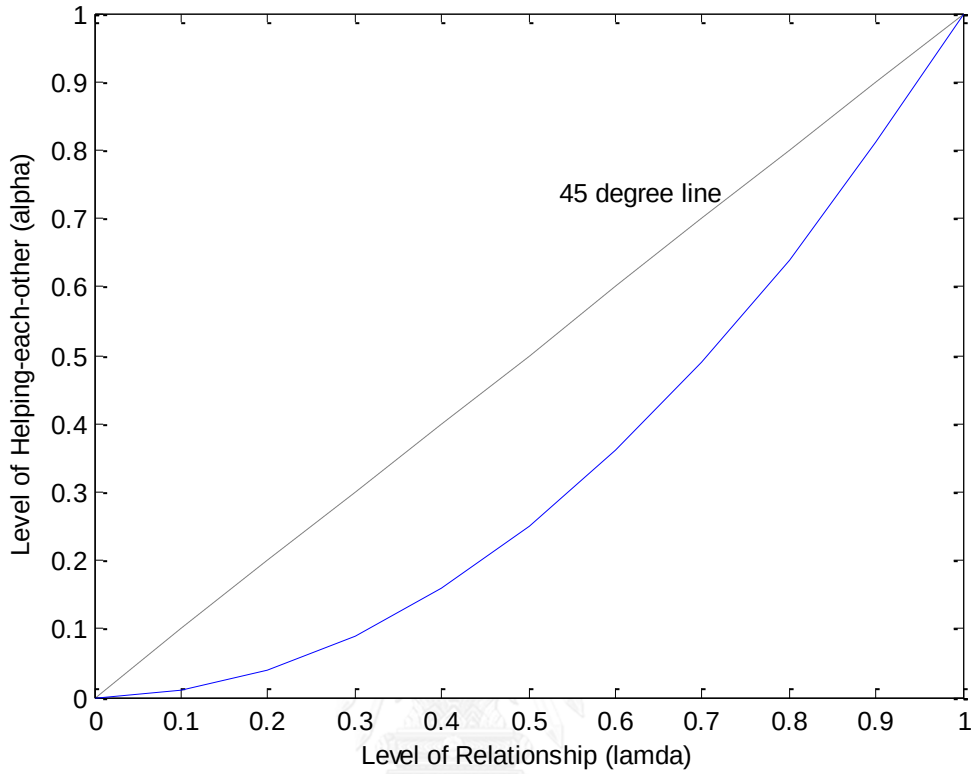
APPENDIX

Appendix A

Figure A: Relation between Level of Relationship and level of helping each other.



Appendix B

Table B1. Answer sheet for individual lending game.

Round	Investment success (Yes/No)	Repayment (Yes/No)	Group assistance (Yes/No)	Total group repayment in the round	Go to next round (Yes/No)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Token Guess member no.

Group no. ……..Member no. ……

Table B2. Answer sheet for group lending game with shock.

Round	Investment success (Yes/No)	Group assistance		Total group repayment in the round	Go to next round (Yes/No)
		Money	Heart		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Group no. …….Member no. ……

Table B3: Description of independent variables.

Variables	Description
Difference in the number of default round	-2 if member has more game round in individual game than in group lending game 2 period -1 if member has more game round in individual game than in group lending game 1 period 0 if member has the same game round in individual game as in group lending game 1 if member has less game round in individual game than in group lending game 1 period 2 if member has less game round in individual game than in group lending game 2 period
Sex	Male=1
Number of Children (persons)	if any = 1
Income (Baht)	Numbers
number of sources of fund	If more than 1 = 1
Rural/Urban	Urban= 1
Remittance or Head of household	remittance back to home area/Main source of household income = 1

Appendix C.

C.1 Repayment Rate.

Case1: When only one member in the group succeed in the investment. Lender will expect the successful member to repay 300 Token.

Rates of return = $R_1/300$;R = Return from member

Case 2: If 2 members in the group succeed, lender will expect to receive the total of 900 Token repayment.

Rates of return = $(R_1 + R_2) / 900$;R = Return from member

Case 3: If 3 members in the group succeed, lender will expect to receive the total of 900 Token repayment.

Rates of return = $(R_1 + R_2 + R_3) / 900$;R = Return from member

Appendix D. Questionnaire for groups

Section1. Personal Information

1. Age…….
2. Sex ☐ Male ☐ Female
3. Marital status ☐ Single ☐ Married ☐ Divorce
4. Number of children……..persons
5. Education level
   - ☐ Did not attend school
   - ☐ Primary
   - ☐ High school
   - ☐ Vocational Certificate
   - ☐ High Vocational Certificate
   - ☐ Bachelor
   - ☐ Graduation
6. Number of household members(including yourself)
   - ☐ Children (below15 years old) ……persons
   - ☐ Adult (between15 and 60years old)…….. persons
   - ☐ Elder (more than60 years old)…… persons
   - ☐ Others such as disabled persons/patients……. persons
7. Sources of household income(can select more than one choice)
   - ☐ Salary/monthly income
   - ☐ Trade/personal business
   - ☐ Agriculture
   - ☐ Freelance
   - ☐ Receive money from relatives
8. Household income(including all members who have income; <u>can select more than one choice</u>)
   - ☐ Monthly, on average,……..baht/household/month
   - ☐ Half monthly, on average, receive income……..baht/times
   - ☐ Daily, on average,…….baht/day

     Number of work day per month…….days
9. Are you the only person who create income for your family?
   - ☐ Yes. ☐ No.
10. Do you have any obligation to support your family who lives in up country?
    - ☐ Yes. ☐ No.

Section2. Relationship with group members

1. How many times in a week do you meet you group members?……times
2. Have you ever visited houses of your group members?
   - ☐ Yes. ☐ No.
3. (Can choose more than one choice) During a previous month, what activities do you work with your group members?
   - ☐ Join parties on weekend…… times
   - ☐ Attend ceremonies such as religious ceremony, wedding ceremony …….. times

☐ Make a trip…….. times
Stay…….nights (if not stay, write 0)

Section 3: Opinion toward access to basic financing

1. Who in your family normally take out the loan?(can answer more than one choice)
   - ☐ You
   - ☐ Your parents
   - ☐ Your spouse
   - ☐ Your son and daughter
   - ☐ Other person ……

2. You have ever borrowed money from…….(can answer more than one choice)
   - ☐ Commercial bank
   - ☐ Government Savings Bank / bank for agriculture and agricultural cooperatives
   - ☐ Pawnshop
   - ☐ Cooperatives/Savings group
   - ☐ Family member/relative
   - ☐ Your company/Employer
   - ☐ Cash card
   - ☐ Loan shark
   - ☐ Other……..

3. What difficulties do you experience when you borrow money from the sources in question?
   - ☐ Long time of credit approval
   - ☐ Credit disapproval
   - ☐ Insufficient loan
   - ☐ Lack of guarantor/group members
   - ☐ High interest rate
   - ☐ Loan approved is not continue
   - ☐ Other……..

4. How many sources of loan do you borrow from?
   - ☐ Borrow from…….sources
   - ☐ Do not borrow

5. Do you or your family members notice others of your family before borrowing?
   - ☐ Yes.
   - ☐ No.

6. Objective of borrowing
   - ☐ To spend for your own business
   - ☐ To spend for medical expense/unplanned expense
   - ☐ To spend for daily consumption
   - ☐ To spend for education expense of family members
   - ☐ Other…….

7. How to do when you cannot repay debt on time?
   - ☐ Always repay on time
   - ☐ Borrow from family member/relatives
   - ☐ Negotiate with lenders
   - ☐ Borrow from other sources to repay old debt.
   - ☐ Migrate to other area
   - ☐ Other……..……

Thank you very much.

VITA

Kawin Phupoxsakul graduated master degree from Chulalongkorn and studies Doctoral Degree of Economic at Chulalongkorn University in 2011.