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AN EMPIRICAL ANALYSIS OF MICROCREDIT
ON CHINA RURAL HOUSEHOLD

A thesis

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ABSTRACT

Abstract of a thesis submitted in partial fulfilment of the requirements for the Ph.D. in Finance

AN EMPIRICAL ANALYSIS OF MICROCREDIT ON CHINA RURAL HOUSEHOLD

By Xia Li

Since its introduction in Bangladesh in the seventies, microcredit has been well documented to have social implications such as reducing poverty and empowering the poor by offering them opportunities to access economic resources. Microcredit was introduced into China in the mid-1990s, aiming to facilitate credit access by farmers and mitigate rural poverty in China. However, the impacts of microcredit on China rural households' livelihoods are not well documented. In addition, despite the efforts made by the Chinese government to support and popularise the implementation of microcredit, the access to institutional credits including microcredit by the rural population remains insufficient.

This research assesses the impacts of microcredit on household welfare (measured by income and consumption) and women empowerment in rural China. In addition, it examines the key factors that influence the accessibility of microcredit by rural households in China. The impact of microcredit on household welfare is estimated using the difference-in-difference approach and logistic regression is employed to analyse the accessibility to microcredit by Chinese rural households and the women's empowerment impact of microcredit respectively. Both primary and secondary data are used in the empirical analyses: primary data are collected through a household survey using a structured questionnaire; secondary data are obtained from the Rural Credit Cooperative, the largest microcredit provider in China.

The results support the wide belief in the literature that microcredit can significantly improve the households' welfare such as income and consumption. The results also reveal that microcredit has a significant impact on five different dimensions of women empowerment ranging from economic security (i.e., control of financial resources) to awareness of social/legal issues (e.g., rights to protest against domestic abuse, minimum legal marriage age, etc). Furthermore, a total of twelve household-related factors (e.g., household income, family size) are identified as key factors influencing households' accessibility to microcredit. Despite the optimistic findings on how microcredit has changed the rural households' lives, the results show that the vast majority of the programme participants are non-poor, which casts some doubts on the social potential (such as poverty reduction) of China's microcredit programmes.

Key Words: China, microcredit, accessibility, household welfare, women empowerment, difference-in-difference, logistic regression

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CHAPTER 1

INTRODUCTION

1.1 Introduction

1.1.1   What is microcredit?

Microcredit is the process of lending capital in small amounts to poor people who are traditionally considered unbankable to enable them to invest in self-employment (Kasim and Jayasooria, 2001). The World Bank (2006, p12) describes microcredit as "a process in which poor families borrow large amounts (or lump sums) of money at one time and repay the amount in a stream of small, manageable payments over a realistic time period using social collateral in the short run and institutional credit history in the long run".

"Microcredit" and "microfinance" are used interchangeably by many researchers, but microcredit is part of microfinance. According to the Asian Development Bank (ADB) (2000, p2), microfinance is the "provision of a broad range of financial services such as deposits, loans, payment services, money transfers, and insurance to poor and low-income households", and it comprises microsavings, microcredit, and microinsurance. Nevertheless, microcredit is similar to 'microdebt', which focuses on the provision of small loans to low income borrowers. In some cases, the microcredit programme involves saving services, but the services are limited to the collection of compulsory deposit amounts from the borrowers to collateralise the loans issued. Borrowers cannot access these compulsory deposits and cannot have voluntary saving accounts in microcredit programmes (World Bank, 2006; Cornford, 2000).

1.1.2   Who does microfinance serve?

Microfinance caters to the financial needs of underprivileged groups including female heads of households, pensioners, displaced persons, retrenched workers, small

farmers, and microentrepreneurs (CGAP[1], 2003). In addition, microfinance borrowers are typically self-employed, household-based entrepreneurs who have relatively unstable income sources and can be divided into two groups: rural and urban. In rural areas, the borrowers are usually small farmers and others who are engaged in small income-generating activities such as food processing and petty trade; while in urban areas, microfinance activities are more diverse and borrowers include shopkeepers, service providers, artisans, street vendors, and small-medium enterprises (Sapovadia, 2006). However, the client-focus of microfinance varies in different regions. For example, in Latin America, microfinance has been developed into a business rather than an anti-poverty programme, which is a branch of commercial banking and focuses more on urban small-medium enterprises than the rural poor (Poyo and Young, 1999). By contrast, in Asia where the poor population is more numerous, especially in rural areas, microfinance would inevitably be directed to serve the rural poor as an anti-poverty instrument (World Bank, 2006).

1.1.3   *Who provide microcredit service?*

A variety of organisations have been involved in the delivery of microcredit services during the last two decades. World Bank (2006) categorises these organisations into seven types which include commercial banks, wholesale development banks/funds, retail development banks/companies, apex organisations funded by multilateral or bilateral donors and/or governments, microfinance institutions (MFIs) and non-profit non-governmental organisations (NGOs), cooperatives, and community-based organisations. Institutions such as wholesale development banks/funds and apex organisations provide lending only to institutions such as MFIs and cooperatives, instead of individuals; by contrast, cooperatives and community-based organisations only lend to individuals.

Different countries have fostered their own local organisations to provide microcredit

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[1] CGAP refers to the Consultative Group to Assist the Poor, which is a consortium of 33 public and private development agencies working together to expand access to financial services for the poor in developing countries.

and such local organisations can be generally classified as NGOs and formal financial institutions. For example, the Bangladesh Rural Advancement Committee (BRAC) and the Association for Social Advancement (ASA) are two major NGOs while the Grameen Bank is the biggest financial institution providing microcredit in Bangladesh. These three major microcredit providers serve around 11 million borrowers throughout Bangladesh (ADB, 2000). Similarly, Amanah Ikhtiar Malaysia (AIM) is the largest NGO in Malaysia providing microcredit to about 50,000 borrowers for a total loan amount of RM 200 million (Kasim and Jayasooria, 2001). In addition, the Unit Desa of Bank Rakyat Indonesia (BRI-UD) in Indonesia is a successful rural financial institution which has attracted more than 2.5 million borrowers with total outstanding loan of US$ 781 million (World Bank, 2006; Timberg, 1999).

1.1.4 Characteristics of microcredit

Compared to traditional lending, microcredit has its own vivid characteristics. Loans from the microcredit programmes are usually in small amounts and have relatively shorter repayment recycles. Du (2004) argues that a major difference between microcredit and conventional lending is that the former targets borrowers from the poor and low-income groups. In addition, collateral requirements that are compulsory in traditional lending are removed from microcredit lending. Furthermore, microcredit adopts special schemes such as group lending to monitor its borrowers.

Targeting the poor

A major difference between microcredit and conventional lending is that the former often targets borrowers from the poor and low-income groups. Microcredit programmes are poverty-focused, which aim to facilitate the access to financial services such as credit for the poor globally who are usually regarded as disadvantaged groups in accessing conventional financial services from formal financial institutions (FIs). In addition, microcredit emphasises lending to poor women who are disproportionately represented among the world's poorest people. According to Cheston and Kuhn (2002), about 74% of microcredit borrowers in the

world are women. The rationale behind lending to women is that most women borrowers have been proven to be more creditworthy than men, in addition to the better ability of controlling the use of loans by women (Garikipati, 2006; Ang, 2004).

Collateral free

Collateral is always a compulsory requirement in traditional lending as a way of minimising default risk anticipated by lenders. Such collateral requirement becomes more rigid if borrowers are economically poor. However, the poor usually don't own valuable assets which can be used as appropriate collateral when applying for loans from traditional financial institutions, and as a result, poor people are historically considered uncreditworthy and precluded from the traditional credit markets. Microcredit is an innovative idea that challenges the traditional lending wisdom of 'no collateral means no credit'. It deems the poor as creditworthy as the rich and provides collateral-free loans to the poor to develop entrepreneurial activities.

Group-lending scheme

In place of collateral, however, microcredit disciplines borrowers through a special scheme such as group lending. Loans are made to an individual borrower who is a member of a borrowing group. However, each individual borrower assumes responsibility for the loan repayment of his or her group members, which means all group members are jointly liable. If only one member from a group defaults, the rest in the group will be denied future access to loans from the microcredit programme. As a result, the principle of joint liability creates an incentive mechanism by which individual borrowers are stimulated to select credible members to group with, to monitor the other members' activities once the loan is received, and to enforce repayment in case a group member fails to fulfil his or her obligation. In other words, the group-lending scheme creates a special kind of collateral called 'social collateral' on the loans, which reduces the costs of screening and monitoring borrowers, and ensures timely repayments for lenders (Anderson and Nina, 2000; Besley and Coate, 1995).

These characteristics and features of microcredit programmes are embodied in the Grameen Bank microcredit, introduced by Muhammad Yunus in the late 1970s. As a pioneer in microcredit, the Grameen Bank (GB) promotes innovative ideas in poverty reduction through its lending programmes. Yunus (2003) advocates that credit should be promoted as a human right and should be based on 'trust' rather than collaterals or legally enforceable contracts. Furthermore, Yunus stresses that in order to eliminate poverty, appropriate changes must be made in the institutions and policies surrounding the poor, rather than just providing charity to the poor. Based on this belief, the Grameen Bank created an accessible mechanism for the poor to access credit on reasonable terms to improve their welfare (Yunus, 2003; Latifee, 2003). Today, the Grameen Bank has a network of nearly 1300 branch offices that serve 3.8 million borrowers of which 96% are women, and has disbursed loans worth US$4.5 billion. Moreover, the Grameen model has been widely followed in more than 50 countries around the world (Chowdhury, 2004; Hussain, Maskooki, and Gunasekaran, 2001).

1.1.5   *How does microcredit help the poor?*

Financial services such as credit contribute greatly to the growth of individuals, sectors and countries, and have positive effects on poor people's livelihoods. In the case of agriculture, credit is an important element in the agricultural production process, which allows producers to satisfy the capital needs of the production cycle. In addition to maintaining consumption of basic necessities, access to credit can increase poor farmers' risk-bearing ability and help them alter their risk-coping strategies so that farmers may be willing to adopt new and riskier strategies with higher potential return in their production instead of risk-reducing but inefficient strategies (Diagne, Zeller, and Sharma, 2000). Hence, credit is a powerful instrument to help poor people invest and break out of a 'vicious cycle' of poverty because it has the potential to improve the users' incomes and savings, and consequently, enhance investment and reinforce high incomes (Mohamed, 2003).

Despite the importance of financial services such as credit in helping the poor to improve their living conditions, poor people are excluded from the formal financial system and such exclusion ranges from partial exclusion in developed countries to full or nearly full exclusion in less developed countries (LDCs) (Brau and Woller, 2004). Traditional financial institutions (FIs) are reluctant to serve the poor mainly because poor people fail to meet the selection criteria such as the requirement of physical collateral set by FIs. The perceived high risks and costs arising from processing and servicing unsecured small loans also make FIs shy away from financing the poor, mainly due to the concern of financial viability. Lacking access to formal credit, most poor and low-income people continue to rely on meagre self-finance or informal credit, which limit their ability to actively participate in and benefit from the development process.

As a special form of financial service, characterised as small scale lending, microcredit largely facilitates the poor's access to institutional credit by removing obstacles in traditional lending. Improved access to credit at reasonable cost enables the poor to smooth consumption (food and non-food), better cope with crises, develop self-employed businesses, enhance income earning capacity, and build up assets gradually. The poor can use the generated income to pay for the instalment of loans while leaving their original capital intact. Consequently, their capital base usually increases in large amounts as they borrow continuously, which gives them opportunities to make medium and long-term investments. Therefore, microcredit borrowers are likely to sustain long-term development by participating in entrepreneurial activities and as a result, shake off poverty with economic growth. There is rich evidence showing that microcredit has a significant impact on poverty reduction around the world. For example, 48% of the poorest households in Bangladesh have risen above the poverty line with access to microcredit; similarly, BRI in Indonesia has witnessed an increase in its microcredit borrowers' income by 12.9% compared to only 3% increase in non-borrowers' income (World Bank, 2006; CGAP, 2003).

In addition to working as a powerful instrument in fighting against poverty, microcredit has the potential to promote gender equality by directly empowering poor women. Since microcredit programmes have generally targeted poor women as clients, access to microcredit can empower poor women by increasing their contribution to household income and assets building, which is a significant contributor toward their increased self-worth and improved family status. As a consequence of participating in microcredit programmes, women borrowers become more financially independent, more likely to participate in social networks and commercialisation processes, and able to better confront systemic gender inequities. A regional study by World Bank (2006) reveals that 90% of women borrowers from Self-Help Groups[2] (SHGs) in India can freely visit local markets and make small and large purchases independently, while 68% of women borrowers in Nepal can make independent decisions on property, children's education and marriage.

Besides, accessing microcredit allows poor borrowers to enjoy some privileges such as accessing education and health care, which otherwise would be impossible for them if there is no microcredit. Due to the great potential of reducing poverty and empowering women, microcredit has been promoted as an effective development intervention programme by many countries and become one of the key driving mechanisms towards meeting the Millennium Development Goals (MDGs) set by the United Nations (UN). The MDGs range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education by the target date of 2015 (UN Millennium Project, 2005). The importance of microcredit is further underscored by the designation of the International Year of Microcredit 2005 by the UN, which called for global attention to build up sustainable microfinance industry to serve the poor.

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[2] Self-Help Group (SHG) is the dominant microfinance scheme in India. The operations of SHGs composed of 15 to 20 members are based on the principle of revolving the members' own savings. The volume of individual borrowing is determined by the volume of member's savings or the savings of the group (World Bank, 2006).

While microcredit significantly contributes to alleviating poverty, it is not a panacea for poverty reduction. It may be less successful, or even counter-productive in helping the poorest of the poor raise their living standards because the worse-off borrowers use loans less effectively than the better-off borrowers due to the relatively weaker economic base of the former. Therefore, microcredit should be involved as a part of broader poverty eradication strategy combining with other intervention programmes such as social protection programmes (Chowdhury, 2004). In addition, microcredit remains inaccessible to the poorest of the poor because microcredit institutions intend to protect their self-sustainability to achieve larger scale of poverty reduction at moderate level (Druschel, 2002).

1.2 An overview of Chinese agriculture

Agriculture plays an important role in the Chinese national economy in terms of Gross Domestic Product (GDP) and employment. For example, agriculture accounted for 26.9% of GDP in 1986 and 14.8% in 2000 (see Table 1.1). In addition, the majority of the Chinese population (about 745 million people or 57% of the total population as of the end of 2005) reside in rural areas and agriculture contributes greatly to the national employment in China. For example, in 1978, agriculture contributed 70.5% of total employment. Employment in the agricultural sector has declined as more labourers have been attracted by the growing tertiary industries such as service and manufacturing during the last 20 years, but the agricultural sector still absorbed some 45% of the total labour force in 2005 (see Table 1.2). Furthermore, the agricultural sector plays an important role in China's international trade. For example, agricultural exports generated foreign exchange earnings of US$91 million in 1980, accounting for 50% of the total exports in China (Huang, Rozelle, and Tuan, 1999).

Since China initiated its economic reforms at the end of 1978, which placed high emphasis on reforming the rural sector, China's agriculture took big leaps forward with increasing output and diversification. For example, the output of grain has been

substantially increased from 305 million tons in 1978 to 508 million tons in 1999 (see Table 1.3). With increased productivity in major agricultural products such as grain, cotton and oil-bearing products, China ranks first in the world in terms of agricultural output (Lu, 2006). In addition, the agricultural foreign trade has developed remarkably due to the flexible market policies during the reform period. For example, the volume of agricultural exports surged by 52% from 1980 to 1985, which resulted in a substantial increase in the balance of agricultural foreign trade during the same period from $21.55 million to $85.39 million (see Table 1.4). It is noteworthy that the average annual growth rate of China agriculture between 1978 and 1984 reached a peak of 7.1% compared to a growth rate of only 2.7% between 1970 and 1978 (Huang and Rozelle, 2002).

Table 1.1 Values and composition of Gross Domestic Product (GDP) in China (million yuan)

Year	Total GDP	Agriculture		Industry		Tertiary	
		Value	Share	Value	Share	Value	Share
1986	10,275.2	2,763.9	26.9%	4,492.7	43.7%	3,018.6	29.4%
1987	12,058.6	3,204.3	26.6%	5,251.6	43.6%	3,602.7	29.9%
1988	15,042.8	3,831.0	25.5%	6,587.2	43.8%	4,624.6	30.7%
1989	16,992.3	4,228.0	24.9%	7,278.0	42.8%	5,486.3	32.3%
1990	18,667.8	5,017.0	26.9%	7,717.4	41.3%	5,933.4	31.8%
1995	60,793.7	12,020.0	19.8%	28,679.5	47.2%	20,094.3	33.1%
2000	99,214.6	14,716.2	14.8%	45,555.9	45.9%	38,942.5	39.3%
2001	109,655.2	15,516.2	14.1%	49,512.3	45.2%	44,626.7	40.7%
2002	120,332.7	16,238.6	13.5%	53,896.8	44.8%	50,197.3	41.7%
2003	135,822.8	17,068.3	12.6%	62,436.3	46.0%	56,318.1	41.5%
2004	159,878.3	20,955.8	13.1%	73,904.3	46.2%	65,018.2	40.7%
2005	183,084.8	23,070.4	12.6%	87,046.7	47.5%	72,967.7	39.9%

Source: China Statistical Yearbook 2006, National Bureau of Statistics of China (NBSC).

However, agriculture's contribution to national economic development in terms of GDP and foreign trade has been declining with the increased shares of the industrial and tertiary sectors in China's national economy. For example, agriculture accounted for 26.9% of the GDP in 1986, while the industrial and tertiary sectors contributed to the total GDP at 38.6% and 29.4%, respectively. Despite a significant increase of up

to 20 billion yuan in the value of agricultural GDP in a span of 20 years, the agriculture's share in total GDP dropped to 12.6% in 2005, while the shares of the industrial and tertiary sectors in the GDP increased to 42% and 39.9%, respectively (see Table 1.1).

Table 1.2 Employment and employment rates by sector (10,000 persons)

Year	Total Employed Persons	Agriculture Employed Persons	% of Total	Industry Employed Persons	% of Total	Tertiary Employed Persons	% of Total
1978	40,153	28,318	70.5%	6,945	17.3%	4,890	12.2%
1979	41,025	28,634	69.8%	7,214	17.6%	5,177	12.6%
1980	42,361	29,122	68.7%	7,707	18.2%	5,532	13.1%
1985	49,873	31,130	62.4%	10,384	20.8%	8,359	16.8%
1990	64,749	38,914	60.1%	13,856	21.4%	11,979	18.5%
1995	68,065	35,530	52.2%	15,655	23.0%	16,880	24.8%
1996	68,950	34,820	50.5%	16,203	23.5%	17,927	26.0%
1997	69,819	34,840	49.9%	16,547	23.7%	18,432	26.4%
1998	70,637	35,177	49.8%	16,600	23.5%	18,860	26.7%
1999	71,394	35,768	50.1%	16,421	23.0%	19,205	26.9%
2000	72,085	36,043	50.0%	16,219	22.5%	19,823	27.5%
2001	73,025	36,513	50.0%	16,284	22.3%	20,228	27.7%
2002	73,740	36,870	50.0%	15,780	21.4%	21,090	28.6%
2003	74,432	36,546	49.1%	16,077	21.6%	21,809	29.3%
2004	75,200	35,269	46.9%	16,920	22.5%	23,011	30.6%
2005	75,825	33,970	44.8%	18,084	23.8%	23,771	31.3%

Source: China Statistical Yearbook 2006, NBSC.

In addition, the role of agriculture in Chinese foreign trade has shrunk over the last two decades. The proportion of agricultural exports plummeted from 50% in 1980 to only 6% in 2005, although the volume of agricultural exports experienced a continuous increase from US$26,338 million in 2001 to US$49,037 million in 2005 mainly due to China's accession to WTO in 2001 (see Table 1.4). Meanwhile, the share of non-agricultural exports (e.g., manufacturing goods) surged to 94% in 2005 (NBSC, 2006). Overall, China's agriculture has been growing since the economic reforms, but its growth rate has been outpaced by that of industry as a result of industrialisation in China.

Table 1.3 Outputs of China's major agricultural products (10,000 tons)

Variety	1978	1999	2005
Grain	30,477.0	50,839.0	48,402.2
Cotton	216.7	383.1	571.4
Oil-bearing crops	521.8	2,601.2	3,077.1
Sugarcane	2,111.6	7,470.0	8,663.8
Flue-cured tobacco	105.2	218.5	243.5
Tea	26.8	67.6	93.5
Fruit	657.0	6,237.6	16,120.1
Meat	856.3	5,960.9	7,743.1
Aquatic Products	466.0	4,122.0	5,107.6

Source: China Statistical Yearbook, NBSC, various years.

Table 1.4 Values and shares of agriculture in Chinese total exports and imports ($ million)

Year	Imports			Exports		
	Total	Agriculture	%	Total	Agricultural	%
1980	200.17	69.59	35%	181.19	91.14	50%
1985	422.52	52.89	13%	273.50	138.28	51%
1990	533.45	98.53	18%	620.91	158.86	26%
1995	1,320.84	244.17	18%	1,487.80	214.85	14%
1996	1,388.33	254.41	18%	1,510.48	219.25	15%
1997	1,423.70	286.20	20%	1,827.92	239.53	13%
1998	1,402.37	229.49	16%	1,837.09	204.89	11%
1999	1,656.99	268.46	16%	1,949.31	199.41	10%
2000	2,250.94	467.39	21%	2,492.03	254.60	10%
2001	2,435.53	457.43	19%	2,660.98	263.38	10%
2002	2,951.70	492.71	17%	3,255.96	285.40	9%
2003	4,127.59	727.63	18%	4,382.28	348.12	8%
2004	5,612.29	1,172.67	21%	5,933.26	405.49	7%
2005	6,599.53	1,477.14	22%	7,619.53	490.37	6%

Source: China Statistical Yearbook 2006, NBSC.

1.3 Land ownership issues in China

Farmers in China do not have ownership of the land on which they farm. Instead, land is owned by the village (or collective) and is contracted or allocated to rural households. Therefore, the Chinese land-tenure system is actually a village-based communal land tenure system (Lin and Zhang, 1998). The ownership entity generally

retains the right to reallocate land among households and when the village or collective leaders exercise the right to reallocate land, rural households risk losing the plots they had farmed and they are not guaranteed to acquire comparable plots through the reallocation. While the reallocation is intended to ensure egalitarian access to land, it also generates significant land-tenure insecurity in rural China.

With the promulgation of the Land Management Law in 1998, the contracted land use right by China rural households has been legally extended to 30 years. However, this policy directive is not always followed and the dynamics of household and village demographics frequently induce local authorities to reallocate land prior to contract expiration. In addition, the Chinese land-tenure system lacks formal rules governing independent land transfers between households, which hinders the development of a rural land market (Huang et al., 1999; Prosterman, Hanstad, Schwarzwalder, and Li, 1998).

The insecure land-tenure system discourages farmers from investing in inputs that have a long-term payoff such as organic fertiliser. In addition, the lack of legal titles on land prevent farmers from using land as collateral and limits their access to formal credit which is another important input in agricultural production. Moreover, the restrictions on land markets, frequent land reallocation and small scale landholdings (less than 0.08 hectare per capita) rooted in the Chinese village-based land tenure system have become the major hindrance to the efficiency of resource allocation and the improvement of agricultural productivity (Huang et al., 1999; Lin and Zhang, 1998).

1.4 Rural poverty and credit accessibility by rural households

Like most Asian developing countries, the majority of the poor population in China dwell in rural areas. With the spectacular growth in agriculture, China has made a significant contribution to global poverty alleviation over the past two decades. The

number of rural people living in 'absolute poverty' of less than 25 cents per day has been dramatically reduced from 250 million in 1978 to only 26 million in 2004. However, there are still another 76 million 'relatively' poor people surviving on less than a dollar per day in rural China and the rural population living in both 'absolute poverty' and 'relative poverty' accounts for 11% of the total rural population. The impoverished areas are concentrated in a poverty 'belt' that stretches from the Northeast to the Southwest, and from the heart of China to the far western province of Xinjiang (Heilig, Zhang, Long, Li, and Wu, 2006; Wu, 2001).

In addition, income inequality persists between rural areas and urban areas. For example, the urban income in 1978 was almost 2.6 times higher than the rural income, but it dropped to 1.5 times higher in 1988 as a result of the rapid rural development arising from the rural economic reforms. However, the urban-rural income gap has widened again since 1989; and in 2003, the urban income was again 2.4 times higher than the rural income, which presents a wide gap between rural and urban living standards (see Table 1.5). Moreover, a regional disparity in rural-urban income inequality is evident. For example, the eastern and southern provinces have a much smaller rural-urban income gap than provinces in Central, Northern, and Western China (Heilig et al., 2006).

Inability to acquire formal financial support, credit support in particular, has constrained poor farmers' ability to expand their production and improve their living conditions. The Chinese collective land-ownership system has prevented farmers from accessing traditional credit support from formal financial institutions because farmers cannot use land as collateral which is a necessary requirement in traditional lending. However, farmers need credit support to meet their living needs including the purchase of durable goods, daily consumption, and festivals and ceremonies. In addition to the living needs, farmers require credit as an important production input, with which they can invest in high-yielding varieties and purchase chemical fertiliser that is indispensable in agricultural production because of the infertile soils in most of

China's impoverished areas.

Table 1.5 Comparison between rural and urban income per capita in China (yuan)

Year	Rural Income (average)			Urban Income (average)			Urban-Rural Ratio of Real Income [d]
	Nominal Income [a] (at current prices)	Real Income Index [b] (1978=100)	Real Income c_1 (1978 constant prices)	Nominal Income [a] (at current prices)	Real Income Index [b] (1978=100)	Real Income c_2 (1978 Constant prices)	
1978	133.6	100.0	133.6	343.4	100.0	343.4	2.57
1980	191.3	139.0	185.7	477.6	127.0	436.1	2.35
1985	397.6	268.9	359.3	739.1	160.4	550.8	1.53
1986	423.8	277.6	370.9	899.6	182.5	626.7	1.69
1987	462.6	292.0	390.1	1,002.2	186.9	641.8	1.65
1988	544.9	310.7	415.1	1,181.4	182.5	626.7	1.51
1989	601.5	305.7	408.4	1,375.7	182.8	627.7	1.54
1990	686.3	311 2	415.8	1,510.2	198.1	680.3	1.64
1995	1,577.7	383.7	512.6	4,283.0	290.3	996.9	1.94
2000	2,253.4	483.5	646.0	6,280.0	383.7	1,317.6	2.04
2001	2,366.4	503.8	673.1	6,859.6	416.3	1,429.6	2.12
2002	2,475.6	528.0	705.4	7,702.8	472.1	1,621.2	2.3
2003	2,622.2	550.7	735.7	8,472.2	514.6	1,767.1	2.4

Source: 1) values of a and b are obtained from China Statistical Yearbook 2006, NBSC;
2) values of c_1 and c_2 are calculated by multiplying Real Income Index (b) by the nominal income of base year (1978);
3) values of d are calculated by dividing the values of c_2 by the values of c_1.

Failing to access formal credit, most farmers have to resort to informal borrowings which are typically offered at higher interest rates. While the formal interest rate set by the People's Bank of China (PBC) on short and medium term loans is low (less than 6%), interest rates in informal markets generally range from 12% to 30%. For example, in the northeast and northwest areas where the economy is relatively underdeveloped, informal lending rates of 100% to 200% annually are not unusual (Linton, 2008). Despite the high interest rates charged by the informal lenders, approximately 50% to 60% of rural households in China still rely on informal credit for their consumption and production (Han, 2004). The high interest on informal loans has increased farmers' indebtedness and further kept most of the households

trapped in poverty.

Since Chinese agriculture is dominated by small farms and farmer households are the basic units of agricultural production[3], limited access to formal credit has been blamed as an important constraint to improving farmers' production, which potentially leads to the stagnant growth of the rural economy (Park, Ren, and Wang, 2004; Cheng and Xu, 2003).

1.5 Microcredit in China

With a widening gap between rural and urban living standards and the threat of political instability in the countryside, the Chinese government carried out various agriculture-support policies focusing on farmer lending to solve '*three rural problems*', namely raising rural incomes, improving agricultural production, and developing rural areas. For example, the government has tried to expand credit access by the rural poor through targeted subsidised-loan programmes since 1986. The national funding for the subsidised loan programmes was significantly increased from 5.5 billion yuan in 1996 to 8.5 billion yuan in 1997. However, most of the subsidised loans are allocated to the rich, township enterprises, or local government-support industrial projects, instead of poor rural households. Moreover, the low repayment rates (less than 50%) made the subsidised loans financially unsustainable (Heilig et al., 2006; Park and Ren, 2001).

As a result of the failure of subsidised loans in reaching the rural poor, microcredit was introduced into China as part of the government's poverty alleviation strategies in the mid-1990s, aiming to ameliorate rural poverty through a financially sustainable approach. The development of Chinese microcredit can be divided into three phases.

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[3] Before the economic reform initiated in the late 1970s, the Chinese agricultural economy was characterised as collective economy, of which the basic production unit was the production team. The most successful reform since the 1970s was the shift from the collective system to the household responsibility system (HRS) which restored the primacy of the individual household as the basic unit of production in rural China.

The first phase was an experimental phase from 1994 to 1996, and the microcredit programmes were mainly supported by international donations through the operation of NGOs; the second phase was an expansion phase from 1996 to 2000, during which more government agencies such as Poverty Alleviation Offices (PAOs) were involved in the implementation of microcredit besides NGOs; the third phase began from 2000 to present, when formal rural financial institutions (RFIs) such as the Rural Credit Cooperatives (RCCs) became involved in microcredit implementation. During the third phase, RCCs have quickly expanded their microcredit activities and took the leading role in popularising and formalising microcredit in China because they are the major RFIs serving the rural population with an extensive network in rural areas (Du, 2005, 2004).

Chinese microcredit programmes can be categorised into three types in terms of different providers. The first type includes experimental microcredit projects provided by NGOs and quasi-official organisations, aiming to explore the feasibility, operating capabilities and policy implications of microcredit in China; the second type focuses on poverty alleviation and is carried out by government agencies; and the third type centres on RCCs with the purpose of minimising credit limit in the rural areas of China. In addition, the People's Bank of China (PBC) promulgated *Guidance of Management of RCC's Microcredit Loans* in 2001 and *Notice on Improvement in Granting Microfinance Loans and Serving Peasants* in 2004, which further strengthened the management, systematisation and support of RCC's microcredit programme (Du, 2005, 2004).

Most Chinese microcredit programmes follow the Grameen Bank characteristics such as targeting the poor, collateral free, and joint liability (group lending). In addition, the microcredit loans from RCCs are provided to the rural households who are engaged in land farming and other related business in agricultural sector. Accordingly, the usage of microcredit includes agricultural production, purchase of small farming machinery, services before, during, and after agricultural production, and daily

expenditure such as housing, medical services, education and consumption. Moreover, the credit lines of RCCs' microcredit are set by the Rural Credit Unions at county or city level according to the local economic situation, the farmers' income levels and the availability of RCCs funds, which is finally approved by the PBCs (PBC, 2001).

With the implementation of microcredit, China has boosted lending to farmers in recent years. Under the agricultural lending support from the PBC which is the main funding source for RCCs' microcredit programmes, RCCs have substantially developed their microcredit programmes and evolved as the largest microcredit providers serving the grassroots level in rural China (Sun, 2003). By the end of 2002, the balance of RCCs' microcredit issued to rural households had reached 74.6 billion yuan, an increase of 41.9 billion yuan compared to the beginning of the year. Moreover, RCCs' microcredit had achieved a timely repayment rate of 81%, creating a foundation for realising a sound cycle of economic activities. By the end of 2005, 31,500 RCCs nationwide, which accounted for approximately 90% of the total RCCs, had been involved in offering microcredit service to 71.3 million rural households, equivalent to 32.31% of the total rural population. Especially, in agricultural provinces such as Hubei, Hunan, and Sichuan, the share of rural households receiving loans was 50% or more, and more than 95% of these loans were provided by RCCs in the form of microcredit (Jin, 2006; Han, 2004).

However, in spite of the strong efforts made by the Chinese government to facilitate credit access in rural areas, there is evidence showing that large numbers of poor farmers who are regarded as marginalised people in their villages do not have access to microcredit because of their weak social and economic conditions. In addition, women in rural China are still disadvantaged in accessing any form of formal credit including microcredit and on some occasions, they have to use their husbands' names to apply for microcredit loans (Dyar, Harduar, Koenig, and Reyes, 2006; Han, 2004; Unger, 2002). Additionally, few attempts have been made to test the efficiency of microcredit as an instrument of poverty reduction in China, with the exceptions of the

studies by Li, Rozelle, and Zhang (2004) and Park and Ren (2001). This may be because Chinese microcredit programmes have been implemented on the assumption that microcredit is an effective anti-poverty tool such as those in Bangladesh and Indonesia (Sun, 2003).

1.6 Research problem statement

A large number of farmers in China are still trapped in poverty. Inability to obtain credit from formal financial institutions has long been viewed as the biggest obstacle to improving farmers' living conditions in China. Alternatively, farmers have to rely on informal credit source to support their production and consumption by accepting a much higher interest rate, which leaves them in a 'vicious debt circle' with little hope to shake off poverty. The credit inaccessibility in the rural areas impedes the development of the rural sector, which potentially decelerates the development of China's rural economy.

Microcredit was introduced into China as an efficient anti-poverty programme, aiming to facilitate credit access by rural households and mitigate the rural poverty in China. However, in spite of the efforts made by the Chinese government to support and popularise the implementation of microcredit, empirical studies on Chinese farmers' accessibility to microcredit show mixed results. On the other hand, empirical studies examining the social potential of microcredit such as reducing poverty and empowering women are limited in China and the impacts of microcredit on China rural households' livelihoods are not well documented.

The purpose of this research is to assess the impact of microcredit in rural China in two areas: household welfare and women empowerment. The lack of credit has been regarded as the major constraint in improving Chinese farmers' livelihoods, thus it is reasonable to assume that microcredit, which targets rural households for the provision of credit could have a positive impact on households' well-being such as

increasing the households' income and/or consumption. In addition, the status of Chinese women has improved greatly in the past two decades, but gender inequality still exists in almost all social aspects including political power, education, health, employment and asset possession, and the problem of gender inequality is far more serious in rural, poverty-stricken areas where women usually lack sources of income (Dyar et al., 2006). A study by Du and Kanji (2003) find that patriarchy still prevails in Chinese rural families and rural women continue to be relatively disadvantaged in matters of survival, health, nutrition, literacy, and productivity. Therefore, it is believed that microcredit can contribute to the empowerment of rural women in China by enabling them to be financially independent. In addition to the impact assessment, the accessibility to microcredit by farmers is examined to identify the key factors affecting farmers' access to microcredit.

This research focuses on the microcredit provided by the RCC, the largest microcredit provider in China. RCC's microcredit programmes are the most prevailing type of microcredit in rural China, which have significant influence on rural households' livelihoods compared to the other two types of microcredit programmes in China (i.e. the microcredit programmes carried out by NGOs and governmental agencies).

1.7 Research objectives

The research objectives in this research include the following:

1. to provide an overview of Chinese microcredit programme development;

2. to identify the determinants influencing the accessibility of microcredit by rural households in China;

3. to assess the impact of microcredit on household welfare in regards to income and consumption in rural China;

4. to assess the impact of microcredit on women empowerment in rural China;

5. to provide policy implications from the research findings.

1.8 Methodology and data

The methodology used in this research is divided as follows:

1. Descriptive analysis is used to answer Research Objective 1:

    Graph, average, and percentage are used to discuss secondary information from previous literature regarding Chinese microcredit programmes.

2. Quantitative analysis is used to examine Research Objectives 2, 3, and 4:

    A difference-in-difference (DD) approach is employed in this research to evaluate the welfare impact of microcredit at the household level (see for example, Islam and Harris, 2008); and logistic regression is used to identify key factors influencing rural households' ability to access microcredit and the impact of microcredit on women empowerment, respectively (see for example, Mohamed, 2003; Zaman, 1999).

Primary data were obtained through a rural household survey using a structured questionnaire. The information gathered from the household survey included household characteristics, such as age, gender, family size, etc., which were hypothesised to influence the households' accessibility to microcredit. These household characteristics also served as control variables in the impacts analyses. Moreover, the information obtained from the female respondents was used to construct the empowerment indicators to evaluate the impact of microcredit on women's empowerment. Secondary data were obtained from the selected RCC branch offices, which comprised of household characteristics (such as age, family size, etc.) in the pre-programme period, household annual income and consumption in both the pre- and post-programme periods, and accumulative micro-loan amounts (in the post-programme period only). Specifically, a two-year panel dataset was used in the DD approach for welfare impact analysis with income/consumption as welfare measures. Cumulative loan amounts reflect the extent of household involvement in the microcredit programme, which is the primary variable used in the microcredit impacts analyses (welfare and empowerment).

The structured interview was administered in Hubei Province in China. Hubei Province is one of the major agricultural provinces in China, where farmers are geographically distributed in both plain and mountain areas and produce various agricultural products such as crops, aquatic products and livestock. The net income per capita and consumption per capita of rural households in Hubei Province are $378 and $296 respectively, which represents the average living standards of rural households in China[4] (NBSC, 2005). In addition, the rural population in Hubei Province comprises different minorities, such as Tujia and Hui minorities. The minority population in Hubei Province is around 3 million (NBSC, 2005). The sample drawn from the rural areas in Hubei Province included households from different ethnicities at different wealth levels. Therefore, studying rural households in Hubei Province allowed comparisons based on characteristics such as income inequality and multinationalism.

1.9 Contribution of this research

The development of microcredit in China still lags behind those of other developing countries such as Bangladesh and India. The development of China's microcredit programmes is constrained by many factors such as the lack of technological support and the lack of strong regulatory frameworks. The findings of this research will provide useful information pertaining to the roles of microcredit in poverty reduction and women empowerment, which reflect the influence of the microcredit programmes on the Chinese rural economy and social development. In addition, the findings of this research will provide relevant information to policy makers in establishing supportive regulatory environments to sustain a viable microcredit sector. It would be appropriate for the policy makers to liberalise regulations and restrictions which have bottlenecked the development of Chinese microcredit to a large extent.

Besides, an understanding of how accessibility to microcredit or financial services

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[4] The national average of net income per capita of Chinese rural households in 2005 is $396; the national average of consumption per capita of Chinese rural households in 2005 is $311 (NBSC, 2005).

would change the farmers' lives helps policy makers to take the appropriate actions towards reforming the rural financial system and further enhance farmers' accessibility to financial services including credit, which could potentially accelerate the development of China's rural economy.

1.10　Outline of this thesis

The rest of this thesis is organised as follows: Chapter 2 reviews the relevant literature including a background of the Chinese rural financial system, credit demand and credit accessibility by rural households, and the performance of governmental credit programmes; Chapter 3 reviews the development of Chinese microcredit programmes and previous empirical studies on credit accessibility and the impacts of microcredit. Chapter 4 illustrates the empirical models, the estimation techniques, and data collection methods. Chapter 5 analyses the data and discusses the empirical results. Finally, Chapter 6 summarises the major research findings and policy implications, followed by the limitations of this research and suggestions for future research.

CHAPTER 2

AN OVERVIEW OF CHINA'S RURAL CREDIT MARKETS

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This chapter provides an overview of rural credit markets in China, including the rural financing system (credit supply), credit demand, and credit accessibility by rural households, and the performance of government rural credit programmes. The chapter is organised as follows: Section 2.1 focuses on the credit supply-side and provides a review of the formal rural financial system as well as informal rural financing in China. Section 2.2 discusses credit demand by the rural households in China; Section 2.3 discusses credit accessibility by the rural households in China. The gap between credit supply and credit demand in rural China is discussed in Section 2.4; and Section 2.5 discusses the performance of the government credit programmes in China.

2.1 Rural financing in China

As a result of the rural reforms since the late 1970s, China's rural economy has been developing rapidly, which has created a demand for pluralism of investment and finance in rural areas. The enormous demand for financial services gave an impetus to the formation and expansion of rural financial institutions, leading to gradual improvement in the overall rural financial system (Scott and Wang, 2006; Zhang, 2004). At present, formal financial institutions and informal financial institutions coexist within China's rural financial system (see Figure 2.1). Figure 2.1 shows China's rural financial system consisting of three kinds of financial institutions including banking institutions, non-banking financial institutions and informal funding organisations. The PBC acts as the central bank implementing a unified monetary policy and supervising the overall financial system in the country (Zhang, 2004; Ma, 2004).

23
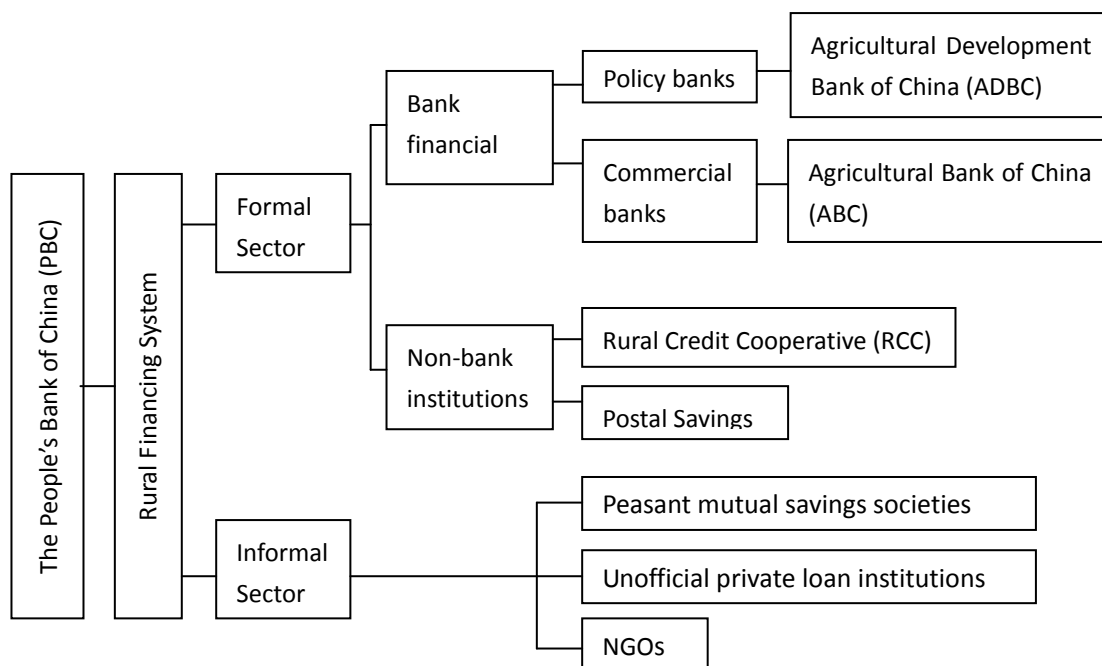
Figure 2.1 Rural financial system in China (adapted from Zhang, 2004)

2.1.1 The formal financial system in rural China

The formal rural financial sector is characterised as a "three-tier system", composed of a state-owned commercial bank (Agricultural Bank of China), a government policy-based bank (Agricultural Development Bank of China), and Rural Credit Cooperatives (RCCs). Each of the three rural financial institutions plays a unique role in providing lending support to the agricultural sector and rural households in China.

(1) The Agricultural Bank of China

The Agricultural Bank of China (ABC) was established in the late 1970s to implement rural financing policies formulated by the PBC, but restructured into a commercial bank serving both rural and urban markets after 1994 (Gale and Collender, 2006)[5]. The ABC is the largest commercial bank involved in agriculture. Loans from the ABC include specialised agricultural loans (such as comprehensive development and subsidiary businesses in grain, oil, and cotton), conventional agricultural loans (such as farming, forestry, livestock, fisheries, and the processing of agricultural products),

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[5] The ABC was first founded in 1955 to provide credit support for rural credit cooperatives. Since then, ABC has undergone several abolishment and re-establishments and the present ABC in China was re-established in 1979 (IFAD, 2001; Gale and Collender, 2006).

loans for township and village enterprises (TVEs), loans for rural supply and marketing co-operatives (SMCs), and loans for basic rural facilities construction. However, the main targets of the ABC's lending are agricultural enterprises rather than rural households. Between 1980 and 2001, the cumulative balance of agricultural loans issued by the ABC reached 9,449 billion yuan, accounting for 66% of the ABC's total lending business (Ma, 2004; Zhang, 2004; Druschel, 2002).

However, Han (2004) notes that the ratio of ABC's agricultural loans to its total loans has been declining. Before the 1990s, the ABC played the leading role in China's rural financial system and more than 98% of total loans from the ABC were issued to support agricultural development. However, owing to the commercialisation reform from the mid-1990s, the ABC's financial resources are no longer restricted to agriculture and more resources have been allocated to rural infrastructure construction such as the rural electricity network, transport, and communication. After the 1990s, the ABC gradually withdrew its branches from the countryside and shifted its business focus from agriculture to industry. Consequently, the share of agricultural lending by the ABC has decreased and the ABC has lost its dominant position in the rural financial system (Dong and Featherstone, 2004; Zhu and Gemert, 2001).

(2) The Agricultural Development Bank of China
The *Agricultural Development Bank of China* (ADBC) is founded in order to separate the policy-based banking business from the ABC in 1994. The scope of the ADBC's credit business in the early days of its establishment included loans for the procurement and storage of grain, cotton, oil, sugar, and meat; loans for the transfer, marketing and wholesale of grain and oil; policy loans for grain, cotton, and oil processing enterprises; loans for poverty reduction and development, and loans for rural infrastructure construction (Ma, 2004; He and Guo, 2004; Druschel, 2002). However, in the late 1990s, the range of the ADBC's credit business shrank to the supply and management of funds for the procurement of grain, cotton, and oil by the state-owned enterprises. The other policy banking businesses such as financing

poverty-relief and comprehensive agricultural exploitation were handed over to the ABC (Wang and Liu, 2005; Ma, 2004; He and Guo, 2004). By the end of 2001, the ADBC had issued procurement loans for grain, cotton and oil amounting to 707.3 billion yuan, accounting for approximately 98% of its total lending balance (Ma, 2004; Zhang, 2004).

Zhang (2004) argues that it is difficult for the ADBC to assume the heavy burden of China's policy finance because ADBC's capital sources are insufficient. Generally, the main source of the ADBC's capital should be funds assigned by financial administration and loan repayment. However, owing to the imbalance between government revenue and expenditure accumulated over years, the allocation of supplementary funds cannot be guaranteed on time. Instead, the ADBC raises its capital through issuing financial bonds to commercial banks and borrowing from the PBC, which subsequently increases the ADBC's cost of financing (Zhang, 2004; He and Guo, 2004). The other reason is that the ADBC's scope of business is too narrow with a single function. As a result of policy adjustment, the ADBC only acts as a 'purchasing bank' to meet the financing needs of agricultural products procurement and stockpiling by the state-owned enterprises (Zhang, 2004; He and Guo, 2004; Zhu and Gemert, 2001). Zhu and Gemert (2001) argue that the ADBC should engage more in issuing policy-related loans to support agricultural production rather than solely extending loans to state-owned enterprises, which is an appropriate way of ensuring an efficient supply of agricultural products.

ABC and ADBC both serve the rural areas, but they mainly focus on agricultural product processing companies and large-scale agricultural development projects run by the state government and do not issue loans to farmers in general (Druschel, 2002; Ma, 2004; Zhang, 2004).

(3) Rural Credit Cooperatives

Established in the late 1950s, *Rural Credit Cooperatives* (RCCs) are financial

cooperative organisations with rural labourers as share-holding members. RCCs operate at either village-level or township-level: the township-level RCCs can run both savings and credit businesses but the village-level RCCs are only allowed to take in deposits from villagers, plus collecting loan applications and submitting them to township-level RCCs for approval. Since the start-up capital of RCCs comes from farmers (80% or more of RCCs' funding comes from farmers' savings deposits), RCCs have a close relationship with farmers and loans provided by RCCs principally target rural households (Druschel, 2002; Guo and Lei, 2000). Loans issued to rural households are mostly in the form of microcredit, giving key support to crop production, fish breeding, raising animals, as well as children's education and daily consumption (Zuo, 2001; PBC, 2001). Operating at county or township level, RCCs are the only formal financial institutions reaching the grassroots of rural society, since other financial institutions such as the ABC have largely withdrawn their financial services from rural areas to target more profitable operations in urban areas (Cheng, 2006; Empel and Smit, 2004).

A study by Zhang (2004) reveals that the proportion of RCCs' agricultural loans in terms of the total formal agricultural loans rose from 26% in 1979 to 78% in 2001, while the proportion of agricultural loans from the ABC dropped from 74% to 22% over the same period of time, which further confirmed the predominant position of RCCs in China's rural financing system. As a mainstay of China's rural financial system, RCCs cater for the basic financial needs of rural households and play a decisive role in providing financial support for agriculture and rural economic development.

Despite the crucial roles played by RCCs in China's rural finance, many problems exist in the way of RCCs' unique roles in rural financing (Scott and Wang, 2006; Wang and Liu, 2005; Wang, 2004; Dong and Featherstone, 2004; Zhu and Gemert, 2001; Guo and Lei, 2000). For example, RCCs are hampered by ambiguous governance as RCCs in China are established on the basis of government directives

and are only 'cooperative' financial institutions in name. Before 1997, RCCs were managed by ABC as an affiliate. After separating from ABC in 1997, RCCs began their own business under the direct supervision of the PBC. In addition, RCCs were still partly under control of the local governments, which increased the supply of capital for agricultural production with little regard to RCCs' institutional sustainability (Wang and Liu, 2005; Dong and Featherston, 2004; Zhu and Gemert, 2001). Such ambiguous governance is further complicated by the fact that the China Banking Regulatory Commission (CBRC) has begun to exert both quasi-managerial and supervisory influence on RCCs since 2003 (Scott and Wang, 2006; Scott and Druschel, 2004). On the other hand, the theoretical owners of RCCs, that is, the farmers in villages, join RCCs under administrative pressure and have virtually no right to participate in management and supervision of the operations of RCCs. In addition, the members' share capital is generally in deficit due to the operational losses by many RCCs (Wang, 2004; Guo and Lei, 2000). Without management rights and bonus incentives, the farmers would rather forego their small shares of capital and are unwilling to bear any responsibility for RCCs' poor performance (Wang, 2004). Dong and Featherstone (2004) argue that RCCs in China are not 'cooperatives' in principle because they fail to meet the requirements of a 'cooperative' such as voluntary participation, democratic management, and mutual risks and benefits.

In addition to the supervisory imperfection, the legal position of the RCC in China's financial system is equivocal. China has not enacted laws regulating co-operative finance and the legal position of the RCC is only defined by the Regulations for the Management of Rural Credit Co-operatives formulated by the PBC (Dong and Featherstone, 2004; Wang, 2004). For daily business RCCs' legal role is to provide financial services to farmers or rural households; but at the macro level, RCCs play a dual role of acting as a quasi-policy financial institution to support agriculture and operating as commercial banks to generate profits to maintain their viability. The combination of cooperative, commercial, and policy finance in one entity inevitably results in frequent confusion with regard to RCCs' operational roles and behaviours

(Wang, 2004; Druschel, 2002). Furthermore, the professional quality of RCCs' staff as well as the management methods and basic facilities of RCCs still lag far behind those of commercial banks, which makes RCCs less competitive compared to commercial banks (Park, Ren, and Wang, 2004).

Problems such as governance ambiguity and unclear legal directives have created disincentives for RCCs to operate effectively to achieve the goal of financial sustainability. In addition, political intervention in lending decisions by local authorities, usually motivated by intentions such as tax collection and employment maintenance, leads to non-recoverable loans made to poorly performing enterprises. This perpetuates weak incentives to implement commercially sustainable lending practices and fosters an unfavourable credit culture within RCCs (Scott and Druschel, 2004). As a result, many RCCs have incurred severe financial losses. According to studies by Han (2004) and Ma (2004), the accumulative losses of RCCs throughout the country stood at 108.3 billion yuan at the end of 2000, accounting for 10% of RCCs' total assets. In spite of the positive response by the PBC to mitigate RCCs' debt burden by writing off bad loans through one-time capital injections, RCCs still had non-performing loans amounting to 514.7 billion yuan at the end of 2002, comprising 37% of their total loans outstanding.

Since the 1978 reform, China has enjoyed a relatively stable rural financial system that is geared towards meeting the diversified financial needs in rural areas. Within the system, the three major financial institutions, i.e., the ABC, ADBC, and RCC, perform their own functions in regards to commercial, policy, and co-operative finance (Zhang, 2004; Zhu and Gemert, 2001). However, there are still many criticisms targeted at the rural financing arrangements. China has a much shorter history of using modern financial instruments to support economic and social development compared to developed countries. In addition, the national development strategy implemented in China has long favoured urban areas and industry at the expense of the countryside and agriculture. The contribution of capital to the national

economy by the agricultural and rural sectors has been far greater than the capital support received by these two sectors. The rural financing system has been mostly criticised for the functional defects in meeting the basic capital requirements by both the agricultural and rural sectors (Zhang, 2004; Han, 2004; Ma, 2004).

2.1.2 Informal finance in rural China

Informal finance refers to all transactions, loans and deposits, occurring outside the regulation of a central monetary authority (Atieno, 2001). Informal credit in China includes loans obtained from non-commercial sources such as friends, relatives and acquaintances with low interest rates or interest free, and loans from private lending and borrowing organisations (PLBs) such as professional moneylenders, traders, pawnbrokers and usurers with high interest rates. PLBs are the dominant source of informal finance in rural China (Han, 2004; Cheng and Xu, 2003).

Informal credit plays an important role in the rural sector in meeting the credit needs of the rural poor. Tilakaratna (1996) estimates that the share of informal credit in the rural sector in developing countries ranges from 30 percent to more than 80 percent. For example, a study by Ma (2004) shows that informal credit has become the main source of credit among the rural population in China, accounting for more than 70% of the farmers' total borrowing. Compared to formal financing, informal financing possesses many advantages that provide reasons for its popularity in China. These include:

1. Personal relationships with clients

Generally, informal lenders lend to persons who are part of their social network within which the contracts can be enforced, and they can keep personal touch with their clients. The close relationships with clients enable informal lenders to have adequate information about the borrowers such as family background and business situation. Such personal knowledge of the borrowers largely releases informal lenders from information constraints, such as the borrowers' creditworthiness, the borrowers'

repayment capacity and the borrowers' willingness to repay (Atieno, 2001; Wenner and Proenza, 2000; Zeller and Sharma, 1998). Unlike formal lenders who tend to establish stringent screening criteria such as the requirements of a co-signer and physical collateral to ensure repayment, informal lenders base their transactions more on the confidence arising from their relationships with their clients and social sanctions within a community (Qadir, 2005; Atieno, 2001; Wenner and Proenza, 2000; Zeller and Sharma, 1998).

2. Flexible lending schemes

Most services of informal finance are client-oriented. With intimate knowledge of the borrowers, informal lenders are able to offer flexible arrangements to adjust to changing economic circumstances of the borrowers and provide different credit demands, without serious risk of loss (Atieno, 2001; Zeller and Sharma, 1998). Such flexibility is reflected in the loan amounts, loan repayment schedules and loan purposes. For example, the repayment structure of informal lending is closely related to local production cycles associated with the borrowers' occupations; and informal loans can be renegotiated in view of both the lender's and borrower's respective circumstances (Zeller and Sharma, 1998). In contrast, the rigid lending policies set by formal lenders include prescribed minimum loan amounts, restrictions on credit for specific purposes and strict terms of repayment (Atieno, 2001).

3. Rapid processing of loan applications

The informality of operations allows informal lenders to process loan applications promptly with little or no paperwork and disburse credit to the borrowers quickly compared to the technical process and lending procedures of formal lenders (Tilakaratna, 1996).

4. Low transaction costs for the borrowers

Informal lenders reduce their borrowers' costs of borrowing to a minimum level by applying lending practices which reflect the needs and realities of the borrowers

(Islam, 2007). First, they impose little or no costs on borrowers as direct financial charges except explicitly high interest rates. In addition, informal lenders offer a fast and responsive service so that accessibility costs due to delays in loan disbursements are minimised under informal lending (Qadir, 2005; Klein, Meyer, Hannig, Burnett, and Fiebig, 1999). By contrast, the interest rate charged by formal credit is relatively low but does not cover all transaction costs incurred by the borrowers in securing formal loans, such as opportunity costs resulting from the loss in investment due to the delay in credit delivery, and time and travel costs incurred during the processing of the loan (Islam, 2007; Atieno, 2001).

In short, personal relationships, flexibility, rapidity, and low transaction costs comprise the main strengths of informal finance. These superiorities have made informal finance either the exclusive or the preferred credit source in rural areas despite high interest rates (between 60% and 240% p.a. charged by PLBs in China) (Cheng and Xu, 2003; Guo and Lei, 2000; Yaron, 1992).

Informal credit also faces severe constraints. For example, Atieno (2001) argues that the limited resources restrict the extent to which the informal sector can effectively and sustainably satisfy the credit needs of its borrowers. The informal lenders in China seldom manage savings deposits, and financial intermediation which provides a common clearinghouse for both borrowers and lenders does not take place within the informal sector (Zhang, 2004; Zeller and Sharma, 1998). Therefore, the supply of credit by the informal sector is quite limited. In addition, Zeller and Sharma (1998) note that the credit shortage within the informal sector is further worsened when natural disasters such as droughts and floods affect both informal lenders and borrowers simultaneously in the agricultural sectors. This is mainly because informal lenders are sporadically distributed and have not formed a network of branches across different regions, which has crippled their ability to diversify risks.

As a result, borrowings from informal lenders are usually in small amounts for short

periods, which can neither stimulate significant business growth in the micro-enterprise sectors nor finance long-term investment in assets. Tilakaratna (1996) argues that informal finance is generally insufficient for development purposes. It is often for short-term purposes and rarely for capital build-up, usually for traditional rather than innovative activities, and mostly for survival needs instead of developmental needs.

Informal finance remains controversial in China's rural financial construction. On the one hand, there are opponents who traditionally regard informal finance as a violation of normal financial discipline in China despite its contribution to meeting farmers' urgent financial needs. The evidence supporting such argument is that the Chinese government never gives overt recognition to the legal existence of the informal sector and the development of informal credit is generally clandestine and out of the government's supervision (Jia, Heidhues, and Zeller, 2007; Zhang, 2004). The opponents suggest excluding informal credit from rural financial markets by improving the lending operations of formal financial institutions to provide more loans in favour of rural households, which is crucial in establishing a sound rural financial system and maintaining the sustainable development of China's rural economy. However, the proponents of informal finance contend that the existence of informal credit in China reflects the imperfections of China's formal rural financing system, which is characterised as unable to meet the diverse capital demands of the rural households. If no changes are made in the current situation, the persistence of informal credit will be both necessary and rational in view of the credit facilities provided to the farmers (Ayyagari, Kunt, and Maksimovic, 2008; IFAD, 2001; Guo and Lei, 2000).

2.2 Credit Demand by Rural Households in China

Credit is important in agricultural production as it enables producers to meet their cash needs during the production cycle. This agriculture cycle includes preparation,

cultivation and harvesting, which typically lasts for several months during which cash revenue is seldom earned. Moreover, cash remuneration is always received some time after harvest. However, the farmers' expenditure and consumption must be in cash. This gives rise to a high demand for credit in rural areas (Diagne and Zeller, 2001; Feder, Lau, Lin, and Luo, 1990). For example, poor rural households need credit to maintain their consumption of basic necessities such as food when there is a shortage of cash – for example, after a bad harvest or between the production seasons.

Wang and Liu (2005) argue that there are generally three reasons why China's farmers seek credit. First, they seek credit to finance their simple production. Farmers have to spend large sums of money on purchasing production inputs such as fertilisers, pesticides, seeds, and livestock. Many farmers cannot afford such heavy expenditures without loans. Second, production alone is not enough to raise farmers' income effectively. Consequently, farmers tend to diversify their production and expand their business so as to improve their living conditions, which results in substantial capital demand as well. Third, farmers require credit to support their daily consumption. For example, house-building, weddings and funerals are costly expenditures in China. In addition, expenses for health-care and children's education are generally very high in China, and are not affordable for many low-income families if they do not borrow.

The demand for credit by China's rural households largely hinges on the type of economic activities that rural households are engaged in. For example, a study by the International Fund for Agricultural Development (IFAD) (2001) shows that the activity with the highest credit needs was livestock (75%), followed by self-employed activities (64%) and cropping (27%). In addition, credit demand has changed with the fast changing structure of economic production. Park et al. (2004) compare the composition of households' credit demands in 1997 and 2000 using data from the China Rural Poverty Survey (CRPS) and found that there is a significant increase in credit demand for self-employment (the share of loans used for self-employed activities rose from 5.9% in 1997 to 21.6% in 2000), while credit demand for

traditional agriculture inputs such as fertilisers and livestock tend to decline except when large investments are made for economies of scale or growing new input-intensive crops[6]. Changes in the composition of credit demand correspond to the changes in income composition of rural households, where an increase in the share of income from self-employment, but a dramatic reduction in the share of income from traditional agriculture (cropping and livestock) could be observed (Park et al., 2004).

Rural households in China are likely to borrow from different sources of credit for different purposes. For example, a study by Feder et al. (1990) reveal that the predominant purpose of formal loans reported by the sampled rural households in Jilin Province was for the financing of current production, while most informal loans were obtained primarily for construction and social expenditures (such as, weddings and funerals). Similarly, Chen (2004) reports that rural households in Sichuan Province borrowed from RCCs largely to support their agricultural production such as purchasing chemical fertilisers and raising livestock (accounting for 52% of the total formal borrowing), while the households borrowed frequently from friends or relatives to supplement their consumption including house building, medical treatment and children's schooling. The study by IFAD (2001) provides further evidence of the strong positive association between formal credit and production loans, and between informal credit and consumption loans. Table 2.1 summarises the types of credit demand in rural China found in these studies.

Furthermore, it is worth noting that rural households at different wealth levels have different financing objectives and needs. The wealthier households are more likely to borrow for small businesses and for housing, but less likely for consumption. On the contrary, the poorer households are more inclined to borrow to supplement their daily consumption, especially for medical treatment and children's education (Chen, 2004;

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[6] The China Rural Poverty Survey is a longitudinal household survey conducted in officially designated poor villages in four poor provinces in China – Shanxi, Gansu, Sichuan and Guizhou.

Table 2.1 Major credit demand in rural China

Sources	Production					Consumption				
	Fertiliser	Other input for crop production	Livestock	Fixed capital	Self-employment	Daily expenses	Weddings and funerals	Schooling	Health care	Housing
Feder et al. (1990)				√		√	√			√
IFAD (2001)	√	√	√	√	√	√	√			√
Park et al. (2004)	√	√	√	√	√	√	√	√	√	√
Chen (2004)	√	√	√		√	√	√	√	√	√

2.3 Access to Credit by Rural Households in China

Farmers in China, similar to those in most developing countries, have been historically constrained from accessing formal credit, and such constraint has impeded farmers from enhancing their productive capacity and improving their welfare. This deprives them opportunities to escape poverty. Most banks do not serve the poor farmers because of the high risks and costs involved in small transactions, the relatively low profit, and the inability of the poor to provide proper collateral (ADB, 2000).

From the perspective of banks, lending to small farmers implies considerable risks. For example, banks frequently relate high default risks to agricultural lending. Agricultural production is seasonal and subject to geographic and climatic conditions, as a result, a farmer's production and ability to repay the loans can be seriously influenced by natural factors not directly under his or her control. Aside from natural conditions, other factors such as market prices and government policies will also affect farmers' revenues, which brings uncertainty to their loan repayment (Klein et al., 1999; Carter, 1988). In addition to default risks, agricultural lenders face specific challenges, such as covariant risks where many or all borrowers are affected simultaneously by external factors (such as market price fluctuations and changes in

agricultural policies), which can severely worsen the quality of lenders' loan portfolios (Klein et al., 1999). Because of these considerations, banks perceive farmers as high risk borrowers, leading to their reluctance to grant loans to farmers due to high financial losses.

Secondly, banks are unwilling to transact with rural households owing to the high costs incurred from small lending. This is because the low population density, together with the scattered location of rural households, makes the provision of formal financial services costly. The long distances between the villages and insufficient rural transportation facilities in many rural areas greatly raise the costs of loan appraisal, loan monitoring and enforcement of loan repayments. Besides, an irregular distribution of the agricultural lending operations over the year increases the fixed costs of personnel and the profits from lending may be insufficient to cover these costs (Okurut, Schoombee, and Berg, 2004; Klein et al., 1999). During the periods of high seasonal credit demand, liquidity requirements increase the prices of loanable funds; in times of low demand, however, surplus liquidity has to be invested in low or non-earning assets. This again imposes opportunity costs on the lenders. In other words, banks are burdened with high costs in agricultural lending (Islam, 2007; Okurut et al., 2004; IFAD, 2001).

However, banks are not alone in facing high costs; poor farmers have to confront substantial transaction costs as well when dealing with banks, which discourage them from borrowing from banks (Okurut et al., 2004). Other than loan interest, the borrowing costs of farmers in China consist of the time and money spent on travelling and loan applications, gifts and kickbacks to loan officers, and membership fees (Cheng and Xu, 2003). Borrowing from banks implies high opportunity costs in time. Farmers have to visit the bank branch office several times to conclude redundant loan application procedures which require a long time to process. Tilakaratna (1996) argues that the earnings foregone during the loan processing time constitute the major cost encountered by the poor when borrowing from formal institutions. Apart from the

time costs, farmers have to bear high transportation costs especially when banks are not conveniently located (Okurut et al., 2004; Klein et al., 1999). It is also quite common for loan applicants to invite loan officers to banquets and/or give kickbacks directly to loan officers for loan approvals. In the case of RCCs, farmers have to pay membership fees (usually USD$7 to USD$20) to RCCs before they can lodge their loan applications (Cheng and Xu, 2003). In fact, these non-interest costs can significantly increase the effective interest rates of formal borrowing given the small size of the loans borrowed by farmers (Tilakaratna, 1996).

In addition to the high borrowing costs, the strict collateral requirement in traditional formal lending also prevents poor farmers from participating in the formal credit market. To address the problems of adverse selection and moral hazard arising from asymmetric information between banks and the poor, banks usually attach collateral requirements to loans. Collateral is used to assist in determining creditworthiness, as well as solving the incentive and enforcement problems (Klein et al., 1999). Such collateral requirement becomes more stringent when the borrower is resource-poor. Land is always a preferred form of collateral in formal agricultural lending. However, farmers in China do not have the ownership of the land on which they farm. Instead, farmland is owned by villages and distributed on an egalitarian basis among village members. This lack of land ownership equals a lack of proper collateral, which makes formal credit inaccessible to China's farmers (Gale and Collender, 2006; Unger, 2002). In some special cases, a savings account of equal value to the loan principal becomes the only acceptable form of collateral, making formal loans inaccessible by many poor farmers (Park et al., 2004).

Some studies have documented that farmers from the poorest strata in China cannot access microcredit which is a special credit scheme aiming to facilitate poor farmers' access to credit (see for example, Cheng, 2006; Unger, 2002). Cheng (2006) notes that China's microcredit programmes have automatically targeted the relatively poor or better off rural households in the poor areas, while excluding the poorest from their

programmes. A reason for such exclusion lies in the principle of self-selected groups for peer monitoring adopted by microcredit programmes (Cheng, 2006; Evans, Adams, and Mohammed, 1999). This is because in group lending, individual performance will decide future access to credit by the whole group. Accordingly, farmers with relatively strong loan repayment capacities and similar socio-economic backgrounds are likely to form into groups, while those with weaker economic bases are rejected from joining groups, losing access to microcredit. In particular, Cheng (2006) observes that some very poor farmers who cannot access microcredit are self risk-rationed, which means they do not apply for microcredit loans because of the perceptions of being unable to repay the loans. Finally, the arrangements inherent in microcredit programmes such as regular meeting attendance also preclude a large number of poor farmers from participating owing to the concerns of additional transportation and opportunity costs incurred (Evans et al., 1999).

Failing to access formal credit and microcredit, the majority of poor farmers have to fall back on informal sources to meet their credit needs. According to a study by Wang and Liu (2005), the Chinese farmers' credit needs for consumption can be met by borrowing from their friends and relatives free of charge, while the needs for production are mostly met by borrowing from PLBs with high interest rates. Despite the strengths of informal credit such as close personal relationships, flexibility and speed, informal lenders are generally ill-equipped to finance substantial, long-term investments since they depend on personal funds (Zeller and Sharma, 1998). The limited credit supply by informal lenders then leads to either severe credit rationing or exploitive interest rates for some borrowers. Atieno (2001) argues that for the formal financial institutions it is the lending terms and conditions that constrain the access to credit by poor farmers, whereas for informal lenders it is the limited financial resources that bring credit constraints to the poor.

2.4 Gap between Credit Demand and Credit Supply in Rural China

Rural financial institutions (RFIs) in China tend to restrict farmers' access to formal credit to protect their financial viability due to the high risks and costs in small farmer lending. On the other hand, the limited resources of informal lenders cannot satisfy the credit needs for substantial, long-term investments by rural households. As a result, there is an excess demand for rural credit, leading to the emergence of a credit gap.

The credit gap has been intensified by the inadequate credit supply in rural China given the considerable credit demand required by the enormous number of rural households in China. First, the credit insufficiency arises from the lack of RFIs in providing financial services to farmers. Although ABC and ADBC serve the rural areas, they mainly focus on agricultural product processing companies and large-scale agricultural development projects run by the state government and do not issue loans to farmers in general (Ma, 2004; Zhang, 2004). As a result, the RCCs are the only RFI penetrating the grassroots of rural society with the provision of financial services (Zhu and Gemert, 2001). However, there are only about 40,000 RCCs across the country and the credit supply is insufficient to meet the overall credit demand of the large rural population in China (Ma, 2004).

Secondly, the insufficient credit supply is further exacerbated by the increasing financial losses of RFIs resulting from the capped lending rates set by the PBC, which have crippled the RFIs' ability to provide credit support to rural households. The low lending rates do not generate sufficient revenues for RFIs to make a profit given the high transaction and operational costs incurred in lending to farmers. In the case of RCCs, the maximum lending rate currently charged by RCCs is around 8%, but still remains the flexibility for RCCs to charge higher lending rates in different areas (Cheng and Xu, 2003). For example, to be profitable, the minimum lending rate for RCCs in major agricultural areas should be 11.5% p.a. and the minimum lending rate in the poor and remote areas should be 16% p.a. (Cheng and Xu, 2003). Besides the

interest rate ceilings, the unclear governance and inefficient management system have caused further deterioration in RCCs' financial bases and many poorly-performing branches had to be closed down, which substantially reduced the credit supply in the countryside (Wang and Liu, 2005).

The rural financial institutions in China are part of the national banking system, in which a large proportion of lending is motivated by government policy objectives (about 42% of total loans as estimated by Park and Ren, 2001). This thus leaves less funds for RFIs to undertake commercial lending.

Finally, large amounts of rural funds have flowed from rural to urban areas, driving a growing wedge between the demand for and supply of agricultural credit in China (Cheng and Xu, 2003). The main outflow channels are postal savings and commercial banks. Postal savings take in deposits but do not advance credit to rural households, and the deposits absorbed by the postal savings are all re-deposited into the PBC. In addition, commercial banks such as the ABC have taken up large amounts of deposits from rural households but seldom issue loans to the households. In particular, after the ABC removed most of its branches from the countryside in the 1990s, funds outflows from rural areas to cities channelled through banks became greater. Moreover, RCCs also channel out funds from rural areas by purchasing bank bonds, issuing loans to urban clients and lending funds to other urban financial institutions (Wang and Liu, 2005). Furthermore, the government control over financial markets has impeded the establishment of new types of RFIs and such control is stricter in rural areas compared with the cities. For example, the government gives consent for the establishment of non-governmental banks in the cities but not in the countryside, which also encourages the flow of funds from rural to urban areas (Ma, 2004).

2.5 Government Credit Programmes for Rural Poverty Alleviation

The provision of financial services, credit in particular, to the poor at reasonable cost

has been increasingly regarded as a crucial mechanism aimed at poverty alleviation. However, rural households in China find it very difficult to access formal credit, mainly because they cannot offer appropriate collateral, a requirement in formal lending. As an alternative to formal credit, informal loans are often available, but their usurious interest rates have increased the farmers' indebtedness and blocked farmers' access to that market as well (Islam, 2007; Cheng and Xu, 2003).

Lack of access to credit has long been viewed as a key constraint on the economic development of poor areas and the chief reason for the persistence of poverty in rural areas. Given the failure of formal financial institutions in serving the rural poor and the disadvantages of informal credit such as illegal operations and exploitative interest rates, China's government has implemented a scheme of providing subsidised credit to the rural poor over the past two decades. The purpose of providing subsidised credit is to combat poverty by expanding the poor's access to credit through the easing of interest rates. Providing subsidised loans to the poor to help them increase their income is a popular government intervention policy in many developing countries for poverty alleviation programmes[7] (Park and Ren, 2001).

Since the launch of the subsidised-credit programme[8] in 1986, the government of China has increasingly invested funds in this programme. The annual amount of subsidised loans used for poverty alleviation increased from 2.3 billion yuan in 1986 to 8.7 billion yuan in 1997, and significantly, the accumulative funding investment mounted to 48.3 billion yuan at the end of 1997 (Rozelle, Zhang, and Huang, 2000). In addition, the Chinese government had officially designated poor counties as 'national poor counties' from which the poor households were targeted by the subsidised loans programmes. Most of these counties are concentrated to the west of a

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[7] Besides the subsidised loan programmes, there are other poverty alleviation programmes implemented in China, such as Food for Work, Agriculture Tax Reduction, and Direct Subsidies to Farmers (Grants Programmes). For details see Heilig et al (2006).
[8] In this section, 'subsidised-credit programme', 'subsidised loan programme', 'poverty loan programme' and 'the programme' have the same meaning of a credit programme with a subsidised-interest rate.

north-south line that runs through the central mountainous parts of the country from Heilongjiang, Gansu, and Inner Mongolia in the north to Guangxi and Yunnan in the south, while the remaining poor counties which are generally better off are mostly situated in the hills of Eastern and South-eastern China (Heilig et al., 2006; Rozelle et al., 2000).

Some studies show that the input of subsidised poverty loans has increased the production and income of poor households to some degree (see for example, Rozelle et al., 2000; Zhang, 1993). However, China's subsidised-credit programme, similar to those in other developing countries, has been heavily criticised for failing to reach the hard core poor and for the high rates of default[9].

Non-targeting issue

Previous studies show that much of the benefit produced by the subsidised loan programmes is enjoyed by the non-poor and local enterprises. For example, Rozelle et al.'s (2000) study indicates that almost all subsidised (over 90%) loans in China in the early 1990s were invested in industrial production instead of agricultural production. Many of the loans were granted to township and village enterprises (TVEs) or county-owned enterprises, which raised the local revenue base for local governments but did not benefit the poor households. This policy failure in targeting the poor can be attributed to several reasons (Heilig et al., 2006; IFAD, 2001; Park, Wang, and Wu, 2002; Rozelle et al., 2000; Wu, 1997; Holcombe and Xu, 1996):

1. The poverty alleviation strategy adopted by the Chinese government is partly responsible for the failure of the subsidised-credit programme.
The Chinese poverty reduction strategy is essentially a trickle-down regional economic development strategy, which expects to realise income growth of poor households via regional economic development. The government carried out a

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[9] The problems of non-targeting and low repayment rates arising from subsidised-credit programmes also exist in other developing countries (see Adams, Graham and Van Pischke, 1984; Klein et al, 1999).

poverty loan policy based on the concept of promoting economic development in poor areas (Heilig et al., 2006; IFAD, 2001; Holcombe and Xu, 1996). The poverty loan policy is the consequence of a compromise between economic considerations and political and moral pressures (promoting unity and integrity of the country), while the economic factors played an important role in the government's introduction of this policy. Thus the conflict between the dual roles of the poverty loan programme, i.e. reaching the poor and promoting economic development, resulted in the poor targeting of the programme (Park et al., 2001; Rozelle et al., 2000). Since the local governments have the authority to select projects for receiving subsidised loans, they may favour diversion of funds to enterprises and investment in more promising areas, rather than lending to the poor with the concerns of generating revenues and boosting overall economic development.

2. The government's involvement in loan allocation also reduces the targeting incidence of the programme.

Rent seeking is an unavoidable issue in any economy that employs loan subsidisation. Rent seeking can result in the benefits of subsidies primarily going to those who can pay higher rents, which will certainly preclude most if not all poor households (Klein et al., 1999). Given the low subsidised interest rate in China (about 2.88%), the real poor have few chances to benefit from the subsidised loan policy if the subsidised loans are distributed using the so-called 'iron law of interest rate restriction' (Tsai, 2004; Wu, 1997; Gonzalez-Vega, 1984). As a result, the government has to assume the responsibility for allocating the loans to the target groups so as to minimise the effect of rent seeking on the distribution of the loans. However, the direct involvement of the government in loan allocation may raise problems associated with a centrally-controlled planned economy, such as distortions in resource distribution, given the discrete information and uncertainty about the risks posed by the loan applicants, and consequently, many poor households could not benefit from the poverty loan programmes owing to misallocation of funds.

3. Profit concerns prevent banks from delivering subsidised loans to the poor.

When implementing the subsidised-credit programmes, banks [10] are required to perform two tasks: (a) as enterprises they must make every effort to pursue the goal of profit maximisation; and (b) they have to execute government policy on delivering subsidised loans to the poor (IFAD, 2001; Rozelle et al., 2000). However, the two objectives, profit pursuit and policy implementation, often conflict with each other, and this conflict is then exacerbated by the asymmetric responsibility between the government and banks (Wu, 1997). However, the wages and bonuses of bank staff are closely related to the profits from lending and the government intervenes in the allocation of subsidised loans and influences the selection of projects for receiving the loans, but leaving all the risks and losses resulting from such intervention to be borne by the banks (IFAD, 2001; Holcombe and Xu, 1996). Compared to normal lending, subsidised lending to the poor usually involves higher transaction costs and greater risks because of the difficulties caused by the enforcement of repayment as well as the lack of collateral. Nevertheless, the government does not offer any additional compensation to banks to cover such costs and risks (Rozelle et al., 2000; Wu, 1997).

The problems arising from the implementation of subsidised loan programmes inevitably exert a strong influence on the action of the banks. To reduce losses and risks incurred from providing subsidised loans, banks frequently either lend to the non-poor or TVEs who represent a higher repayment rate and less risk, or put off delivery of the loans to poor clients as a way of earning money from the time delay (Wu, 1997).

4. The target problem is also associated with the difficulty in identifying the real poor.

In the absence of reliable household income data, the only way to differentiate the poor from non-poor is principally the instinctive judgement of local officers who

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[10] Prior to 1995, the subsidised loans were mainly disbursed by the Agricultural Bank of China (ABC). Since 1995, the business of issuing poverty loans has been transferred to the Agricultural Development Bank of China (ADBC) as required by the central government. But the ADBC does not have branches in rural areas. It contracts all its credit business to the ABC. Therefore, the ABC is the actual executor of this programme.

often have an obscure and varied understanding of the poverty line set by the government (Wu, 1997). Thus, it is difficult to monitor the delivery of the subsidised loans to ensure that the loans actually reach the poor.

High default rates

The loan repayment of China's subsidised-credit programmes does not match the initial expectations of the central government. Studies suggest that the average timely repayment rates are about 50% (see for example, Park and Ren, 2001; IFAD, 2001; Holcombe and Xu, 1996). The potential reasons leading to such high default rates include (Park and Ren, 2001; IFAD, 2001; Wu, 2001, 1997; Holcombe and Xu, 1996):

1. There are too many welfare components involved in the poverty loan programmes and the poor tend to treat the subsidised loans as government grants which do not need to be repaid (Wu, 2001; Park and Ren, 2001). Thus, the high default rate in the repayment of subsidised loans is related to such misconceptions among the poor.

2. The defects inherent in the poverty loan policy adopted by the Chinese government are likely to distort the behaviour of poor households towards the use of loans, reducing their ability and willingness to repay loans. For example, the policy stipulates that projects to be financed by the poverty loans should be selected by local governments instead of poor households themselves. If the households cannot repay the loans due to the failure of loan-funded projects, they can still evade the loan repayment because they are not the only decision maker involved in poverty loan utilisation (Park et al., 2002; Wu, 1997). Without proper monitoring and penalties, the households may not use their loan-funded projects in a profitable way, thereby increasing the probability of default.

3. Households may not be able to repay the loans as the term of the loans might be shorter than the term needed for capital investment returns (IFAD, 2001).

4. To maintain the operation of the subsidised loan programmes in some poorer areas, the government has to provide funding support to absorb all or part of the risks in

subsidised lending. This, in turn, promotes the inertia of banks in collecting loans in arrears and further increases loan defaults (Wu, 1997; Holcombe and Xu, 1996).

It can be concluded that the subsidised-credit policy in China is a double-edged sword that has placed the Chinese government in a dilemma. On the one hand, the dual functions of the policy, income generation and social justice, make it difficult to deliver the loans to the real poor. On the other hand, however, once the poor are targeted, which is the intended goal of the policy, the programme implementers (including local governments and banks) in China have to face the problem of high default rates. The high delinquency will substantially impair the financial viability of the programmes, which in turn will reduce the outreach of the programmes to the poor (Wu, 1997; Holcombe and Xu, 1996).

CHAPTER 3

LITERATURE REVIEW

This chapter consists of two parts: Part One provides an overview of the development of Chinese microcredit programmes, and Part Two reviews the empirical models used in analysing credit accessibility and examining the impacts of microcredit. The chapter is organised as follows: Section 3.1 discusses the development of China's microcredit programmes. Section 3.2 reviews the empirical studies analysing the determinants of credit accessibility by the poor. Section 3.3 discusses the impacts of microcredit on various aspects of poor people's lives. A discussion of the impact assessment methodologies is provided in Section 3.4. Section 3.5 reviews the empirical studies evaluating the welfare impact of microcredit on poor households, followed by a review of empirical studies measuring the empowerment impact of microcredit on poor women in Section 3.6.

PART I   Microcredit in China

3.1 Development of China's Microcredit Programme

A microcredit scheme is supposed to overcome some of the lending problems to the poor by offering collateral-free loans at near-market interest rates through group-based programmes operated by different financial institutions and NGOs (Islam, 2007). The outstanding function of microcredit schemes in reducing poverty has been well documented in many developing countries such as Bangladesh and India. Frustrated by the failure of subsidied-credit programmes in efficiently delivering rural credit to poor famers and inspired by the successes of other developing countries in implementing microcredit programmes, the Chinese government launched the microcredit programmes in the countryside in 1994, aiming to achieve poverty alleviation in a financially sustainable way (Park et al., 2004).

In terms of different organisations and sources of funds involved, the development of China's microcredit programme can be roughly divided into three stages: the experimental stage from 1994 to 1996, the expansion stage from 1996 to 2000, and the steady development stage from 2000 to the present (Du, 2005,2004; IFAD, 2001; Wu, 2001; Du and Sun, 2000). Regardless of the different types of microcredit programmes operated in different phases, the overwhelming majority of China's microcredit programmes have adopted Grameen Bank (GB) methodology including collateral-free, targeting the poor and joint-liability (Sun, 2003; Park and Ren, 2001).

3.1.1 The Experimental Stage from 1994 to 1996

The microcredit programmes from 1994 to 1996 were experimental projects operated by NGOs or quasi-official institutions in collaboration with international organisations[11]. These pilot practices aimed to investigate the feasibility of GB methodology, operating modes and policy propositions of microcredit in China, as well as the relevance to poverty alleviation. The outstanding characteristic of this stage is that most projects relied on international donations and soft loans and scarcely at all on government capital (Xie, 2007; Du, 2005, 2004; Druschel, 2002, Wu, 2001).

The experimental projects were carried out by two types of institutions. One type consisted of specialised institutions (offices) established to manage foreign aid funds and implement bilateral or multilateral projects in conformity to donor requirements (Gao and Hu, 2005; Du, 2004; Du and Sun, 2000). Projects with this type of organisational structure included projects funded by UNDP, World Bank, UNICEF, AusAID, and CIDA. The other institutions were NGOs set up to carry out poverty alleviation. Projects operating in this form of organisational structure included the Funding the Poor Cooperative (FPC) projects which were initiated by the Chinese Academy of Social Sciences (CASS) and supported by the Ford Foundation and

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[11] These international organisations include the World Bank, United Nations Development Programmes (UNDP), Australian Agency for International Development (AusAID), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), International Fund for Agricultural Development (IFAD), World Food Programme (WFP), and Canadian International Development Agency (CIDA).

Grameen Trust, and Hong Kong Leshi Association's projects (Gao and Hu, 2005; Du, 2005, 2004; Sun, 2003). According to Du (2004), the experimental microcredit programmes funds stood at 90 million yuan at the end of 1996.

Previous studies suggest that early NGO microcredit programmes in China performed successfully in three areas: targeting the poor (including poor women), financial sustainability, and positive impact on the poor. For example, Park and Ren (2001) found that the NGO programmes effectively targeted poor farmers and poor women by charging a moderate interest rate, and achieved both operational sustainability and financial self-sufficiency (an average financial self-sufficiency rate of 95%). The low operating costs and perfect loan repayment (nearly 100%) accounted for the excellent performance by the NGO programmes (Park and Ren, 2001; Wu, 2001). The empirical analyses by Park and Ren (2001) also provide evidence of a rise in income of the programme participants.

However, the scale of NGO-led microcredit programmes has significantly diminished since the late 1990s and most programmes failed to institutionalise commercial banking practices that are requisite to maintain sustainable growth (Park et al., 2004). A critical reason for their failure was that the NGOs in China have no legal status to provide any type of financial service and regulatory restrictions in China have prohibited NGOs from mobilising their own deposits, which has severely reduced the possibilities for expansion[12] (Du, 2005; Park et al., 2004; Druschel, 2002; IFAD, 2001). Lau (2008) argues that the ambiguity and the lack of a clear and legal financial role for the NGO microfinance programmes have undermined the development of China's microfinance to some extent.

In addition to the illegal status, poor reporting and information systems and the

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[12] When implementing microcredit programmes, the local governments and donors have to negotiate a temporary legal status for NGOs. The PBC has adopted a compromise method with regard to the important role played by NGOs in microfinance and their legal limitations, which silently permits the NGOs to provide microcredit for poverty alleviation (Du, 2005).

outdated internal management of many NGO programmes have impaired their vitality. The majority of the experimental programmes carried out by NGOs did not have sound accounting and financial reporting systems (Wu, 2001; Du, 2004). Consequently, the NGOs had little information about their programmes' performance because they did not have consolidated profit and loss statements or comprehensive loan quality and business progress reports. Moreover, the NGO staff usually regarded the programmes as development projects or experiments and seldom had personal stakes in the programmes' commercial viability or growth (Du, 2004; Park et al., 2004). As Park et al. (2004, p258) conclude, "No NGO programmes have evidenced institutional potential for widespread expansion and outreach".

3.1.2   *The Expansion Stage from 1996 to 2000*

Encouraged by the successful performance of the NGO microcredit programmes in achieving 'win-win' goals, i.e., helping the poor households and maintaining financial sustainability, the Chinese government decided to lead rather than follow the microfinance movement in 1997, employing the GB model to disburse loans as part of its subsidised loan programme for poverty alleviation (Xie, 2007; Gao and Hu, 2005; Park et al., 2004; Sun, 2003; Park and Ren, 2001). In October 1998, the Third Plenum of the 15th Central Committee of the Chinese Communist Party passed the 'Resolution of the Central Committee of the Chinese Communist Party on some major problems of agriculture and rural work', which proposed that effective methods of delivering funds to households for reducing poverty, such as microfinance should be implemented (Du, 2004; Sun, 2003; Du and Sun, 2000). This was the first confirmation of microfinance as an effective anti-poverty instrument by the central government. In the subsequent working conferences held in 1999 and 2000, the government reiterated the significance of microfinance in combating poverty and emphasised that microfinance programmes should be actively and steadily developed (Park et al., 2004; Du, 2004; Du and Sun, 2000).

As a result of the policy encouragement, government agencies (e.g., poverty

alleviation offices) and financial institutions (the ABC) began carrying out poverty-focused microcredit programmes on a large scale between 1996 and 2000, in addition to the microcredit programmes led by NGOs (Druschel, 2002; Du and Sun, 2000). The main funding sources of government-led microcredit programmes were national fiscal funds and subsidised loans from the poverty alleviation funds. The main characteristic of the expansion stage was the active involvement of the government with a supply of financial, manpower and organisational resources to achieve the goal of poverty alleviation (IFAD, 2001; Wu, 2001; Du, 2005, 2004). Meanwhile, practitioners began highlighting the necessity of developing China's microfinance practice in accordance with international best practice standards (Wu, 2001; Du, 2005, 2004).

The government programmes developed to cover 605 counties in 22 provinces nationwide as of August 1998, and issued loans amounting to 600 million yuan. The balance of the loans advanced by the government microcredit programmes was then raised to 24 billion yuan at the end of 2001 and an outstanding total of 17.2 million impoverished rural households had been targeted (Park et al., 2004; Park and Ren, 2001; IFAD, 2001; Du and Sun, 2000).

The rapid expansion of the government-led microcredit programmes almost immediately dwarfed the NGO-led programmes (Park et al., 2004). However, the government programmes have been frequently criticised for not targeting the poor effectively and achieving low repayment rates. For example, Park and Ren (2001) reported that the timely repayment rate of microcredit loans from the surveyed government programme was only 64%, much lower than the NGO programmes (98%). The authors noted that while the rich were effectively excluded from participating in the NGO programmes, they were more likely to take part in the government programme mainly due to the higher rents associated with lower interest rates. Likewise, studies by Sun (2003), Drusched (2002), and Wu (2001) also provide evidence of the problems in the government-led programmes such as limited targeting

and poor performance of repayment.

In terms of targeting the poor and repayment performance, the government microcredit programmes differed little from the unsuccessful subsidised-credit programmes which they attempted to replace (Park and Ren, 2001; Wu, 2001; Du and Sun, 2000). The failure of the government microcredit programmes resulted both from the rapid expansion without proper preparation, and from the inherent incentive conflicts when local governments intervene in the programmes (a similar situation to the subsidised loan programme) (Park et al., 2004; Du, 2004; Du and Sun, 2000). Zuo (2001) further summarised three problems associated with the implementation of government-run programmes including tight budget and staff constraints, non-professionalisation of government staff in operating credit activities, and frequently, diversion of programme funding by the local governments for purposes other than poverty reduction, such as supporting revenue-generating businesses and/or local industrial development.

Park and Ren (2001) argue that the performance of the microcredit programmes administered by government agencies in China is very disappointing compared to those in other developing countries such as Indonesia[13]. Druschel (2002) stresses that the monitoring of project funding usage must be strengthened to ensure that the funds are properly invested in microfinance projects. In addition, reforms, such as providing strong managerial incentives, fostering professionalism among the programme staff and establishing independent financial accounting systems must be carried out for the sake of sustainable development (Du, 2004; Park et al., 2004; Du and Sun, 2000).

3.1.3   *Year 2000 onwards*
From the end of 2000, formal rural financial institutions such as RCCs gradually became involved in China's microcredit programme to facilitate credit access in rural

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[13] The bank-supervised microfinance programme in Indonesia which utilises the village governance structure is a successful example of a government programme in contrast with China's government programme (Llanto and Fukui, 2004).

areas as required by the People's Bank of China (PBC). In December 2001, the PBC published an 'Opinion on directing the management of microfinance by RCCs to rural households', mandating that microcredit programmes should be fully implemented by RCCs to solve the problem of 'loan difficulties for rural households' (Gao and Hu, 2005; Du, 2005, 2004). Druschel (2002) revealed that the RCC's microcredit programme was not solely a means of alleviating poverty but rather a method of increasing credit supply in rural China. With the on-lending loans from the PBC as their main funding source, RCCs launched the microcredit programmes on a national scale by the end of 2002, becoming the main force in popularising and formalising China's microcredit programmes with their extensive network penetrating the grassroots level (Du, 2005, 2004; Sun, 2003). The amount of microcredit loans issued to rural households by RCCs nationwide totalled 96.7 billion yuan in 2002 and around 60 million rural households had received microcredit loans provided by RCCs. The scale of RCCs' microcredit programme has far surpassed the scales of both the NGO and government programmes (Gao and Hu, 2005; Du, 2004; Druschel, 2002).

Compared to the microcredit programmes operated by the NGOs and government agencies, the lending scheme adopted by RCCs' microcredit programme is much more flexible, reflecting the desire of satisfying different credit demands among the rural population. For example, a notable shift in the RCCs' microcredit programme is placing a greater emphasis on individual borrower accountability for loan repayment and less reliance on group-liability (Du, 2004; Sun, 2003; Wu, 2001). Accordingly, RCCs' microcredit programme has two types of loan products including the individual micro-loan and the group-liability loan for rural households. Individual micro-loans are issued to individual farmers or households according to their credit limits, which are established by RCCs based on an assessment of farmers' creditworthiness, i.e. the credit ratings of farmers. The group-liability loan targets clients who have credit needs exceeding their individual credit limits but lack sufficient collateral. Both types of loan products do not require physical collateral provision, except potential social collateral used in the group-liability loan product

(Yang, 2006; Du, 2004; Situ, 2003; Sun, 2003). In addition, while the NGO and government programmes have imposed compulsory savings on the borrowers to be used as a group fund replacing mortgages and guarantees, RCC microcredit programmes encourage rural households to save but do not link it to the offer of loans, making the access to credit by rural households, especially the poor, much easier (Du, 2004; Wu, 2001).

Zuo (2001) concludes that the RCC model of microcredit can outperform both the NGO and government models in terms of financial sustainability and programme replicability. First, the operational cost of the RCC microcredit programme is low since it makes use of existing RCC service outlets and thus reduces the marginal costs for carrying out microcredit programme. Second, unlike the other two types of microcredit programmes which rely heavily on external or government funding, RCCs can mobilise their own programme funds via their saving facility. The low operational costs, combined with the strong capacity to mobilise funds for expansion, leads to the sustainable development of RCCs' programmes. In addition, the RCC model can be easily replicated owing to the well-established network of the existing RCC branches throughout the country. Furthermore, RCCs' microcredit programmes are supposed to be less financially risky because as a formal financial institution, RCCs are strictly regulated and supervised by financial authorities such as the People's Bank of China. This further enables RCCs to easily acquire government support for their programme replication, which is an important condition to operate any programme in China (Zuo, 2001; Wu, 2001). Table 3.1 provides a comparison between the three types of microcredit programmes implemented in China.

Despite the leading role played by RCCs in China's microcredit programs, RCCs still face many constraints that have impeded the development of their microcredit programmes to a large extent. The most prominent problem is that the interest rates have been regulated and set at artificially low levels by the PBC. The interest rates of micro lending by RCCs can only float within a range around the PBC base interest

rate (usually between 0.9-2.2 times around the base interest rate). Despite the good intention of ensuring affordable rates for the rural poor, the interest rate ceilings are far from sufficient to cover the high transaction costs arising from lending to the poor (Du, 2005; Park et al., 2004; Cheng and Xu, 2003).

Table 3.1 Summary of microcredit programmes in China

	NGOs	**Government**	**RCC**
Starting time (year)	1994	1997	2000
Loan size (yuan)	400-1,000	1,000-2,000	1,000-20,000
Loan terms	3-12 months	1 year	Ranging from few months to 1 or 2 years
Repayment frequency	1-4 weeks	1-4 weeks	Single repayment at maturity
Lending methods	5-member groups with group funds as collateral	5-member groups with group funds as collateral in rural areas; physical collateral required in urban areas	Individuals; joint-liability groups; no physical collateral required
Savings	Compulsory on members	Compulsory on members	Voluntary
Targeted borrowers	Poor households	Poor households	All households in rural areas
Interest rates	Between 6-20% p.a.	Between 2.88-7.2% p.a.	Based on bank rates (6-7% p.a.)

Sources: Du (2004); Sun (2003).

The maximum lending rate currently charged by RCCs is only 7.97% p.a. However, as suggested by Cheng and Xu (2003), RCCs should at least charge a rate of 15% p.a. to sustain a viable development. In fact, many studies have revealed that the poor farmers in China are able to pay high rates of interest to access scarce credit. However, "there remains deep-seated resistance to charging anything but a subsidised rate of interest to the poor borrowers" (Holcombe and Xu, 1996, p31). Many RCCs have suffered considerable financial losses due to the interest rate ceilings, resulting in either a decline in credit supply or unwillingness to lend (Park et al., 2004; Cheng and Xu, 2003). Drusched (2002) argues that the elimination of the interest rate ceiling on microcredit would be crucial for the sustainable development of microcredit in China, and market-enforced interest rates should be adopted by China's financial system.

In addition to the interest rate ceilings, weak governance and ambiguous ownership have severely constrained RCCs' ability to expand their microcredit programmes. The supervisory imperfections have led to low incentives to implement commercially sustainable lending practices and have fostered a weak credit culture within the RCCs (Park et al., 2004; Scott and Drusched, 2003). In addition, with the lack of farmers' participation, there are no owners with the ability and appropriate incentives to maintain the value of RCCs' capital. Instead, managers appointed by the PBC respond to contractual incentives which stress high rates of repayment, deposit mobilisation and profitability. However, the poor governance system, along with inefficient motivations, can easily induce deceptive strategies such as rolling over bad debts, which on paper satisfy the managers' short-term objectives while undermining RCCs' financial viability (Park et al., 2004; Scott and Drusche, 2003). Moreover, limited innovations in financial instruments and lack of experience and expertise in commercial financial management practices have hindered the expansion of RCCs' microcredit programmes as well (Dyar et al., 2006; Park et al., 2004).

Microcredit in China has developed quickly since its initiation in 1994, given the relatively short history of microcredit in China compared to other developing countries such as Bangladesh, Indonesia, and India. The expansion of microcredit programmes in China is attributed to the positive attitude towards and active participation in microcredit programmes by the government (Du, 2004; Park and Ren, 2001; Zuo, 2001). The government has fully recognised the link between microcredit and poverty alleviation and endorsed it as an important part of China's long-standing development strategy. Moreover, the Chinese microcredit programme has evolved from an anti-poverty instrument that only targets the rural poor (such as the NGO-led programmes) to a popular rural financial programme that is provided by RCCs to facilitate credit accessibility by the whole rural population (Du, 2004; Druschel, 2002).

However, some defects have been exposed during the course of development, which

have held back further development of China's microcredit considerably. As far as NGO microcredit programmes are concerned, not being legally recognised as financial institutions has severely limited NGOs and quasi-official organisations in developing microcredit (Lao, 2008; Park et al., 2004; Druschel, 2002). Although the government-led programmes contributed significantly to large-scale aid to the poor, these programmes only aimed at assisting the government's poverty reduction initiatives without a long-term goal of continuing development (Du, 2004; Park and Ren, 2001; Wu, 2001). Moreover, the development of RCC's microcredit programmes has been hampered by the capped interest rates, as well as incentive problems and managerial authority limits, which have largely discouraged RCC managers from fostering the necessary motivations to perform profitably with microcredit design features (Cheng and Xu, 2003; Druschel, 2002). In other words, the stagnation of China's microcredit programmes in general is mainly a consequence of an unfavourable legal and regulatory environment, and microcredit cannot be fully extended without some critical reforms (Park et al., 2004).

PART II   Empirical Models Review

3.2 Factors Affecting Credit Accessibility and Modelling Techniques

Okurut (2006) defines 'credit accessibility' as the supply side phenomenon of credit markets because it is the lenders who decide whether borrowers can access or be denied credit. The credit process involves two stages. First, borrowers who demand credit decide how much to apply for, and from which particular lender (the formal or informal sector) at the prevailing market interest rates. This process constitutes the demand side. In the second stage, the lenders decide who can access the credit and what amount, based on their financial viability, which represents the supply side. Similarly, focusing on the supply side, Diagne et al. (2000) and Diagne (1999) argue that the household's accessibility to certain types of credit is determined by the lender's choice of credit limit to a larger extent. The credit limit is the maximum that

the lender is willing to lend, and is a subjective assessment of the likelihood of default and the borrower's characteristics. Diagne (1999) points out that every potential borrower faces a credit limit owing to asymmetric information between the borrower and lender and the imperfect enforcement of loan contracts. Accordingly, Diagne (1999, p7) defines that a household has access to a certain type of credit "when the maximum credit limit for that credit type is *strictly positive*" and a household lacks access to credit from a given source "when the maximum credit limit for that source of credit is *zero*".

Mohamed (2003) conducted an empirical study examining the accessibility to formal and quasi-formal credit by smallholder farmers in Zanzibar and found that they had limited access to formal credit. The empirical evidence of his study indicated that social-economic characteristics of rural households such as age, gender, education level, and income levels significantly influence smallholder farmers' accessibility to formal credit. For example, the education level was found to be an important factor affecting an individual's access to formal credit because educated borrowers manage their loan expenditures much better. Moreover, the awareness of credit availability by farmers had a positive significant relationship to the accessibility to formal credit, which implies that farmers who are aware of the availability of credit services have better chances to access formal credit than those who are unaware of it.

Besides household characteristics, Mohamed (2003) also revealed that the cumbersome lending procedures and rigid conditions set by the rural financial institutions have restrained the rural households from accessing formal credit to a larger extent. This view is supported by Atieno (2001) who observed that lending terms and conditions reflected in collateral, application procedures and repayment schedules have considerably restrained the poor in Kenya from accessing formal credit and, in turn, forced the poor to find alternatives such as informal credit. Similarly, an empirical study by Umoh (2006) also revealed that inadequate collateral security, difficult loan-processing procedures and high interest rates are three major

obstacles in obtaining formal credit by micro-entrepreneurs in Nigeria.

Okurut (2006) investigated household-level factors that influence households' accessibility to different sources of credit in South Africa, including formal credit, semi-formal credit and informal credit. The author found that people who are relatively poor[14] have very limited access to both formal and semi-formal credit but could easily access informal credit owing to the absence of collateral requirements by informal lenders. Household factors including household head age and gender, location, household size, educational level and household per capita expenditure were found to have different effects in determining accessibility to different sources of credit. For example, factors such as household size and household per capita expenditure contributed greatly to facilitating accessibility to formal and semi-formal credit by households. In addition, Okurut (2006) found that a male household head can significantly help the household gain access to formal credit, but was inversely related to household accessibility to semi-formal credit. Moreover, educational level was a facilitator of household accessibility to formal credit but appeared to have a negative effect on household accessibility to informal credit. Interestingly, the rural location of a household was found to impede his or her accessibility to semi-formal credit in Okurut's (2006) study.

Vaessen (2001) conducted an empirical study of accessibility to formal rural credit in Northern Nicaragua and revealed that accessibility to credit was influenced by both the bank (supply-side) and household (demand-side) characteristics. At the bank level, the interest rates of the loans and client selection criteria were important characteristics influencing accessibility to credit by a rural population. High interest rates can crowd out poor and more risk-averse households in favour of less poor and more risk-taking households. In addition, the selection criteria included the requirements of a guarantor and physical collateral, which excluded the resource-poor

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[14] In Okurut's (2006) study, 'the poor' are not identified as the population below a fixed poverty line, but refer to the households in the bottom 40% of the distribution of expenditure of all households in the survey.

people from accessing formal credit (Vaessen, 2001). At the household level, Vaessen (2001) emphasised that household access to networks of recommendation/information such as connections between households in the area and existing clients of the bank and bank staff members, plays a decisive role in obtaining formal credit. The empirical results suggest that household characteristics including education level, family size, occupation, availability of informal credit and access to the networks of recommendation/information have a significant effect on the probability of gaining access to formal credit.

Davis, Gaburici, and Hare (1998) examined private farmers' characteristics among those who had accessed formal credit in Rome and found that the existence of off-farm income sources (for example, small businesses) can noticeably increase the chances of acquiring formal loans. Similarly, the empirical analyses also provide evidence that a reasonable level of farm income is important in obtaining formal loans by farmers. The authors' findings suggested that improved asset values and a secure non-farm income provide good quality collateral, making the farmers less risky and more attractive to banks.

A study by Evans et al. (1999) demystified the inaccessibility to microcredit by the majority of poor households in Bangladesh, including in areas of well-established microcredit programmes. First, the authors detected four programme-related barriers that inhibited the eligible poor from accessing microcredit. The barriers included an insufficient supply of microcredit, membership requirements, peer group expectations (self-selected groups) and institutional incentives. The authors criticise the membership requirements of microcredit programmes including attending regular meetings, paying registration fees, depositing minimum savings, and joining educational/planning activities, as having imposed too many impossible obligations on the poor given the scarce resources (time and money) owned by the poor, which pose a barrier to credit accessibility. The self-selected credit group is another way of impeding accessibility, because the group selects members based on social class,

literacy, health status, and other socio-cultural norms and practices, and those who do not meet these criteria are excluded (Evans et al., 1999). Furthermore, institutional incentives to meet target repayment goals and to respect the programmes' self-financing principle lead microcredit programme managers to reject potential clients who are, or appear to be at risk of repaying the loans. These programme-related barriers are also evidenced in Weiss and Montgomery's (2004) study. In addition to the programme-related barriers, Evans et al. (1999) investigated a large number of indicators covering household health, demographic, and socioeconomic characteristics to study household-related barriers to credit accessibility. The authors identified three 'risk factors' including low female education, small family size and landlessness which characterise those with high probability of not accessing microcredit.

Okurut (2006) concluded that the poor face constraints in accessing formal credit due to both institutional and household level factors. At the institutional level, the banks incur high information costs in assessing the creditworthiness of small borrowers and low returns due to the small loan amounts borrowed. This motivates the formal lenders to adopt strict collateral requirements as a screening mechanism to minimise default risk, hence rationing out the poor from the formal credit market. At the household level, the low levels of income and poor asset accumulation, and highly skewed income and asset distribution give the poor households a high risk profile, which makes them less attractive to formal lenders.

Table 3.2 summarises the key factors influencing household accessibility to institutional credit including microcredit from the studies described above. However, some factors have an ambiguous effect on household accessibility to credit given the heterogeneous nature of different study contexts. For example, family income level is found to be positively related to the probability of accessing formal credit in Davis et al. (1998) but as a negative effect on credit access in Mohamed's (2003) study.

Table 3.2 Key factors affecting household access to institutional credit

Institution-level factors		Household-level factors	
Interest rates (-)	Mohamed (2003); Atieno (2000); Umoh (2006); Vaessen (2001)	Household head features including age (-/+), male (+), educational level (+)	Mohamed (2003); Okurut (2006); Vaessen (2001); Evans et al. (1999)
Collateral requirements (-)			
Lending procedures (-)			
Credit limits (+)	Diagne (1999); Diagne et al. (2000)		
Credit sufficiency (+)	Evans et al. (1999); Weiss and Montgomery (2004)	Family size (+)	Evans et al. (1999); Vaessen (2001); Okurut (2006)
Membership requirements[a] (-)		Family income level (-/+)	Davis et al. (1998); Mohamed (2003)
Self-selected credit group[b] (-)		Household expenditure (+)	Okurut (2006)
Incentives for target repayment (-)		Land ownership (+)	Evans et al. (1999)
		Awareness of credit availability (+)	Mohamed (2003)
		Access to networks of recommendation/information (+); available informal credit (-)	Vaessen (2001)

Note: 1. a and b only apply to microcredit programmes;
2. Signs in parentheses are empirical relationships between these factors and probability of accessing credit by households.

Modelling techniques of credit accessibility can be categorised into two types: logistic regression models (see for example, Okurut, 2006; Mohamed, 2003; Vaessen, 2001; Evans et al., 1999; Davis et al., 1998) and probit models (see for example, Umoh, 2006; Okurut, 2006). For example, in Mohamed's (2003) logit model, the dependent variable (Y_i) is designated as "obtain formal/semi-formal loans or did not obtain" and takes the values 0 (respondent did not obtain formal/semi-formal loans) or 1 (respondent obtained such loans). The independent variables (X_i) used in Mohamed's (2003) model include a range of demographic and socio-economic factors of households including age, gender, occupation, income level, etc. Similar to Mohamed (2003), Davis et al. (1998) also used a logit model to analyse farmers' credit accessibility in Rome. The dependent variable and independent variables are defined similarly as those in Mohamed's (2003) model, except that Davis et al. (1998) also include detailed farm information such as 'pastures and moistures areas (in Ha)' as

independent variables. Omoh (2006) employs the probit model to estimate the relationship between 'a micro-entrepreneur's access to credit' (dependent variable) and a vector of household/enterprise characteristics including age, family size, educational level, firm size, age of enterprise, type of enterprise, etc.

Regardless of the different types of modelling techniques, previous studies focusing on households' credit accessibility have generally used 'probability to access credit' as the dependent variable, with a range of household characteristics such as age, education, and family size as independent variables. Logistic regression models have dominated the credit accessibility literature. Logistic and probit models are very similar to each other and both of them can render asymptotically consistent, efficient and unbiased estimates (Train, 2003; Omoh, 2006). The difference is that logistic models assume the probability of credit access to be logistically distributed, but probit models assume such probability to be normally distributed. Since the empirical results of logistic and probit models tend to be very similar in large samples, logistic models are commonly preferred to probit models due to their simplicity (Ruiz-Tagle, 2005; Train, 2003).

3.3 Impacts of Microcredit on the Livelihoods of the Poor

Microcredit has impacted the poor in various aspects via improving their accessibility to credit, and such impacts can be classified as economic impacts and non-economic or social impacts (World Bank, 2006). By extending small collateral-free loans to underprivileged people at affordable costs, microcredit enables its borrowers to actively take up job-creating activities which generate a range of improvements in their economic conditions. Islam (2007) notes that microcredit can positively impact the poor's welfare in terms of income, employment, assets/capital accumulation, and productivity. According to Islam (2007, p101), microcredit can create a 'virtuous circle' for poor borrowers: *low income, credit, investment, more income, more credit, more investment, and more income*. The continued growth in income will then push

up the total consumption levels of the households, which constitutes an immediate welfare result from borrowing from microcredit programmes. In addition, enhanced income from borrowing encourages the poor to increase investment in working capital (for example, raw materials, seeds, and fertilisers) and assets (physical, such as machinery, and financial such as cash savings). As the microcredit loan is repaid in small instalments at relatively short intervals (usually one week), it is easy for a borrower to pay the instalment from their income while leaving the original capital untouched (Aghion and Morduch, 2005; Hossain and Diaz, 1999). Capital/assets accumulation, which is a long-lived welfare effect brought about by microcredit, in turn reinforces the income-generating capabilities of borrowers (Islam, 2007).

Microcredit also contributes greatly to borrowers' productivity, which is a crucial determinant of the economic condition of the rural poor (Islam, 2007). For example, financial support from microcredit allows the poor to invest in high-yielding varieties and advanced technology, which significantly stimulates productivity and promotes production. According to Islam (2007), increased productivity is important for a 'concomitant' and 'secular' rise in income, which is crucial for rural poverty reduction. Furthermore, microcredit also creates employment opportunities for a vast under-utilised labour resource by undertaking economic activities on a self-employed basis. As the self-businesses expand over time, more labour is demanded. On the other hand, owing to the advantages of self-employment such as flexible working time and low opportunity costs in terms of foregone household production, a number of microcredit borrowers substitute self-employment for wage employment (Islam, 2007; Hossain and Diaz, 1999). The wage employment opportunities given up by microcredit borrowers may be pursued by those who, for example, cannot obtain microcredit loans to start self-businesses. As a result, the total employment is improved through the intervention of microcredit.

Microcredit has been universally accepted as an efficient tool for fighting poverty due to its positive impact on the poor households' economic well-being such as increasing

income/consumption levels and creating employment opportunities. In addition, microcredit has the potential to empower the poor, women in particular, which reflects the social impact of microcredit. Microcredit generally targets poor women who are the most marginalised group among the poor in many developing countries, being both economically and socially disadvantaged (Ang, 2004). The rationale for lending to women also relates to the fact that women are a better credit risk and have a greater tendency to use increased earnings to improve their family's well-being, compared to male borrowers (Ang, 2004; Mourji, 2000).

Osmani (2007) described how poor women can be empowered through participation in microcredit programmes. First, microcredit enables poor women to earn an independent income and contribute financially to their families, which immediately raises their self-esteem as well as their esteem in the eyes of others. This is supposed to give women greater power within the household. Second, women will free themselves from the narrow confines of household precincts and move into a wider world in the process of taking out loans and using loans to initiate income-generating activities. The exposure to the outside world, together with the formation of networks with other women in the community, is expected to help women foster self-confidence and courage so as to exercise more power both within and outside households. Women's empowerment can be manifested in various dimensions, such as increased decision-making, a more equitable status of women in the family and community, and being more active and mobile in participating in social networks and the commercialisation process (Cheston and Kuhn, 2002; Maclsaac, 1997).

Malhotra, Schuler, and Boender (2002) further point out that women become more conscious about the quality of their life and family welfare as a result of empowerment, leading to beneficial effects on other outcomes including fertility control, child health and education, and household well-being. For example, a study by Schuler, Hashemi, and Riley, (1997) reveals that poor women in Bangladesh become empowered from participation in microcredit programmes. Such

empowerment leads to more use of contraceptives, which greatly contributes to reducing fertility rates in Bangladesh. The authors emphasised that the reduction in fertility rates substantially helped ameliorate poverty situations through population control given the limited natural and financial resources available in most developing countries such as Bangladesh.

According to Basher (2007, p1), microcredit functions as a catalyst in transforming its participants from a "passive credit recipient to a well responsive and active agent in economic and non-economic aspects of life". Because of the potential to reduce poverty and empower women, microcredit plays a major role in many countries' gender and development strategies.

However, microcredit can have negative impacts on the poor as well. Islam (2007) found that microcredit borrowers who are extremely poor experienced a further deterioration rather than improving their situation. Islam (2007) noted that those who experience further deterioration are either trapped in previous debts from informal lenders so that they could not use microcredit loans for productive purposes; or for any natural calamity or illness, or sudden incidents such as theft or death of livestock purchased with microcredit loans. Likewise, Maclsaac (1997) observes that microcredit is less effective, or even counter-productive, in helping the poorest of the poor to raise their living standards. This may be because the worse-off borrowers use the loans only for consumption or invest in less risky (and generally less remunerative) activities compared to the better-off borrowers who tend to invest in riskier and more productive ventures including technological improvements, which provide opportunities for generating a greater income to improve their living standards.

Considering these negative impacts, microcredit, or credit in a wider sense, cannot ultimately reduce poverty by itself, and it will be more effective when combined with other financial interventions such as savings and insurance (Islam, 2007; Maclsaac, 1997). For example, Islam (2007) emphasises that accessibility to reliable and

monetised saving facilities can improve the economic security of the extremely poor and it is only when they acquire some economic security that accessibility to credit can help lift them out of poverty by increasing the productivity of their businesses or creating new sources of livelihood. Khandker (1998) suggests that the ultra-poor need initial help provided by public work programmes to get over the food, health, or labour market thresholds before they can respond to the positive changes brought by any financial programmes.

3.4 Impact Assessment Methodologies

Hulme (1997, p3) constructed a model of impact chain (see Figure 3.1) and defines 'impact assessment' (IA) as to "assess the difference in the values of key variables between the outcomes on 'agents' (individuals, enterprises, households, populations, policymakers, etc.) which have experienced an intervention against the values of those variables that would have occurred had there been no intervention". Based on this model, the process of IA includes three steps: choosing 'agents' (assessment units), choosing 'outcomes' (assessment indicators) and assessing.
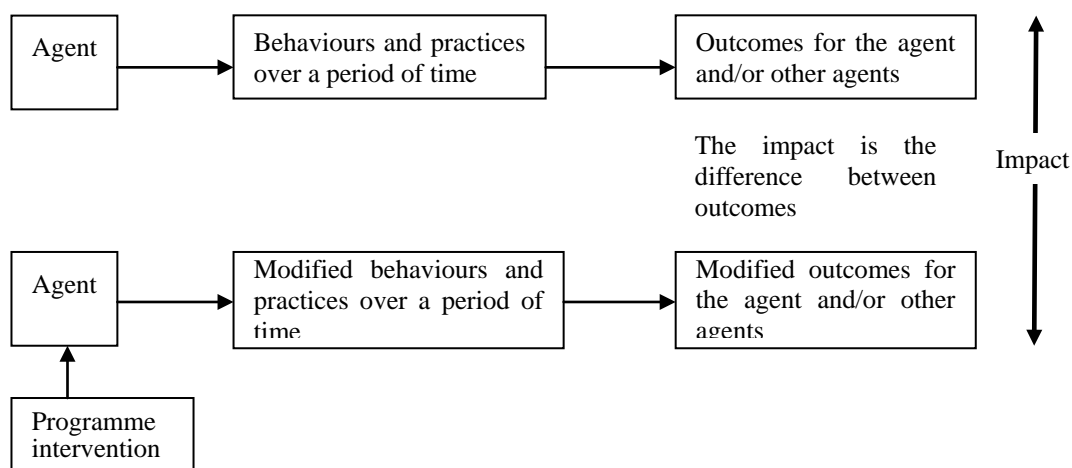
Figure 3.1 Model of impact chain (adapted from Hulme, 1997)

Common parameters used in IA of microcredit include individual, household, enterprise, and institutional environments within which microcredit agents operate

(Hulme, 1997). Most impact studies have been conducted at the household and community levels, assessing the poverty reduction potential of microcredit (for example, Coleman, 2002; Khandker, 1998); while studies conducted at the individual level seem relatively limited and are generally restricted to evaluating the empowerment impact of microcredit on women (for example, Goetz and Gupta, 1996). A comprehensive attempt has been made by USAID's AIMS[15] Project, which seeks to assess the impacts of microfinance on individual, household and community levels and produce a complete picture of the overall impacts of the microfinance programmes (Hulme, 1997).

Impact studies that use performance indicators such as high repayment rates as a proxy for increased income to measure the success of microcredit programmes in alleviating poverty have been heavily criticised. Maclsaac (1997) argues that timely loan repayment is not an accurate indicator of improved income because even when a borrower repays a loan on time, the fund of repayment is not necessarily from the income generated from credit-supported businesses. The high loan recovery rates may be attained from the social, peer, and other forms of pressure imposed on borrowers by microcredit programmes. If the borrowers must commence weekly repayment immediately after the investment is made, they will have to repay the loan from other sources (example, from family income or moneylenders) in order to maintain their good standing with microcredit lenders (Swain, 2004; Maclsaac, 1997). Maclsaac (1997) further points out that the drop-out rates may also be high with high repayment rates, indicating that the repayment figures only report the repayment ability of those who remain in the programme. Maclsaac (1997) concludes that no direct correlation can be found between repayment and business success (improved income), and even less so between repayment and impacts on social and gender relations.

Hulme (1997) argues that assessment indicators for microfinance programmes must be precise and measurable, and the author classifies the assessment indicators into two

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[15] AIMS stands for Assessing the Impact of Microenterprise Services.

categories: economic indicators and social indicators. Economic indicators include the levels and patterns of income, expenditure, consumption, and assets. Social indicators such as individual control over resources, involvement in household and community decision-making, levels of participation in community activities and social networks have been extended into the socio-political arena in an attempt to assess whether microcredit can promote empowerment (Hulme, 2000, 1997).

The commonest methods used in IA include sample survey, rapid appraisal, participant-observation, case studies and participatory learning and action (PLA) (Hulme, 2000). Table 3.3 provides a summary of the IA methods including a description of the key features of each method. Each method has its own strengths and weaknesses. Hulme (2000) suggested that impact studies should adopt pluralistic approaches instead of a single method to avoid the weaknesses of individual methods.[16]

Table 3.3 Common impact assessment methods

Method	Key Features
Sample Surveys	Collect quantifiable data through questionnaires. Usually a random sample and a matched control group are used to measure predetermined indicators before and after intervention.
Rapid Appraisal	A range of tools and techniques developed originally as rapid rural appraisal (RRA). It involves the use of focus groups, semi-structured interviews with key informants, case studies, participant observation and secondary sources.
Participation Observation	Extended residence in a program community by field researchers using qualitative techniques and mini-scale sample surveys.
Case Studies	Detailed studies of a specific unit (a group, locality, organisation) involving open-ended questioning and the preparation of 'histories'.
PLA	The preparation by the intended beneficiaries of a program of timelines, impact flow charts, village and resource maps, well-being and wealth ranking, seasonal diagrams, problem ranking and institutional assessments through group processes assisted by a facilitator.

Source: Hulme (1997, p8)

One major obstacle to assess the impacts of microcredit programmes is the difficulty in addressing the 'attribution' or determining the 'counterfactual' (Islam, 2007; Baker,

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[16] For detailed comparison between the strengths and weaknesses of these methods, see Hulme (1997, p9).

2000; Hulme, 2000, 1997). Attributing specific effects (impacts) to specific causes is at the core of impact evaluation. In other words, how observed changes or impacts are attributed to microcredit or what would have happened in the absence of microcredit (Aghion and Morduch, 2005; Mosley, 1997). However, changes or impacts after a project intervention (like microcredit) may have been affected by other factors irrelevant to the particular project being evaluated, which makes the attribution of an observed change or impact to the project under evaluation difficult (Islam, 2007).

The attribution problem can be demonstrated through experiments in which the treatment is randomly allocated among a well-defined set of people. The random allocation process itself then creates comparable treatment and control groups that are statistically equivalent to one another given appropriate sample sizes. In theory, the control group automatically generated through this experimental design can serve as a perfect counterfactual in that it is assumed to be identical to the treatment group except for the difference in accepting treatment [17] (Baker, 2000). Thus the comparisons made between the treatment group and the control group established through an experimental process are considered to be an accurate estimate of the impact of the given project (or treatment) (Baker, 2000; Hulme, 2000).

However, experimental designs are thought to be unethical in social science due to the denial of benefits to otherwise eligible members of the population for the purposes of the study, and as a result, are relatively difficult to conduct (Baker, 2000; Khandker, 1998). Alternatively, impact evaluations of anti-poverty programmes such as microcredit programmes resort to non-experimental (or nonrandomised) designs to establish comparable control groups as similar as possible to treatment groups through econometric techniques. These techniques include matching method (propensity-scoring matching), difference-in-differences (double difference) method, and instrumental variables method (Baker, 2000). Table 3.4 provides explanations on

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[17] There can still be differences due to sampling error. The larger the size of the treatment and control samples, the less the error.

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the different methods used in non-experimental impact assessment designs.

Table 3.4 Methods used to conduct quasi-experimental designs

Method	Description
Matching method	In which one tries to construct an ideal control group that matches the treatment group from a larger survey;
Propensity-scoring matching	Most widely used matching, in which the control group is matched to the treatment group on the basis of a set of observed characteristics or by using the "propensity score" (predicted probability of participation given observed characteristics); the closer the propensity score, the better the match;
Double difference or difference-in-differences method	In which one compares a treatment group and control group (first difference) before and after a programme. It is sometimes combined with the use of the matching method.
Instrumental variables (IVs) method	In which one identifies one or more variables that affect participation but not outcomes given participation and applies the IVs to predict programme participation, then sees how the outcome indicators vary with the predicted values

Source: Baker, 2000.

However, unlike experimental designs in which the selection of the treatment and control groups is random, non-experimental designs select the treatment and control groups after an intervention using non-random methods, which may give rise to a number of biases such as sample selection bias. Selection bias arises mostly from the unobserved or unmeasured characteristics, such as individual abilities, pre-existing conditions, and a subjective (often politically driven) process of selecting programme participants (Islam, 2007; Aghion and Morduch, 2005; Baker, 2000). These unobserved characteristics may bias the estimation of outcomes being investigated, including under or over estimations of actual programme impacts, negative impacts when actual impacts are positive (and vice versa), and statistically insignificant impacts when actual impacts are significant (and vice versa) (Aghion and Morduch, 2005; Baker, 2000). Baker (2000) argues that statistical techniques such as matching and using instrumental variables can possibly control for selection bias, but cannot fully remove it, leaving a major challenge for impact assessments.

3.5 Welfare Impact of Microcredit at Household Level

Impact assessments of microcredit have placed an increasing emphasis on addressing sample selection bias (such as non-random programme placement bias and self-selection bias), which otherwise would misestimate the true impact (see for example, Coleman, 1999; Pitt and Khandker, 1998; Khandker, 1998). This section reviews previous impact studies using different techniques to mitigate selection bias based on the heterogeneous nature of the study context.

Pitt and Khandker (1998) evaluate the impacts of group-based microcredit programmes in Bangladesh on a set of household behaviours (e.g., labour supply, children's schooling) and intra-household distribution of resources (e.g., household consumption). Based on cross-sectional data, they used a method called WESML-LIML-FE[18] to address bias arising from self-selected participation and non-random programme placement. This intricate econometric method relies ultimately on an instrumental variable constructed on the basis of the interaction between participation eligibility and programme availability[19]. The impact analysis is based on double difference, which is simplified as follows:

$$impact = (Y_{ep} - Y_{ip}) - (Y_{en} - Y_{in}) \tag{3.1}$$

where Y is an outcome measure (such as consumption, income), e and i stand for eligible and ineligible households, respectively; p and n stand for programme and non-programme villages, respectively. The authors' results show that microcredit not only has a direct and significant effect on households' material poverty by increasing annual household consumption, but also indirectly contributes to the households' well-being by improving children's schooling and the labour market supply including self-employment. Moreover, credit provided to women seems to influence all the

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[18] WESML-LIML-FE refers to an econometric framework consisting of weighted exogenous sampling maximum likelihood, limited information maximum likelihood and village fixed effects (Pitt and Khandker, 1998).

[19] In order to obtain the instrumental variables, the authors conducted a quasi-experimental survey design in which households in villages with and without credit programmes are separated by an exogenous eligibility criterion - those with more than 0.5 acre of land cannot be borrowers - which allows the authors to avoid the self-selected participations.

outcomes investigated more significantly than credit provided to men.

However, the main problem of Pitt and Khandker's (1998) study is that the 'exogenous' eligibility criterion is found to be violated in many cases – households which should not have been eligible for loans are actually programme participants – which creates a further source of error (Morduch, 1998). In addition, their methodology may not be replicable because many microcredit schemes do not use formal eligibility criteria to screen participants. The Chinese microcredit programmes are such an example, in that they do not set explicit eligibility rules for programme participation[20].

Park and Ren (2001) provided an early impact assessment of the Chinese microcredit programmes. Three microcredit programmes are examined in their study, including an NGO programme, mixed programme (NGO-government), and government programme. The authors implemented two strategies to identify suitable instrumental variables (IVs) to identify programme impacts. They first tested the appropriateness of 'consumer durables' as IVs. However, the durables as instruments performed poorly, failing to explain participation in the programmes. Following that, the authors constructed IVs (eligibility interacted with participation variables) by directly asking non-participants whether they are eligible in their survey. This IV approach was applied to each programme and performed well in controlling for selection bias. Compared to the naive estimation using OLS, the estimation using eligibility instruments suggested much greater benefits from programme participation in terms of increasing household income, especially for NGO programmes. The study also raised concerns about the efficiency of government programmes which have been found to attract rich households rather than the poor and deliver few benefits to their poor participants.

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[20] Unlike Bangladesh which used landholdings as the eligibility rule, land size is not an ideal eligibility criterion in China since it is distributed on an egalitarian basis within villages. In most cases, the screening is largely based on the observations by loan officers in terms of the values of housing and consumer durables.

Khandker (2005) argued that the IV approach is a good way to correct for the endogeneity problems in model estimation, but it is difficult to acquire appropriate and reliable instruments if the identification conditions are not adequately restrictive, which leads to the sensitivity of the study results. Given the sensitivity to the instruments used, Khandker suggests using alternative methods to demonstrate whether microfinance matters. For example, based on Pitt and Khandker's (1998) study, Khandker (2005) carried out an impact assessment study using a dynamic regression model with panel data to estimate the time-varying borrowing effects on household welfare (measured by household consumption) for programme participants and nonparticipants including average villagers. With the benefit of panel data, the author opted for a household-level fixed-effect method without instrumental variables to solve any time-invariant participation-related endogeneity. The empirical results revealed that besides imposing the positive effects on the poverty reduction of borrowers by raising their household consumption per capita, microcredit also benefits nonparticipants through growth in local income and reduces village-level poverty through spillover effects, which reflects the aggregate impacts of microcredit on poverty reduction.

Coleman (1999) made use of a unique survey design to address selection bias in assessing the impact of microcredit programmes in Northeast Thailand, which drew on the fact that most microcredit activities operated by village banks start in a narrowly defined area and then expand their coverage to similar villages elsewhere. The author first made a comparison of household outcomes between participants and non-participants in 'treatment villages' where the microcredit programmes were already available[21]. Following this, the author made the same comparison between participants and non-participants in 'control villages' where the programmes would be introduced later. The impact was thus estimated as follows:

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[21] Among the 14 villages surveyed by Coleman, eight had village banks (VBs) operating at the start of 1995, the remaining six 'control villages' did not but would receive VB funding a year later. Interestingly (but crucial for evaluation), at the beginning of 1995, households in 'control villages' were allowed to self-select into VBs according to VBs' standard procedures but were forced to wait for one year to get the first loans.

$$impact = (Y_{M(t+1)} - Y_{N(t+1)}) - (Y_{Mt} - Y_{Nt}) \qquad\qquad (3.2)$$

where *M* and *N* stand for members and non-members of microcredit programmes respectively; *t* stands for the time length of the programme's operation in a particular village, and *(t +1)* and *t* cover the early and the late entrant villages respectively. Similar to Pitt and Khandker (1998), Coleman applied the village-fixed effects method to correct for programme placement bias. In addition, the self-selecting participants in the 'control villages', who have not yet received a loan, provided an accurate 'control group' for current borrowers in 'treatment villages', thereby controlling for selection bias.

Unlike Pitt and Khankder (1998) who estimate marginal impacts using a cumulative amount of borrowing variable, Coleman (1999) estimated average impacts using a membership dummy and found that the membership of village banks' microcredit programmes did not have a significant impact on the household outcomes such as income, assets, and spending on health care and education. A follow-up study by Coleman (2002) improved the estimation strategy to better control for self-selection bias by further dividing participants into rank-and-file participants (poorer households) and committee participants (richer households). The author found a significant difference between ordinary and committee participants. While the impact of microcredit on ordinary members' welfare was either insignificant or even negative, the impact on committee members' outcomes such as income and production expenses was positive, implying that most of the benefits of microcredit programmes were captured by the less poor rather than the poorest.

Alexander (2001) explored the poverty reduction potential of Peruvian microcredit programmes using data collected in two periods on the same household sample. The striking feature of Alexander's study is that the author carried out both cross-sectional data analysis and panel data analysis due to the panel nature of the dataset. The cross-sectional analysis (one period data) was totally based on Coleman's (1999)

model[22] and the household fixed effects method was used to test panel data (two periods). Both methods gave roughly the same results, showing that microcredit has statistically significant effects on increasing household income, leading to a great reduction in household poverty. Based on this, Alexander (2001) pointed out that Coleman's model is a satisfactory way of addressing selection bias, which means that expensive longitudinal studies may not be necessary for accurate impact assessments.

Li et al. (2004) investigated the impact of one UNDP's microcredit programme on the poor in China using data in year 1996 and 1998. This study is based on a difference-in-differences (DD) method by which the average impact of the programme is assessed as follows:

$$impact = E(Y_{p,1998} - Y_{p,1996}) - E(Y_{n,1998} - Y_{n,1996}) \tag{3.3}$$

where $Y_{p,1998}/Y_{p,1996}$ refer to investigated household outcomes of participants in 1998 and 1996 respectively; and $Y_{n,1998}/Y_{n,1996}$ refer to investigated household outcomes of non-participants in 1998 and 1996, respectively. The authors apply the propensity-score matching method to match each participant with a non-participant who had (almost) the same probability of joining the programme[23]. A group of non-participants selected in this way can then serve as an accurate control group to correct for selection bias. The empirical results do not report an obvious impact of microcredit on the poor's well-being in terms of accumulated assets. However, the authors found that the UNDP microcredit programme helped its participants switch to off-farm work, which is one of the best ways to escape poverty in China.

Some studies use the Heckman two-step technique to tackle selection bias problems by simultaneously estimating the outcome regression equation and participation

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[22] In Alexander's (2001) study, the households who were not borrowers in the first period but became borrowers in the following period served as the 'control group' to borrowers in the first period, thus controlling for selection bias in the cross-section analysis.

[23] It takes two steps to complete the matching: first, the participation probability of both participants and non-participants are estimated using the Probit model; then, the participation probability of each observation from the participant group is matched to the observation in the non-participant group which has the participation probability that most closely matches its participant counterpart.

equation. One such study was carried out by Zaman (1999) who assessed the impact of the BRAC microcredit programme on reducing consumption poverty in Bangladesh. Following Heckman's model, the author first identified factors driving participation with the probit estimate, which helped to construct a household specific selectivity variable (referred to as the inverse of Mill's ratio). Subsequently, the selectivity variable is added to the outcome equation to control for selection bias. The empirical analysis revealed that the impact of BRAC microcredit on consumption poverty is a function of borrowing beyond a certain loan threshold and is contingent on how poor the household is at the beginning of borrowing. Similarly, Sarangi (2007) and Kumar (2005) also employed Heckman's two-step technique to examine whether microcredit programmes in India have the potential to increase borrowers' income and both studies showed that microcredit had such potential.

A major problem using Heckman's technique is similar to that using the IV approach: it is difficult to find an appropriate identification variable affecting participation but not poverty. Moreover, even if a proper identification variable can be found, the estimation results would be sensitive to the choice of the variable (Zaman, 1999).

There is an increasing trend to use integrated impact assessment methods to overcome methodological problems of selection bias and data bias. For example, in assessing the welfare impact of one microcredit programme (PULSE) in Zambia, Copestake, Bhalotra, and Johnson (2001) drew on multiple data collection methods involving questionnaires, focus group interviews, and key informant interviews to mitigate data bias. Besides, potential selection bias was addressed by establishing a 'control group' consisting of households who have been approved for loans but yet to take a loan. After using the 'with/without' and 'before/after' comparisons between the treatment group and the control group, the authors found that the positive impacts of microcredit on the borrowers' business profits or household income were strictly associated with the receipt of a second loan and those who never qualified for a second loan were actually worse off, due to the collection mechanisms of PULSE.

Using similar methods to those employed by Copestake et al. (2001), Mosley (2001) evaluated the poverty impact of four microcredit programmes on borrowers in Bolivia. The author's empirical results produces evidence that all the programmes studied had positive impacts on poverty reduction in terms of income and asset levels, but such impact was greater in relatively richer borrowers than in poorer borrowers. Mosley (2001) concluded that microfinance might be successful in reducing the poverty of those close to the poverty line but inefficient in reducing extreme poverty. Table 3.5 summarises the empirical studies reviewed in this section.

Despite methodological variations, the literature widely accepts that microcredit does improve the living standards of the poor in terms of their income and household consumption and is linked to other associated benefits such as increases in labour market supply, and accessibility to more education and better health facilities.

Table 3.5 Summary of empirical poverty reduction studies

Sources	Coverage	Main Methods	Empirical Results
Pitt and Khandker (1998)	Bangladesh (BRAC, BRDB, Grameen Bank)	•Quasi-experimental survey design; •Double differences comparisons; •WESML-LIML-FE; •Instrumental variables (IV)	• Significant positive effect on household's poverty reduction in terms of income and consumption; •Indirectly improve households' welfare by increasing children's schooling and market labour supply;
Khandker (2005)	Bangladesh (BRAC, BRDB, Grameen Bank)	•Dynamic regression model with panel data analysis; •Household-fixed effects	• Significant positive impact on borrowing households by raising consumption; • Significant aggregate impact on village-level poverty reduction (spillover effect)
Coleman (1999)	Thailand (village banks)	•Quasi-experimental survey design; •Double differences comparison;	Membership in microcredit programmes has little impact on household poverty reduction

Table 3.5 Summary of empirical poverty reduction studies (Cont.)

Sources	Coverage	Main Methods	Empirical Results
Coleman (2002)	Thailand (village banks)	Almost the same as Coleman (1999) but some changes to the variables	• Programmes favour better-off households; • Impact is larger on richer committee members than on ordinary members
Alexander (2001)	Peru (Mibanco)	•Coleman-type test with cross-section data; •Panel data analysis with household fixed-effects	Significant and positive impact on household income
Zaman (1999); Kumar (2005); Sarangi (2007)	Bangladesh; India	Heckman two-step estimation technique	• there is a loan threshold before microcredit can significantly increase household consumption (Zaman, 1999); • positive significant impact on increasing borrowers' income
Park and Ren (2001)	China (NGO programme, government programme, mixed programme)	•Probit estimation for participation and eligibility for each type of programme; •OLS and IV for impact analysis	•Positive effects on poverty reduction in terms of income; •The rich are successfully excluded from NGO and mixed programmes but they are eligible and more likely to participate in government programmes
Li et al. (2004)	China (UNDP's programme)	•Double differences; •Propensity-score matching;	•No definite effects on increasing household total assets; •But help participants diversify occupations by switching to off-farm jobs
Mosley (2001)	Bolivia (BancoSol, ProMujer, PRODEM, SARTAWI)	•Questionnaire-based sample survey, focus group discussion, key informant interviews; •Before and after comparison between treatment and control groups	• Positive impact on income and asset levels with the richer enjoying a larger impact; • Microcredit can reduce moderate poverty instead of extreme poverty
Copestake et al. (2001)	Zambia (PULSE)	Almost the same as with Mosley (2001)	Positive impact on borrowers' business profits and household income growth strictly arises from the second loan

Note: contents in parentheses are names of individual microcredit programmes assessed in each study.

3.6 Empowerment Impact of Microcredit on Women

Impact studies on women's empowerment can be classified into two categories: those using process-based proxy indicators of empowerment and those using outcome-based direct indicators of empowerment. However, using different types of empowerment indicators leads to conflicting evidence of the impact of microcredit on women. This section reviews studies empirically investigating the empowerment effect of microcredit on women.

I. Process-based impact studies

Process-based impact studies do not directly measure the impact of microcredit on the possible outcomes. Instead, they look at the processes through which the borrowers are supposed to achieve empowerment, as a proxy indicator for empowerment outcomes (Malhotra, Schuler, and Boender, 2002; Kabeer, 2001b).

Goetz and Gupta (1996) tested the empowerment potential of microcredit programmes in Bangladesh, using a five-level index of 'managerial control over loans' as their indicator of empowerment. This index was built based on a range of questions concerning women's control over the productive process. At one end of the index were women described as having 'no control' over their loans, including those who had no idea how their loans were being used and those providing no labour into the activities funded by the loans. At the other end were women considered to have 'full control' over their loans, including those participating in all stages of the loan-supported activities as well as the marketing of produce. The authors' findings revealed that the majority of women borrowers exercised little or no control over their loans, reflecting a widespread loss of control by women over their loans to men.

Based on their findings, Goetz and Gupta (1996) suggested that this lack of control could have an adverse impact on the well-being of women when the loans are to be repaid. For example, in cases where men have appropriated loans but are unable or

unwilling to repay loans, women may suffer because they are forced to sell assets or go hungry to raise money to repay the loans. Furthermore, men's unwillingness to repay the loans may result in conflicts within households, often growing into violence. In general, Goetz and Gupta presented a negative image of the effect of microcredit on women's empowerment.

Goetz and Gupta's (1996) study is quite similar to that of Ackerly (1995), who used 'accounting knowledge' as the empowerment indicator. Women who were able to provide financial information of their loan-funded businesses such as input costs, product yield and profitability, were classified as 'empowered'. The likelihood that the credit process will lead to empowerment was tested in a Probit model, with explanatory variables including credit variables (loan amount and duration of borrowing) and market access variables (direct involvement in buying supplies or selling or accounting for the loan). The empirical analysis showed that the 'empowerment' measured by 'the knowledge of accounting' was largely attained via access to the market rather than participation in microcredit programmes.

In Montgomery, Bhattacharya, and Hulme's (1996) study, the authors focused on the managerial aspect of loan-supported enterprises and defined 'empowerment' as 'sole management of loan-funded activities'. Similarly, their study failed to provide supportive evidence of the empowerment impact of microcredit since the authors found most of the loan-funded activities were managed by the male partners of women loanees or in a form of 'joint management'. Interpreting the 'joint management' as disguised male dominance in decision-making, the authors concluded that access to microcredit did little to empower women borrowers.

II. Outcome-based impact studies

In contrast to process-based studies, outcome-based studies measure the empowerment impact with direct indicators, aiming to capture the changes in the structures of gender inequality within the household and community (Malhotra et al.,

2002; Kabeer, 2001b).

Hashemi, Schuler, and Riley (1996) examined the impact on women's empowerment of the microcredit programmes provided by the Grameen Bank and BRAC in Bangladesh. Based on the responses to a series of specific questions related to various aspects of empowerment, the authors constructed eight 'empowerment indicators' including mobility, economic security, ability to make small purchases, ability to make large purchases, involvement in major decisions, participation in public protests and political campaigning, political and legal awareness, and relative freedom from family domination. The eight indicators were constructed as scale variables and a cut-off point was established for each indicator so that women who scored above the cut-off point were labelled *empowered* and *unempowered* otherwise. This system then reduced the measure of empowerment to a single binary outcome for each of the eight indicators. The eight indicators were further compacted into a 'composite empowerment indicator' so that a woman was labelled *empowered overall* if she had been labelled 'empowered' on five or more of the eight categories.

Using sample survey data, Hashemi et al. (1996) adopted logistic models to explore whether microcredit programmes affected different dimensions of empowerment. After controlling for potential selection bias, the authors' results confirmed that both microcredit programmes contributed significantly to empowering women on the eight dimensions investigated. Women borrowers were able to negotiate gender barriers, increase their control over their own lives, and improve their relative positions within their households. The authors also found that controlling for membership duration, participation in microcredit programmes and in some cases, being a non-member in a village with a programme, has a greater impact on women's empowerment.

Garikipati (2006) investigated the impact of India's SHG microcredit programme on women's empowerment using data obtained from multi-stage surveys. Six empowerment indicators including control over household assets, role in household

decisions, work-time allocation, control over minor/major finances, and division of domestic chores were constructed based on the sample responses from a series of specific questions relating to different aspects of empowerment in the villages surveyed. Similar to Hashemi et al.'s (1996) study, the author established an index and chose the cut-off point for each indicator to distinguish between those women who were relatively more empowered than others in similar situations, rather than identifying those at the extremes. In Garikipati's logistic model, the impact on women's empowerment expressed in terms of the six indicators was assessed against three sets of independent variables such as credit programme, control variables measuring household characteristics and those capturing women's personal characteristics, where control variables were used to correct for possible selection bias. However, the empirical results suggested that the impact of SHG microcredit programmes on women's empowerment was rather limited and the programme participation may have an adverse effect on women's domestic standing.

Zaman (1999) examined the empowerment impact of the microcredit programme provided by BRAC in Bangladesh. Similar to the studies discussed above, Zaman first worked out sixteen empowerment indicators based on a detailed questionnaire given to rural women to elicit information on various dimensions of their lives. The questions were of the 'yes' or 'no' format and divided into several sections including ownership and control of the assets, general and legal knowledge, fertility and mobility. The author assessed all sixteen indicators separately with logistic models rather than constructing any empowerment index to avoid the problem of assigning subjective weights to different responses. In Zaman's empirical model, all the sixteen indicators were binary variables with value one for 'yes' and zero for 'no' otherwise. The empirical results showed that microcredit has an overall positive impact on women's empowerment in terms of the sixteen indicators and more significantly, microcredit largely enhances women's control over their assets and women's knowledge of social issues.

Pitt, Khandker, and Cartwright (2003) argued that studies using the 'empowerment index' are too arbitrary because the researchers assign weights to different components of a given indicator and establish cut-off scores based on their own judgement instead of referring to theory or data (for example, Hashemi et al., 1996). Responding to this weakness, Pitt et al. (2003) carried out a comprehensive study to examine the empowerment impact of gender-based microcredit programmes in Bangladesh based on a factor analytical approach. This approach treats each empowerment indicator (for example, purchasing capacity) as a latent factor, estimates the index weight of each component variable of a certain empowerment indicator using factor analysis methods, and computes numerical estimates of the latent factor. More specifically, the authors first estimated the index weight of each component variable using a model known as a two-parameter item-response model. The estimation of this model is accomplished by maximum likelihood using Gauss-Hermite quadrature for numerical integration. Following this, the authors proceed to estimate the latent factor for each respondent using Bayes' method and the estimation is performed by the Gllamm6 programme[24]. The authors acknowledge that the methods they adopted are fairly demanding computationally. In their factor analysis, there are ten empowerment indicators (latent factors) and a total of 75 component variables[25].

On accomplishing the estimation of empowerment indicators, Pitt et al. (2003) applied regression analyses to evaluate the impact of borrowing from microcredit programmes on each empowerment indicator. The econometric methods used in the regression analyses were essentially the same as those presented in Pitt and Khandker (1998). The empirical results of the impact assessment provided strong supportive evidence of the empowerment impact of microcredit, suggesting that programme participation enables women to take a greater role in domestic decision-making, have wider access to financial and economic resources, have more extensive social

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[24] See Rabe-Hesketh, Skrondal, and Pickles (2002).
[25] The 75 variables were chosen from 101 variables that were eligible for use and the eligibility criterion included variables with at least 1800 observations (out of a sample of 2074).

networks, gain greater bargaining power when facing their husbands, and enjoy more freedom of mobility. The study also revealed that men's participation in credit programmes has a negative effect on some indicators of women's empowerment such as physical mobility and access to financial resources.

Similar to Pitt et al. (2003), Steele, Amin, and Naved (1998) conducted an impact study on one microcredit programme called Save the Children USA in Bangladesh, using a technique of latent trait analysis which is a variant on factor analysis and aims to locate individuals on some underlying scale or latent factor. In their empirical models, each respondent was allocated to a certain score which is the estimated conditional mean of the latent factor, given the respondent's combined responses to a set of component variables. Based on this technique, the authors developed two empowerment indices representing a woman's level of mobility and the extent of her role in domestic decision-making respectively. Specifically, the index for mobility ranged from -1.14 (indicating women who responded negatively to all component variables) to 2.14 (indicating a set of positive responses) and the index for decision-making ranged from -1.57 to 1.05, where negative values corresponded to women with below-average decision-making power in their households. However the authors' findings suggested that participation in the microcredit programme had little impact on both women's mobility and their decision-making power. This might be because a discernible change in women's behaviour such as physical mobility is less plausible given a short period of participation (the maximum participation time in Steele et al.'s study is only two years). Table 3.6 provides a summary of the empirical studies discussed in this section.

A review of existing studies on the empowerment impact of microcredit presents mixed evidence: while the process-based studies report negative evidence for the empowerment impact of microcredit, the outcome-based studies provide supportive evidence (except Garikipati's (2006) study). Kabeer (2001a) concludes that process-based studies tend to render negative evaluations because they stress gender

antagonism within one household and discount the significance of cooperation; in contrast, outcome-based studies are more likely to report positive evidence because they do not favour individualised over joint forms of behaviour.

Table 3.6 Summary of empirical women's empowerment studies

	Study by	Research methods	Empowerment indicators	Findings
Process-based studies	Goetz and Gupta (1996)	•qualitative analysis; •empowerment index	Managerial control over loans	Women lost most control over their loans to men, thus microcredit does not empower women
	Ackerly (1995)	•empowerment index; •probit estimate of impact	Accounting knowledge	Women gain their accounting knowledge through market access rather than microcredit programme participation
	Montgomery et al. (1996)	Comparisons of management of loan-funded activities between female borrowers and male borrowers	Management of loan-funded activities	Women lost the sole authority over loan-assisted activities, so microcredit has done little to empower women
Outcome-based studies	Hashemi et al. (1996)	•empowerment index; •logistic regression for impact estimate	Eight indicators including mobility, economic security, ability to make small/large purchase, decision-making power, political and legal awareness, participation in public protests and political campaign, relative freedom from family domination	Microcredit programmes were found to have significant positive effects on all eight empowerment indicators

Table 3.6 Summary of empirical women's empowerment studies(Cont.)

	Study by	Research methods	Empowerment indicators	Findings
Outcome-based studies	Garikipati (2006)	•empowerment index; •logistic regression for impact estimate	Six indicators including control over household assets, role in household decision-making, work-time allocation, control over minor/major finances, division of domestic chores	Microcredit empowers women little and programme participation may have adverse effects on women's domestic standing
	Zaman (1999)	Logistic regression	Sixteen indicators falling into 3 categories such as ownership and control over assets, general and legal knowledge, and fertility and mobility.	Microcredit has overall positive effects on all empowerment dimensions investigated
	Pitt et al. (2003)	•empowerment index constructed on the basis of factor analysis; •regression analysis for impact estimate	Ten indicators including economic decision-making, purchasing capacity, control over loans, control over income/savings, mobility, political awareness, networks/friendships, family planning, attitudes, and spousal arguments and abuse	Microcredit has greatly affected women borrowers on all empowerment dimensions investigated
	Steele et al. (1998)	•empowerment index constructed on the basis of latent trait analysis; •regression analysis for impact estimate	Two indicators including mobility and household decision-making	Microcredit has no obvious impact on these two empowerment indicators

A study by Malhotra et al. (2002) indicated that there has been an increasing trend to use direct outcome indicators (such as decision-making) as measures of women's empowerment, and these are considered to be the most efficient representations of the process of empowerment since they are closest to measuring agency. Malhotra et al. (2002) further point out that the indicators with 'face validity' (i.e. empowerment indicators based on survey questions associated with very specific and concrete

actions) signify power relationships and are meaningful within a particular social context.

CHAPTER 4

RESEARCH DATA AND METHODOLOGY

This chapter discusses the empirical models used to investigate the accessibility to microcredit by Chinese rural households; evaluates the welfare impact of microcredit on Chinese rural households; and assesses the empowerment impact of microcredit on Chinese rural women. Following this, data collection is discussed including questionnaire design and sampling technique.

4.1 Accessibility to microcredit by rural households

4.1.1 Conceptual framework

Household's accessibility to credit can be defined as the ability to borrow from different sources of credit (Diagne and Zeller, 2001; Diagne, 1999). For example, Diagne and Zeller's (2001) study showed that households characterised as resource-poor and/or requiring small loan amounts have better access to informal credit compared to formal credit. This is because these households are more able to secure informal loans given a credit need due to the merits possessed by informal lending such as no collateral requirement and flexible loan arrangements. By contrast, households who appear to be in better economic conditions and/or require credit in larger amounts can access formal credit more easily because they are capable to comply with formal lending policies such as collateral requirements and prescribed minimum loan amounts.

Evans et al. (1999) present a conceptual framework in analysing factors that affect households' access to microcredit in Bangladesh, in which both household-related factors and programme-related factors are taken into account. Similarly, Vaessen (2001) examines households' accessibility to rural credit in Northern Nicaragua by analysing both demand-side (household) factors and supply-side (lender) factors. Our study employs Evans et al.'s (1999) conceptual framework to investigate households'

accessibility to microcredit in rural China by focusing on the microcredit programme implemented by the Rural Credit Cooperatives (RCCs).

Household-related factors (such as income, occupation, age, education) are hypothesised to affect households' demand for microcredit, which can directly influence households' accessibility to microcredit. This is because households' access to a certain type of credit can be conceptualised as a sequential decision making process that is initiated at the demand side (Zeller, 1994). In addition to household-related factors, there are programme-related (supply-side) factors influencing the households' access to microcredit too. For example, Umoh (2006) argues that inaccessibility to credit is generally created by the lending policies of financial institutions, which can be manifested by complicated application procedures, specified minimum loan amounts and prescribed loan purposes. In addition, some features unique to microcredit programmes can also constrain households' access to microcredit, including membership requirements, self-selected credit groups, and group lending (see for example, Ros, 2007; Maes and Foose, 2006; Evans et al., 1999). Institutional incentives such as achieving repayment targets and ensuring programme financial viability may induce the lenders shy away from lending to households who are or appear to be risky borrowers (Maes and Foose, 2006; Evans et al., 1999).

Due to the supply-related factors, households who have a demand for microcredit may access microcredit or stay frustrated by denial. Therefore, household-related factors and programme-related factors, singly or in combination, may work to impact households' accessibility to microcredit. Focusing on the demand side, this research attempts to measure households' accessibility to microcredit by empirically examining the influence of household factors on the probability of securing micro loans from RCC. Factors studied encompass household demographics (such as age and gender), socio-economic factors (such as income level and asset ownership) and other household-related factors (such as attitude towards debt and ability to access other sources of credit). Data used in our empirical analysis includes primary data

collected from a rural household survey in China. The influence of institution-level factors (i.e., supply side factors) on households' accessibility to microcredit is examined descriptively with qualitative information collected from the household survey. Furthermore, this research assumes that rural households in China prefer microcredit to other credit types such as formal credit and informal credit when they need to borrow, due to the merits of microcredit such as no collateral requirement and affordable interest rates (RCC's micro loans are provided at commercial rates).

4.1.2 Empirical framework

The empirical approach used to analyse accessibility of microcredit from the perspective of the rural household is based on discrete choice models (DCMs). DCMs describe decision-makers' choices among a set of alternatives, termed as a choice set. The choice set exhibits three features to fit within a discrete choice framework, which include (Train, 2003; Ben-Akiva and Lerman, 1985):

1. The alternatives within the choice set are mutually exclusive from the decision maker's perspective, which means that choosing one alternative implies giving up all the other alternatives;

2. The choice set is exhaustive so that all possible alternatives are included;

3. The number of alternatives is finite to be counted.

DCMs are probability models that specify the probability of a certain choice as a function of the utility derived from that choice (Cramer, 1991). A decision-maker chooses the alternative with the greatest utility among those available at the time of making the choice. Accordingly, the probability that a given alternative is chosen is defined as the probability that it has the highest utility among the available alternatives in the choice set (C_m) (Train, 2003; Ben-Akiva and Lerman, 1985).

Let U_{in} and U_{jn} denote the utilities that decision-maker n obtains from alternatives i and j respectively, then the probability that decision-maker n chooses alternative i

from C_m is given as follows[26] (Ben-Akiva and Lerman, 1985):

$$P_n(i \mid C_m) = \Pr[U_{in} > U_{jn}, \quad \forall\, i, j \in C_m \text{ and } i \neq j] \tag{4.1}$$

It is important to note that the utilities of the alternatives are treated as random variables in DCMs to address the concerns of observational deficiencies arising from unobserved attributes, unobserved preference variations and measurement errors. As a random variable, utility U_{in} is decomposed into two parts including the systematic (or representative) part V_{in} and random components (or called disturbances) ε_{in}. Specifically, V_{in} is a function that relates the observed information (such as key characteristics of the decision-maker and alternatives) to the decision-maker's utility and ε_{in} captures the factors that affect utility but are not included in V_{in} (Train, 2003; Wassenaar and Chen, 2003; Ben-Akiva and Lerman, 1985). Therefore, the utility function can be written as:

$$U_{in} = V_{in} + \varepsilon_{in}, \qquad\qquad \forall\, i \in C_m \tag{4.2}$$

As such,

$$U_{jn} = V_{jn} + \varepsilon_{jn}, \qquad\qquad \forall\, j \in C_m \tag{4.3}$$

When substituting Equation (4.2) and (4.3) into Equation (4.1), the probability of choosing alternative *i* can be rewritten as follows:

$$P_n(i \mid C_m) = \Pr(U_{in} > U_{jn}) = \Pr(V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}) \tag{4.4}$$

Hence, $P_n(i \mid C_m) = \Pr(V_{in} - V_{jn} > \varepsilon_{jn} - \varepsilon_{in}) \qquad \forall\, i, j \in C_m \text{ and } i \neq j$ (4.5)

A special case takes place when the choice set C_m contains only two alternatives *i* and *j* (binary choice), and such situations lead to what are termed as binary choice models.

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[26] This research ignores the probability that $U_{in}=U_{jn}$ for any i and j in the choice set because if the distributions of U_{in} and U_{jn} can be characterised by a probability density function, $\Pr(U_{in}=U_{jn})=0$ (Ben-Akiva and Lerman, 1985).

The probability of choosing alternative *i* rests on the probability that the utility of alternative *i* exceeds the utility of alternative *j*, namely (Train, 2003; Ben-Akiva and Lerman, 1985),

$$P_n(i) = \Pr(U_{in} > U_{jn})$$

$$= \Pr(V_{in} - V_{jn} > \varepsilon_{jn} - \varepsilon_{in}) \qquad (4.6)$$

and the probability of choosing alternative *j* simply is (Ben-Akiva and Lerman, 1985):

$$P_n(j) = 1 - P_n(i) \qquad (4.7)$$

Different binary choice models can be derived by assuming different distributions of the two disturbances ($\varepsilon_{in}, \varepsilon_{jn}$) or of the difference between them (i.e., $\varepsilon_n = \varepsilon_{jn} - \varepsilon_{in}$) (Ben-Akiva and Lerman, 1985). For example, probit models and logit models are common binary choice models, which assume ε_n to be normally distributed and logistically distributed respectively. Both models provide consistent, efficient, and asymptotically normal estimates, and yield very similar prediction results in empirical work[27]. Due to the advantages possessed by logit model such as approximating the normal distribution quite well and analytical convenience, logit models always surpass probit models in predicting choice probabilities (Ruiz-Tagle, 2005; Stock and Watson, 2003; Ben-Akiva and Lerman, 1985).

The logit model is based on the assumption that the difference between two random components of utility ($\varepsilon_n = \varepsilon_{jn} - \varepsilon_{in}$) is logistically distributed, namely,

$$F(\varepsilon_n) = \frac{1}{1 + e^{-\mu\varepsilon_n}}, \qquad \mu>0, -\infty < \varepsilon_n < \infty \qquad (4.8)$$

where F($\cdot$) is the cumulative distribution function (CDF) and μ is a positive scale parameter (i.e., $\mu > 0$). In particular, the parameter μ cannot be differentiated from the overall scale of β's in the case of linear-in-parameters utilities and thus can be

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[27] Maddala (2001) suggests that it is not likely for very different results to be obtained using logit or probit models unless the samples are very large so that it is possible to have enough observations in the tails.

assumed to take the value 1 for convenience (Ben-Akiva and Lerman, 1985).

Under the assumption that ε_n is logistically distributed, the choice probability for alternative i is given by (Train, 2003; Ben-Akiva and Lerman, 1985)

$$
\begin{aligned}
P_n(i) &= \Pr(U_{in} > U_{jn}) \\
&= \frac{1}{1 + e^{-\mu(V_{in} - V_{jn})}} \\
&= \frac{e^{\mu V_{in}}}{e^{\mu V_{in}} + e^{\mu V_{jn}}}
\end{aligned}
\tag{4.9}
$$

The systematic part of utility V_{in} is generally specified to be linear in parameters as

$$
V_{in} = \beta X_{in}
\tag{4.10}
$$

where X_{in} is a vector of observed variables relating to alternative i and decision maker n, and β is a vector of unknown parameters associated with the variables. With this specification, the logit probability becomes (Train, 2003; Ben-Akiva and Lerman, 1985)

$$
P_n(i) = \frac{e^{\beta X_{in}}}{e^{\beta X_{in}} + e^{\beta X_{jn}}} = \frac{1}{1 + e^{-\beta(X_{in} - X_{jn})}}
\tag{4.11}
$$

Obviously the choice probability is dependent on the observed data (for example, characteristics of the decision-maker and attributes of alternatives) up to some parameters.

In this research, the households can choose to access microcredit or not to access based on their evaluations of the utilities of these two mutually exclusive alternatives, which can be viewed as a binary choice model (Umoh, 2006). Let $U_n(Y_n, X_n)$ be the utility function of household n, where Y_n is a dichotomous variable denoting whether the household has access to microcredit (1 if yes; 0 otherwise); X_n is a vector of household characteristics. The household will choose to borrow from the microcredit programme if such choice implies a higher utility level compared to not borrowing, i.e.

$$U_{1n}(Y_n = 1, X_n) > U_{0n}(Y_n = 0, X_n)$$

or $\quad U_{1n}(Y_n = 1, X_n) - U_{0n}(Y_n = 0, X_n) > 0$ $\qquad$ (4.12)

Instead of trying to determine the household's choice, this research utilises the observed information of household's choice (borrow or not borrow) and household's characteristics to estimate the probability of the household's choice conditional on the household characteristics using the binary logit model. The logit model has been widely used in analysing credit accessibility (see for example, Yehuala, 2008; Okurut, 2006; Mohamed, 2003; Vaessen, 2001).

Let Z_n be a latent variable denoting $(U_{1n}\text{-}U_{0n})$, then following Equations (4.2), (4.3), and (4.10), Z_n can be rewritten as:

$$\begin{aligned} Z_n &= (V_{1n} + \varepsilon_{1n}) - (V_{0n} + \varepsilon_{0n}) \\ &= (V_{1n} - V_{0n}) + (\varepsilon_{1n} - \varepsilon_{0n}) \\ &= \beta X_n + \varepsilon_n \end{aligned}$$ $\qquad$ (4.13)

where the systematic component of the household utility is assumed to depend on the observable household characteristics represented by X_n; all unobserved and omitted attributes and household characteristics are captured by the error term ε_n which is assumed to be independent and identically Gumbel-distributed (Ben-Akiva and Lerman, 1985).

Thus the logit model predicting the probability of household n choosing to access microcredit can be expressed as

$$P_n(Y_n = 1) = \Pr(U_{1n} > U_{0n}) = \Pr(Z_n > 0) = \frac{1}{1 + e^{-\beta X_n}}$$ $\qquad$ (4.14)

where: $\quad Y_n$ equals 1 if the household has access to microcredit and 0 otherwise;

$\qquad P_n$ is the estimated probability of a household having access to microcredit;

Equation (4.14) represents the cumulative logistic distribution function in a non-linear form, which gives rise to difficulty in interpreting the coefficients. For the purpose of

interpretation, it is normal to write the model in terms of log-odds ratio (Ruiz-Tagle, 2005; Maddala, 2001). If P_n is the probability of accessing microcredit by a household, then the probability of not accessing microcredit or $(1-P_n)$ is given as:

$$(1-P_n) = \frac{1}{1+e^{\beta X_n}}$$
(4.15)

Thus the odds of observing a successful outcome ($Y_n=1$) versus a failed outcome ($Y_n=0$) is:

$$\frac{P_n}{1-P_n} = \frac{1+e^{\beta X_n}}{1+e^{-\beta X_n}} = e^{\beta X_n}$$
(4.16)

Taking natural logarithm of equation (4.16) yields the following:

$$\log(\frac{P_n}{1-P_n}) = Z_n^* = \beta X_n$$
(4.17)

where Z_n^* is called the log-odds ratio which is a linear function of the explanatory variables. By adding a constant term to Equation (4.17), the model estimated in our research becomes:

$$Z_n^* = \alpha + \beta X_n$$
(4.18)

where: α is a constant term;

β is a vector of coefficients for the independent variables X_n;

X_n is a vector of independent variables including household demographics,

socio-economic characteristics and other household-related factors.

Since our model is a logit model, which is a nonlinear function of coefficients (β_n), the use of the ordinary least squares (OLS) estimation method is not statistically appropriate. Instead, the maximum likelihood estimation (MLE) technique is employed to yield consistent and asymptotically efficient coefficient estimates. The use of MLE determines the coefficients that maximise the probability (or likelihood) of the sample data. The likelihood function treated as a function of the unknown coefficients β is given by (Verbeek , 2000):

$$L(\beta) = \prod_{n=1}^{N} P\{Y_n = 1 \mid X_n; \beta\}^{Y_n} P\{Y_n = 0 \mid X_n; \beta\}^{1-Y_n} \qquad (4.19)$$

Accordingly, the log likelihood function is:

$$LL(\beta) = \sum_{n=1}^{N} Y_n \ln P_n + \sum_{n=1}^{N} (1-Y_n) \ln(1-P_n) \qquad (4.20)$$

where $P_n = P\{Y_n = 1/X_n; \beta\}$ denotes the probability of accessing microcredit. Using the formula for logit probabilities, the log likelihood function for the logit model can be written as:

$$LL(\beta) = \sum_{n=1}^{N} Y_n \ln\left(\frac{e^{X_n\beta}}{1+e^{X_n\beta}}\right) + \sum_{n=1}^{N} (1-Y_n) \ln\left(\frac{1}{1+e^{X_n\beta}}\right) \qquad (4.21)$$

Therefore the maximum likelihood estimator $\hat{\beta}$ can be obtained by differentiating Equation (4.21) with respect to β

$$\frac{\partial LL(\beta)}{\partial \beta} = \sum_{n=1}^{N} [Y_n - \frac{\exp(X_n\beta_n)}{1+\exp(X_n\beta_n)}]X_n = 0 \qquad (4.22)$$

4.1.3 Explanation of variables

<u>Dependent variable</u>

The dependent variable for the logit model is of dichotomous nature indicating rural households' access to microcredit. As there is no direct measurement of microcredit accessibility, the 'accessibility' is measured by using observations on household borrowings such as 'obtained micro loans' and 'did not obtain micro loans'. This is in accordance with previous studies which adopted observable formal or informal borrowings as indicators of credit accessibility (see for example, Yehuala, 2008; Ravi, 2003; Mohamed, 2003; Vaessen, 2001). Specifically, the dependent variable (Y_n) takes a value of '1' for households who have secured micro loans from RCC and '0' for households who have never secured micro loans from RCC.

Independent variables

The independent variables used in the logit model include the following variables:

X_1 = Age (-): age of household head (in years);

X_2 = Gender (-): gender of household head (1=female; 0=male);

X_3 = Location (-): geographic location of the village where household is living (1=mountainous area; 0=otherwise);

X_4 = Household size (+/-): number of people living in household;

X_5 = Farm size (+): 1 if the farmland area is 10 mu or less; 0 if the area is larger than 10 mu[28];

X_6 = Income (+/-): household annual income (in 1,000 yuan);

X_7 = Self employment (+): 1 if household head is engaged in self-run business; 0 otherwise;

X_8 = Economic dependency ratio (-);

X_9 = Assets (+/-): total value of household assets (in 1,000 yuan);

X_{10} = Savings (+): household savings with a RCC (1=yes; 0=otherwise);

X_{11} = Attitude (-): household attitude towards debt (1=averse; 0 otherwise);

X_{12} = Alternatives (-): access to other sources of credit (1=yes; 0=otherwise);

X_{13} = Official status (+): 1 if household has member working in a village or township committee; 0 otherwise;

X_{14} = Shareholding[29] (+): 1 if household is a shareholder of a RCC; 0 otherwise.

X_{15} = Distance: a vector of dummy variables indicating distance between the household dwelling-place and the RCC office [where $X_{15(1)}$ = 1for within 10 lis[30], 0

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[28] *mu* is the common area measurement in rural China. 1 mu ≈ 0.067 ha.

[29] RCCs were established in the late 1950s with funds invested by rural households as their establishment funding. Since then RCCs have kept this tradition and encourage rural household to buy shares. Households who have shares in a RCC then become shareholders of the RCC.

[30] *li* is the common distance measurement in rural China. 1 li ≈ 0.5 kilometres.

otherwise; $X_{15(2)} = 1$ for between 11and 20 lis, 0 otherwise; $X_{15(3)} = 1$ for more than 20 lis, 0 otherwise];

X_{16} = Education: a vector of dummy variables for educational attainment of household head [where $X_{16(1)} = 1$ for no education, 0 otherwise; $X_{16(2)} = 1$ for secondary school or less, 0 otherwise; $X_{16(3)} = 1$ for post-secondary, 0 otherwise].

The positive and negative signs in the parentheses indicate the hypothesised relationship between the variables and household accessibility to microcredit. For example, *Age* (-) means that age of household head is negatively related to household's access to microcredit.

Farm size and *self employment* are hypothesised to positively affect households' access to microcredit. Households with larger farm size are likely to have a higher capital requirement in their farm production and are thus more likely to apply for micro loans (Mohamed, 2003; Ravi, 2003; Davis et al., 1998). By the same token, there is a higher probability for households who are running self business in addition to agricultural production to access microcredit owing to the higher potential need for financial support. *Official status* is a variable describing whether a household has family members working as village or township officials. It is assumed that households with members working as officials have higher demand for credit for off-farm investment and thus are more inclined to access microcredit (Cheng, 2006). Such official status also reflects households' social standing and connections with local organisations such as RCCs, which could facilitate the households' access to microcredit. Furthermore, *savings* and *shareholding* are used as a proxy for households' relationship with the RCC. Depositing money and/or purchasing shares to some extent imply a higher capacity of repaying the loans. It is thus expected that households who have savings with the RCC and/or who are shareholders of the RCC are more willing to apply for micro loans if they need to borrow.

Household demographics such as *age* and *gender* of the household head are hypothesised to negatively affect households' access to microcredit. Generally, older people tend to be risk averse and thus may not be willing to enter into debt obligations. Besides, older farmers may find it difficult to understand the operations and loan conditions of microcredit programmes, further reducing their propensity to access microcredit. Okurut (2006) and Mohamed (2003) have confirmed that the probability of borrowing from formal and semi-formal credit sources decreases as people become older. In addition to age, a female-headed household is assumed to be more disadvantaged in securing micro loans than a male-headed household. This is because rural women might have less access to information, technology information in particular, due to their limited freedom and mobility, which potentially lowers their demand for credit as an input to improve production and thus reduces the likelihood of accessing microcredit. Even when they have a financing need, women might be inhibited from taking micro loans due to the perceived low repayment capacities manifested by the weaker control over economic resources compared to men (Yehuala, 2008; Evans et al., 1999; Zeller, 1994). *Geographic location* is also hypothesised to have negative a impact on households' accessibility to microcredit. Households living in mountainous areas would have less exposure to information and consume less due to transportation inconvenience. As a result, such households have low demand for credit and thus have lower probabilities of accessing microcredit. Further, it could be possible that microcredit programmes are not available to villages in mountainous areas (Sharma and Zeller, 1999).

Distance and *Education* dummy variables are hypothesised to influence households' accessibility to microcredit. For example, ceteris paribus, households living 20 lis or more away from RCC office will be less likely to access microcredit than those who reside within 10 lis from the RCC office. This is because households living further away would incur a higher borrowing cost if they decide to borrow from a RCC microcredit programme, due to the high transaction costs (such as travelling expenses and time opportunity costs) involved (Ho, 2004; Vaeseen, 2000). In addition,

educational attainment of the household head reflects household human capital and is hypothesised to facilitate households' access to microcredit. For example, assuming all else equal, farmers with formal education (for example, secondary or post-secondary education) are likely to have more exposure to the external environment including risks and possess more skills, and therefore they might require more credit for consumption and/or production, compared to uneducated farmers. In addition, educated farmers can better understand the terms and conditions of micro loans and might be more ready to comply with the formalities required by microcredit providers such as a RCC (Yehuala, 2008; Okunade, 2007; Okurut, 2006; Vaessen, 2001).

Economic dependency ratio measures the ratio of economically inactive population to economically active population expressed in percentage terms (Husain, 1998). In our research this is calculated as the ratio of household members without income to household income earners. A higher ratio indicates a lower ability to repay loans and thus lower probability for the household to access microcredit. Vaessen (2001) stresses that *household's attitude towards debt* plays an important role in affecting household's borrowing decision. It is assumed that a household holding an adverse attitude towards debt may refrain from accessing any type of credit including microcredit. Moreover, *access to other sources of credit* might discourage household's borrowing from microcredit programmes because the transaction costs of acquiring a loan from an alternative source might be lower or the loan contract provided by an alternative lender is more attractive, compared to microcredit. This has been confirmed by Mohamed (2003) and, Diagne and Zeller (2001) who reveal that many poor households choose informal credit instead of formal credit because of the advantages possessed by informal credit such as flexible lending terms and rapid loan application processing.

The relationship between households' accessibility to microcredit and variables, such as *household size*, *income* and *assets*, however, is ambiguous according to the

literature. The ambiguity of the effects of the three variables on households' access to microcredit arises from their uncertain effects on households' demand for credit. For example, a large family may have a higher desired consumption and hence may demand more credit. However, a larger family size also implies a lower repayment capacity due to smaller future expected income per capita, which in turn decreases the demand for credit (Nguyen, 2007; Ruiz-Tagle, 2005; Ho, 2004). Similarly, household's annual income and total assets, on the one hand, have an 'income effect' and households with higher level income and/or assets may feel rich and consume more. This has a positive effect on households' demand for credit (Cheng, 2006; Ruiz-Tagle, 2005). At the same time, income and assets represent the initial capital of households and a higher level of income and/or assets indicates a less constrained budget of the households, which might potentially weaken the households' demand for credit (Umoh, 2006; Ruiz-Tagle, 2005; Zeller, 1994).

4.2 Assessing the welfare impact of microcredit

4.2.1 Welfare outcomes of interest

The most popular economic indicators used in welfare impact assessment (WIA) of microcredit at household-level are income and expenditure (or consumption)[31] (Islam, 2007; Coudouel, Hentschel, and Wodon, 2002; Hulme, 1997). Empirical studies on WIA attempt to use the changes in the levels or patterns of the economic indicators as a measure of the welfare impact brought by microcredit (see for example, Islam and Harris, 2008; Nguyen, Pham, and Minh, 2007; Alexander, 2001; Pitt and Khandker, 1998). Following the literature, our study measures the welfare impact of microcredit on the borrowers in terms of income and expenditure. Specifically, the primary welfare outcomes of interest in our research are household annual income and household annual consumption.

Household income refers to the total income earned by all household members, which

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[31] Compared to income and consumption, asset is less popularly used as a welfare indicator due to the quantitative problems in measurement such as depreciating and valuing physical assets (Islam, 2007).

encompasses the income from all possible sources such as agriculture, non-agriculture, self-employment, wages, etc. Using the changes in household incomes as a measure of welfare impact is misleading due to the possible measurement error in income data (Islam, 2007; Coudouel et al., 2002; Maclsaac, 1997). First, households' incomes tend to fluctuate during the year or over the year due to the dependence on agricultural production which largely hinges on the harvest cycle and natural conditions. This gives rise to a potential difficulty for households in accurately recalling their incomes, leading to a low quality of the income data derived from the survey. The inaccuracy of income data can be more severe in the case where numerical skills are low and records are not maintained. In addition to recall memory, some other factors can result in the wrong estimation of income. For example, a large proportion of incomes are not monetised if the households consume their own production or exchange it for other goods, which leads to an underestimation of household income. In contrast, consumption is more stable than income during the household's lifetime, which can better reflect a household's actual standard of living and ability to meet basic needs (Islam, 2007; Coudouel et al., 2002; Husain, 1998; Maclsaac, 1997).

Based on the above discussion, our research also uses household consumption to provide an alternative, and possibly better, measure of household welfare in view of the possibility of measurement error in the income variable. Household consumption in this research is the sum of food consumption and non-food consumption within a household.

4.2.2 Identifying the impact of a microcredit programme

The major purpose of impact assessment of a programme (or any intervention) is to measure the extent to which the programme has changed the outcomes of subjects studied, where the subjects can be individuals, households, firms, cities, etc. (Nguyen, 2007). In other words, assessing the impact of a programme requires comparing outcomes (e.g., household income and consumption) when a person participates in the programme to the same outcomes when he/she does not participate. For example, let

w_i be a binary indicator of programme participation: $w_i=1$ for participation by subject i and $w_i=0$ for non-participation by subject i. Further let Y_{i1} denote the value of the outcome of interest when subject i participates in the programme and Y_{i0} denote the potential value of the same outcome when subject i is in the state of non-participation. Thus the **true** impact of the programme on the outcome of subject i, which is represented by Δ_i, can be quantified by the difference between Y_{i1} and Y_{i0}, as (Sarangi, 2007; Perry and Maloney, 2007; Kumar, 2005):

$$\Delta_i = Y_{i1} - Y_{i0} \qquad\qquad (4.23)$$

The problem in identifying the true impact for a particular subject is that the same subject can never be observed in both participation and non-participation states at the same time and thus the true impact of participation in the programme on a certain outcome can not be observed. In other words, one or the other component of the difference expressed by Equation (4.23) is missing (Heckman, 1997; Rosenbaum and Rubin, 1983). Instead, the observed outcome of interest of subject i can be described as follows:

$$Y_i = w_i Y_{i1} + (1 - w_i)Y_{i0} \qquad\qquad (4.24)$$

where Y_i is either Y_{i1} or Y_{i0} and the unobserved outcome is called 'counterfactual' (Nguyen, 2007; Sarangi, 2007; Kumar, 2005).

To overcome this missing data problem, impact assessment studies use a statistical approach to replace the missing data on individual subjects with group means or some other group statistics (Heckman, 1997). The most popular group statistics widely used in the impact evaluation literature, and the one adopted in this research, is the 'average effect of treatment on the treated (**ATT**)' [32], which measures the extent to which the programme changes the outcome of a group of participants compared to what they would have experienced in the absence of participation (see for example,

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[32] There are other group statistics used in impact assessment such as local average treatment effect, marginal treatment effect, or the effect of non-treatment on the non-treated which measures the impact the programme would have on the non-participants if they had participated in the programme. See Heckman (1997) for details.

Perry and Maloney, 2007; Nguyen, 2007; Nguyen et al., 2007; Kumar, 2005). The true programme impact measured by ATT can be expressed by the following equation:

$$\gamma = E(Y_{i1} \mid w_i = 1) - E(Y_{i0} \mid w_i = 1) \tag{4.25}$$

where E ($\cdot$) signifies expectation in the population. Specifically, $E(Y_{i0} \mid w_i = 1)$ represents the counterfactual outcome for participants had they not participated (Dehejia and Wahba, 2002; Heckman, 1997).

This gives rise to another problem of unobservability, $E(Y_{i1} \mid w_i = 1)$ can be estimated while the counterfactual $E(Y_{i0} \mid w_i = 1)$ cannot. As an alternative, impact evaluations resort to constructing 'counterfactuals' based on a treatment/control framework, where a group of programme non-participants are selected as a control group and the observed outcomes of this control group are supposed to serve as 'counterfactuals' to the observed outcomes of programme participants (treatment group). Accordingly, the ATT measured with this treatment/control framework is used to estimate the true impact (γ) and the basic idea of this approach is described as follows:

$$\gamma^* = E(Y_{i1} \mid w_i = 1) - E(Y_{j0} \mid w_j = 0) \qquad (i \neq j \in N) \tag{4.26}$$

where γ^* is the estimation of γ, i, and j denote two different subjects in a chosen sample of N subjects where subject i participates in the programme while subject j does not; Y_{i1} is the outcome investigated of subject i and Y_{j0} is the same outcome investigated of subject j (see, Sarangi, 2007; Kumar, 2005; Coleman, 1999). From Equation (4.26), it can be seen that the average programme impact (γ) can be estimated by comparing the average outcomes of programme participants (treatment group) to the same average outcomes of programme non-participants (control group). An essential requirement for the treatment/control framework to function efficiently is that the control group should resemble the treatment group as much as possible in terms of both observed and unobserved characteristics (Karlan and Goldberg, 2007; Ezemenari, Rudqvist, and Subbarao, 1999).

Following this treatment/control framework, our research assesses the average welfare impact of microcredit programmes by comparing the average household outcomes (such as income and consumption) between borrowing households (treatment group) and non-borrowing households (control group).

4.2.3 Selection bias issues in the impact assessment

The ATT estimation with treatment/control framework depends strongly on the assumption that the distribution of the outcome variable for control group is the same as the counterfactual distribution that treatment group would have followed in the absence of treatment (Abadie, 2005a). This can be illustrated by rewriting Equation (4.26) as follows:

$$\gamma^* = E(Y_{i1} \mid w_i = 1) - E(Y_{j0} \mid w_j = 0)$$

$$= E(Y_{i1} \mid w_i = 1) - E(Y_{i0} \mid w_i = 1) + [E(Y_{i0} \mid w_i = 1) - E(Y_{j0} \mid w_j = 0)]$$

$$= \gamma + [E(Y_{i0} \mid w_i = 1) - E(Y_{j0} \mid w_j = 0)] \tag{4.27}$$

Equation (4.27) suggests that γ^* is an unbiased estimator for the true impact of a programme or treatment on the treated (i.e., $\gamma^* = \gamma$) if and only if the term in square bracket is zero. However it is worth noting that the constructed counterfactual $E(Y_{j0} \mid w_j = 0)$ can differ significantly from the true counterfactual $E(Y_{i0} \mid w_i = 1)$, suggesting that the difference, $\gamma^* = E(Y_{i1} \mid w_i = 1) - E(Y_{j0} \mid w_j = 0)$, could be a potential biased estimator of the true programme impact (γ). Selection bias exists if $[E(Y_{i0} \mid w_i = 1) - E(Y_{j0} \mid w_j = 0)] \neq 0$. The main challenge associated with the treatment/control framework is to correctly establish a control group, which otherwise might result in selection bias particularly in non-experimental evaluation designs with cross-sectional data[33] (Sarangi, 2007; Perry and Maloney, 2007; Dehejia and Wahba, 2002; Baker, 2000).

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[33] Experimental evaluation design where a treatment is randomly assigned to a set of eligible subjects can resolve the selection bias problem because the randomisation balances the outcome bias between the treated and non-treated samples (Dehejia and Wahba, 2002; Baker, 2000).

Selection bias in microcredit programme evaluation arises when the households' participation in microcredit programmes or households' receipt of credit from microcredit programmes is related to unmeasured or unobserved factors that simultaneously affect the outcomes of their credit application and these unobserved factors are not correctly accounted for in the impact assessment (Perry and Maloney, 2007; Baker, 2000; Ezemenaris et al., 1999). This can be illustrated by the following cross-sectional data model, where the household characteristics (X) and village attributes (V) are formulated to determine both the household's receipt of microcredit (M) and the household outcome investigated (Y) (Pitt and Khandker, 1998; Khandker, 1998; Coleman, 1999):

$$M = \alpha_M X + \beta_M V + \varepsilon_M \tag{4.28}$$

$$Y = \alpha_Y X + \beta_Y V + \gamma M + \mu_Y \tag{4.29}$$

Selection bias occurs as a result of the non-zero correlation between the error terms ε_M and μ_Y. Econometric estimation of the above equation system will yield biased impact estimation (γ) if such correlation exists but it is not taken into account. The non-zero correlation between the two error terms can result from two main sources: self-selection into programme by households and non-random placement of the programme (Islam, 2007; Coleman, 1999; Zaman, 1999; Pitt and Khandker, 1998).

1. Self-selection into programme

In most non-experimental evaluation designs, households themselves decide whether to borrow from microcredit programmes or not, based on their own perceptions of the expected gains from such borrowings (Sarangi, 2007). This is referred as 'self-selection'. In the presence of self-selection, ε_M and μ_Y are likely to be correlated because unobserved household characteristics (such as individual ability and risk preference) that influence both households' participation in microcredit programmes and outcomes might not be correctly controlled for (i.e., included in variables X) even

if the observed factors (such as age and gender) have been taken into account, giving rise to a potential bias in impact estimation (γ).

2. Non-random programme placement

Rather than placing programmes randomly, programme managers might choose to operate microcredit programmes based on observed and unobserved attributes of the locations (Pitt and Khandker, 1998). Given the non-random programme placement, selection bias is possible to occur when comparing borrowing households from programme villages and non-borrowing households from non-programme villages. This is because unmeasured village attributes (for example, village attitudes, leadership, and infrastructure) that determine the households' demand for microcredit as well as the households' welfare outcomes might not be properly adjusted for, leading to a non-zero correlation between ε_M and μ_Y.

It can be concluded that comparing welfare outcomes between borrowing households and non-borrowing households without accounting for unobserved heterogeneity (such as unobserved household and village characteristics) would produce biased results since it will wrongly ascribe the entire change (improvement or deterioration) in welfare outcomes to programme impact, which partly arises from the uncontrolled and unobserved attributes (Khandker and Faruquee, 2003; Coleman, 1999).

Microcredit impact evaluations using non-experimental data have to carefully address the selection bias issue to mitigate biases in estimating programme impact. Different econometric methods have been applied to deal with selection bias in empirical studies. For example, using instrumental variables (IVs) is one standard approach in tackling selection bias, which aims to find exogenous variables to be included as regressors in the Programme Equation (4.28) but not in the Outcome Equation (4.29) (Coleman, 1999; Heckman, 1997). However this approach has been criticised for the difficulty in justifying the use of any variables affecting the households' borrowing from microcredit programmes but not the household outcomes (Aghion and Morduch,

2005; Coleman, 1999). Another method gaining increasing popularity is panel data models. Using data containing at least two periods of observations on the same set of households characteristics, panel data models are expected to achieve reliable estimates of programme impact by differencing out the effect of 'unobserved factors'. However it is difficult to collect panel data due to time constraints and cost (McIntosh, Villaran, and Wydick, 2007; Wooldridge, 2007; Ezemenari et al., 1999).

4.2.4 Empirical model and estimation strategy

Our research assesses the welfare impact of RCC microcredit programme on rural households in China. To mitigate the potential selection bias in the impact assessment, our research adopts the panel data model owing to the availability of panel data on the sampled households including both borrowing and non-borrowing households. In addition, all sampled households in our research are selected from villages where RCC programmes are available, which helps mitigate the potential non-random programme placement bias[34] (Osmani, 2007; Nguyen, 2007).

The empirical analysis is built upon the difference-in-differences (DD) approach, which is an increasingly popular panel data method in economics for identifying causal effects of programmes or treatments in the absence of purely experimental data (see for example, Perry and Maloney, 2007; Athey and Imbens, 2006; Bertrand, Duflo, and Mullainathan, 2004; Ashenfelter and Card, 1985). The DD estimation framework requires that the outcomes investigated (such as household income and consumption) be observed for two groups over two time periods. The first group, referred to as the borrowing group, consists of households who received microcredit in the period after the start of the programme (i.e., post-programme period) but not prior to the initiation of the programme (i.e., pre-programme period); the second group, called the

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[34] A potential risk of using this selection procedure is that the control group could be 'contaminated' because some effects of the treatment group's involvement in RCC's programme may be transferred to the control group as well given the fact that the two groups of households live close together in the same programme villages. This might result in an underestimation of the programme impact (welfare impact as well as empowerment impact) (Islam, 2007; Osmani, 2007; Mosley, 1997). This should be borne in mind when interpreting the findings in this research.

non-borrowing group comprises of households who did not receive microcredit during either period (Athey and Imbens, 2006; Bertrand et al., 2004).

The *standard* DD method can be illustrated by the following regression equation (Wooldridge, 2002; Angrist and Krueger, 1999; Meyer, 1995):

$$Y_{it} = \beta_0 + \delta_0 d2_t + \beta_1 P_i + \gamma M_{it} + \varepsilon_{it} \tag{4.30}$$

where Y_{it} is the household outcome investigated (i.e., household annual income or consumption) for household i at period t; $d2_t$ is a time dummy variable equal to 1 for $t=2$ (post-programme period) and 0 for $t=1$ (pre-programme period); P_i is a group dummy variable and takes a value of one if household i belongs to the borrowing group and zero otherwise; M_{it} is an interaction term of the product of $d2_t$ and P_i, which indicates the programme participation and is equal to 1 if household i borrowed money and the observation occurs in the second period (i.e., participating in the programme), and zero otherwise; δ_0 captures time influence suffered by both treatment group and control group; β_1 captures the potential time-invariant difference in overall averages between the two groups; γ is the primary parameter of interest measuring the average programme impact on borrowing (treatment) group; ε_{it} is the idiosyncratic error assumed to be independent and identically distributed over households and time, with mean zero at each time period.

The key assumption of the standard DD method, also called common trend assumption, is that γ would be zero in the absence of the programme, or E$[\varepsilon_{it}|M_{it}]$=0. In other words, the average change in the outcome variables (Y_{it}) would not have been systematically different between borrowing group and non-borrowing group if there were no programme (Abadie, 2005a and b; Meyer, 1995). Under this assumption, an unbiased estimate of γ can be obtained by simply calculating the difference of two differences: 1) the average difference in the outcomes over the two time periods for the borrowing group; and 2) the same differences for the non-borrowing group (Athey and Imbens, 2006; Abadie, 2005a). This is illustrated by the following equation:

$$\hat{\gamma}_{sdd} = \Delta \bar{Y}_B - \Delta \bar{Y}_N$$
$$= E(Y_{i,t=2} - Y_{i,t=1} \mid P_i = 1) - E(Y_{i,t=2} - Y_{i,t=1} \mid P_i = 0)$$

(4.31)[35]

where "Δ" denotes the change from $t = 1$ to $t = 2$; $\hat{\gamma}_{sdd}$ signifies the standard DD estimator of γ; the over bar stands for averages across households; B and N denote borrowing households and non-borrowing households respectively. As a result of subtracting the average differences in the non-borrowing group from the average differences in the borrowing group from Equation (4.31), the DD estimation strategy ensures two types of estimation bias to be removed: bias arising from cross-sectional comparisons between the two groups in the post-programme period, which could be the result of permanent differences between these two groups (captured by β_1) but unrelated to the programme, and bias arising from the comparisons over the two periods for the borrowing group, which could be the result of time trends (captured by δ_0) but irrelevant to the programme (Imbens and Wooldridge, 2007; Athey and Imbens, 2006; Abadie, 2005a; Ashenfelter and Card, 1985).

The standard DD method is valid if the households' receipt of microcredit is random (such as in experimental settings), conditional on time and group fixed effects (Bertrand et al., 2004). The randomisation ensures that the pre-programme attributes[36] that might be associated with the outcome variables (Y_{it}) over time are balanced between the two groups. However, given the non-experimental nature of our data, it is likely that the households in both groups are systematically different and unbalanced in the pre-programme attributes which are possibly related to the outcome variables. Consequently, the pattern of change in the outcomes could vary systematically across the two groups of households if there were no RCC programme, leading to biased estimates of RCC programme impact (Islam and Harris, 2008; Abadie, 2005a and b).

As suggested by Islam and Harris (2008) and Abadie (2005b), a vector of observable

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[35] Equation (4.31) is a representation of the ordinary least squares (OLS) estimate of γ in equation (4.30) (Wooldridge, 2007, 2002; Cameron and Trivedi, 2005).
[36] Pre-programme attributes refer to both observable and unobservable characteristics of households and villages.

household characteristics is included in the regression as control variables to adjust for the observable differences between the two groups. In addition, to control for the unmeasured household and village attributes that can potentially result in selection bias, a fixed effects method is used in our research. The *adjusted* DD method can be illustrated by the following regression equation (Islam and Harris, 2008; McIntosh et al., 2007; Cameron and Trivedi, 2005):

$$Y_{it} = \beta_0 + \delta_0 d2_t + \alpha X_{it} + \gamma M_{it} + V_j + h_i + u_{it} \tag{4.32}$$

where Y_{it}, $d2_t$, δ_0 are defined similarly to Equation (4.30). X_{it} is a vector of household characteristics (such as age, family size); M_{it} is the treatment variable and γ is the primary parameter of interest that captures the microcredit impact on borrowing households; V_j is village fixed effect used to control for potential non-random programme placement bias, which captures both observable and unobservable village factors that are time-constant but affect the outcome of interest Y_{it}; h_i is household fixed effects capturing unobserved, time-constant household attributes that affect Y_{it}; u_{it} is the idiosyncratic error term that represents unobserved household factors which change over time and affect Y_{it}. It should be noted that u_{it} is normalised to have mean zero for each period and is assumed to be independent of the programme variable M_{it} and have the same distribution over time, i.e. $u_{it} \perp M_{it}$, but it can be correlated with h_i (Athey and Imbens, 2006; Abadie, 2005b). The inclusion of X_{it} as regressors may help control for confounding trends and improve the efficiency of the estimate of γ by reducing residual variance (Abadie, 2005b; Meyer, 1995).

Studies by Islam and Harris (2008) and Khandker (2005) have documented that household fixed effects estimation, which treats the household-specific component (h_i) of the error as a parameter to be estimated, can resolve selection bias at both household and village levels, including the upper level (e.g., township level), based on the assumption that the unobserved factors at the household and village level are invariant over time. Accordingly, our research employs household fixed effects estimation to correct for the potential selection bias in impact evaluation. The

econometric model for the welfare impact analysis is specified as the following two-way (time and household) fixed effects model, which is a simplified form of Equation (4.32) omitting village fixed effects (V_j):

$$Y_{it} = \beta_0 + \delta_0 d2_t + \alpha X_{it} + \gamma M_{it} + h_i + u_{it} \qquad (4.33)$$

The variables and parameters in equation (4.33) are similarly defined as in Equation (4.32). In particular, the treatment variable M_{it} takes two different forms: 1) a continuous variable denoting the total credit amount borrowed by household i from RCC microcredit programmes in period t=2; and 2) a binary variable equal to one if household i receives loans from the programme in period t=2 and equal to zero otherwise. Compared to the binary treatment variable, the cumulative borrowing (continuous) variable is often used in assessing the impact of microcredit since it better represents the extent of a household's programme participation (see for example, Nguyen et al., 2007; Niño-Zarazúa, 2007; Montgomery, 2005; Khandker, 2005; Alexander, 2001). This would lead to a greater impact of microcredit on households with larger cumulative loan sizes, which reflect deeper involvement in the programme by these households. The parameter γ thus measures the average programme impact when M_{it} is a binary treatment variable and measures the average programme impact of additional credit amount on borrowing households where M_{it} represents the amount of loans borrowed by the household (Nguyen et al., 2007; Alexander, 2001). All the variables used in the welfare impact analysis are documented in Appendix 1.

Using Equation (4.33), the underlying assumption of the *adjusted* DD method is that the counterfactual outcomes in the absence of the programme are independent of the programme (i.e., γ would be zero in the absence of programme), conditional on household characteristics (X_{it}) and household fixed effects (h_i) (Islam and Harris, 2008; Abadie, 2005a and b). The adjusted DD estimator of programme impact γ no longer has the simple form of Equation (4.31) (but has similar interpretation) and has to be

obtained using a regression approach (Wooldridge, 2002). As documented in Abadie (2005a), the DD estimator is a particular case of fixed effects estimators for panel data, with only two time periods and a proportion of the sample receiving treatment in the second time period.

One advantage of the *adjusted* DD method based on the fixed effects regression [Equation (4.33)] is that it relaxes the stringent restriction (randomisation) made in the standard DD method and allows the two groups of households to be systematically different. Assuming that the selection bias is caused by the time-invariant unobserved household heterogeneity (h_i) and observed differences between borrowing and non-borrowing households (X_{it}), the adjusted DD estimate allows for bias on the condition that the bias exists in both periods and is the same for each period. Then differencing the differences between the two groups of households can remove the bias and yield the true programme effect (Islam and Harris, 2008; Perry and Maloney, 2007).

4.3 Assessing the women empowerment impact of microcredit

4.3.1 Concept of 'women empowerment'

Empowerment is generally described as a dynamic process, which involves changes from a disadvantageous state to a relatively advantageous one. For example, Kabeer (2001b) defines 'empowerment' as the process by which those who have previously been deprived of the ability to make strategic life choices acquire such ability. 'Strategic life choices' in Kabeer (2001b) is defined as 'first order choices', which have greater importance than others in terms of their influence on people's lives, such as choice of livelihood (including where to live, whom to marry, whether to have child, etc.). Similarly, Cheston and Kuhn (2002, p12) stress that empowerment "is about change, choice and power" and it can be described as "a process by which individuals or groups with little or no power gain power and ability to make choices that affect their lives".

When connecting women empowerment with microcredit, the process of empowerment primarily occurs at the individual/household level and is initiated by economic betterment in the form of increased independent income resulting from the loan-supported activities, which leads to the economic empowerment of poor women. Such economic empowerment enables poor women to make economic contributions to their families, which leads to increased power in the family decision-making process as well as greater control over household resources such as income and assets. In addition to economic empowerment, microcredit programmes provide poor women with access to human and social resources, such as knowledge, skills, and information networks, through activities taking place outside household domain including group formation and interaction with programme staff. This helps foster women's social and political awareness, indirectly leading to social and political empowerment on women. Economic empowerment, together with social and political empowerment, contributes greatly to building up women's self-esteem and self-efficacy, resulting in an improved psychological well-being of women (Gaiha and Thapa, 2006; Ansoglenang, 2006; Malhotra et al., 2002).

More specifically, Banu, Farashuddin, Hossain, and Akter (2001, p2) advanced a concept of women's empowerment in the context of microfinance, which defines women's empowerment as "the capacity of women to reduce their socioeconomic vulnerability and their dependency on their husbands or other male counterparts, in terms of their ability to become involved in income generating activities and freely spend the income thus generated; to accumulate assets over which they can have right of sale and profit; increase their contribution to household expenditure and thereby acquire a greater role in household decision-making and finally, increase their self confidence and awareness of social issues". This concept is employed in our research as a reference in analysing the impact of microcredit on women empowerment in rural China.

4.3.2 Developing empowerment indicators

Hashemi et al. (1996) argue that developing reliable and valid measures of women's empowerment is the most difficult task when assessing the empowerment impact of policy interventions such as microcredit programmes. Such difficulty may arise from the context-specific nature of empowerment: behaviours and attitudes that signify empowerment in one social context may have no relevance in another. Malhotra et al. (2002) assert that even after identifying empowerment as a key development goal, neither the World Bank nor any other major development agency has worked out a rigorous or universal method of measuring empowerment due to the variation in the nature and significance of empowerment across different contexts.

In addition to the contextual nature of empowerment, the methods adopted to evaluate empowerment can also pose a challenge on yielding robust indicators. With reference to the literature, the two most important methods for assessing women empowerment impact are the process-based method and the outcome-based method. The process-based method advocates that empowerment cannot be measured directly since it is a dynamic process. Instead such evaluations focus on the loan use processes through which women borrowers are supposed to achieve empowerment and measure empowerment with proxy indicators, such as education level, accounting knowledge, and managerial control over loans (see for example, Goetz and Gupta, 1996; Ackerly, 1995). However the process-based method has been frequently criticised for producing unconvincing findings due to the invalid proxy indicators of women empowerment selected by this method. As stated in Malhotra et al. (2002, p19), the proxy measurements used in the process-based method are always "conceptually distant from the dimensions of gender stratification that are hypothesised to affect the outcomes of interest, and may in some cases be irrelevant and misleading".

In contrast, the outcome-based method, an increasingly used method of assessing the empowerment impact of microcredit, attempts to capture the empowerment process through direct measures of empowerment such as decision-making roles and control

over assets (see for example, Garikipati, 2006; Zaman, 1999; Hashemi et al., 1996). Such direct measures are usually constructed on the basis of survey questions pertinent to very specific and concrete behaviours of women and thus effectively represent the empowerment process within a particular social context. Malhotra et al. (2002) conclude that the outcome-based method is more successful than the process-based method in evaluating women's empowerment since the direct measures are closest to measuring agency.

Following Garikipati (2006), Zaman (1999), and Hashemi et al. (1996), our research employs the outcome-based method to assess women empowerment impact of microcredit in rural China. The operational measures of empowerment are direct measures rather than proxy indicators of empowerment, which are developed based on the responses to a questionnaire conducted specially to women villagers. In recognition of the context-specific nature of women empowerment, a series of specific questions relating to various dimensions of women's lives in the survey areas were included in the questionnaire. Specifically, the survey questions attempt to elicit information on four dimensions of women's behaviours, including control over financial resources, mobility, ability to make independent purchase, and involvement in major household decision-making. Each dimension contains a number of questions. Besides the specific questions capturing women's actual behaviours, a set of statements pertaining to relative freedom from household domination and legal awareness were included in the questionnaire to assess women respondents' perceptions of empowerment manifested by these two dimensions[37] (the survey questionnaire is included in Appendix 5).

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[37] Dimensions such as 'control over resources', 'mobility' and 'involvement in household decision-making' are universally considered important in measuring women empowerment (see for example, Malhotra et al., 2002; Steele, Amin and Naved, 1998); while other dimensions (such as making independent purchases, freedom from household domination, and legal awareness) are less-frequently-used but have been thoroughly investigated in some empirical studies (such as Corsi, Botti, Rondinella and Zacchia, 2006; Pitt, Khandker and Cartwright, 2003; Zaman, 1999; Hashemi et al., 1996).

Table 4.1 Empowerment indicators

E_i (i=1,2,...,24)	Indicators	Description of indicators
E_1	CINC	Control over own income
E_2	CSAV	Control over own cash savings
E_3	CITY	Travel alone to city
E_4	PARNT	Visit parent home without asking for consent
E_5	UTENS	Independently purchase utensils
E_6	CLOTH	Independently purchase clothes
E_7	FURNT	Independently purchase furniture
E_8	JEWL	Independently purchase jewellery
E_9	LIVSK	Independently purchase livestock
E_{10}	EQUIP	Independently purchase farming machinery
E_{11}	DESHOUS	Involvement in deciding house repair/construction
E_{12}	DESEDU	Involvement in deciding children education
E_{13}	DESLAND	Involvement in deciding land lease
E_{14}	DESCRP	Involvement in deciding what crops to grow
E_{15}	DESLVSK	Involvement in deciding livestock sale/purchase
E_{16}	DESEQP	Involvement in deciding what farm machine to buy
E_{17}	DESCSM	Involvement in deciding what consumer durable to buy
E_{18}	DESACCT	Involvement in deciding to open bank account
E_{19}	DESBIR	Involvement in deciding when to have a child
E_{20}	FABUSE	Aware of women rights against domestic abuse
E_{21}	FCTCEP	Aware of the use of contraception
E_{22}	FARMAGE	Aware of the incorrectness of arranged marriage
E_{23}	LMAGE	Aware of female minimum marriage age
E_{24}	LDIVC	Aware of legal method of divorce

Hashemi et al. (1996) adopted an index approach to construct empowerment indicators. In this approach, each dimension of empowerment is treated as an empowerment indicator and the empowerment indicators are constructed as scale variables by assigning different weights to the components involved in each indicator. The weights assigned to different components are based on the authors' in-depth knowledge of women in the sampled villages based on a three-year prior ethnographic study. However, this approach has been criticised as 'quite arbitrary' since the weights of components are chosen without reference to any theory (Pitt et al., 2003). Our research does not construct any empowerment indices due to the problem of allocating different subjective weights to different responses. Following the suggestion by Zaman (1999), our research assesses all empowerment indicators

separately and then draws general conclusions on the impact of RCC's microcredit programme on various aspects of women empowerment.

A basic idea of developing empowerment indicators is to identify those women who appear to be relatively more empowered than other women, rather than singling out extremely unusual respondents. Twenty four empowerment indicators were developed from women's responses to our surveyed questions and they are presented in Table 4.1. All indicators are expressed in the form of binary variables with value one for 'empowered' and zero otherwise (the construction of empowerment indicators is described in Appendix 3).

4.3.3 Model specification

Given the dichotomous nature of the dependent variables (empowerment indicators), logistic regression models have been widely used in assessing women empowerment impact of microcredit programmes, which examines whether borrowing from microcredit programmes can influence the possibility of being empowered in different dimensions (see for example, Basher, 2007; Garikipati, 2006; Zaman, 1999; Hashemi et al., 1996). Following the previous empirical work, our research employs the logistic model to explore relationships between RCC microcredit programmes and various aspects of women empowerment in rural China. Specifically, to assess the empowerment impact of RCC microcredit, two groups of women are compared – one group consisting of women who have borrowed money from RCC microcredit programmes and the other group with similar socio-economic background to women in the first group but having not taken any loan from the microcredit programme. The data used in the empirical analysis of women empowerment were collected from a survey questionnaire conducted among rural women in China.

It has been well established in the literature that self-selection bias can exaggerate the statistical relationship between borrowing from microcredit programmes and empowerment because women who are already relatively more enterprising and

dynamic are more likely to join the credit programme and thus would be more likely to be 'empowered' compared to a random sample of eligible women (see for example, Sukontamarn, 2007; Garikipati, 2006; Zaman, 1999; Hashemi et al., 1996). In other words, the estimated empowerment impact could be partly due to the pre-programme characteristics between women borrowers and women non-borrowers. In addition to self-selection bias, the empirical relationship between programme participation and outcomes of empowerment could also be biased by non-random programme placement, where the location-specific characteristics are likely to affect women's lives and hence the outcome of being empowered (Sukontamarn, 2007; Osmani, 2006).

To deal with the potential non-random placement problem, both groups of women were selected from villages where RCC programmes are operating. Moreover, a set of village dummy variables indicating which village the woman comes from was included in the regression model to further correct for the location effects.

In addition, the literature suggests that the self-selection bias in assessing empowerment impact of microcredit with cross-sectional data could be partially adjusted by introducing a set of control variables into the regression model. These control variables represent the heterogeneous background of women respondents, which are assumed to influence the empowerment measures. The control variables encompass those capturing household characteristics (socio-economic status) and those measuring women's personal characteristics (e.g., age and education level). More importantly, whether the woman contributes to family support has been documented to be a crucial factor that affects her empowerment and therefore a variable indicating women's contribution to family support should be included in the model to control for the bias (see for example, Garikipati, 2006; Zaman, 1999; Schuler, Hashemi, and Riley, 1997; Hashemi et al., 1996).

However, if the women borrowers are relatively more empowered than women

non-borrowers and if this is irrelevant to the control variables, then it is still likely to yield an upward bias in the impact estimation. Our research attempts to further address selection bias by including the variable of accumulated loan amount as a regressor (Zaman, 1999). The accumulated loan amount borrowed by the women respondents is used as a proxy for the extent of women's involvement in the microcredit programme, which examines whether the impact of microcredit on empowering women increases as their involvement in the programme (captured by the accumulated loan size) increases (Zaman, 1999; Montgomery, Bhattacharya and Hulme, 1996).

Based on the above discussion, the empirical model used to analyse the impact of RCC microcredit on empowering rural women in China is written as follows:

$$P_i = E(E_i = 1 \mid H_{ij}, F_{ij}, V_j, LOAN_i) = \frac{1}{1 + e^{-E_i^*}} \tag{4.34}$$

$$E_i^* = \alpha + \sum \theta_1 H_{ij} + \sum \theta_2 F_{ij} + \sum \theta_3 V_j + \sum \theta_5 LOAN_i \tag{4.35}$$

where P_i is the estimated possibility of a woman respondent being empowered as measured by a certain indicator; E_i^* is the log-odds ratio; θ's are coefficients to be estimated; and α is constant term. The dependent variables and independent variables used in the model are discussed below.

1) Dependent variable

The dependent variables used in the logistic model (Equation 4.34) are E_i (i=1, 2,…, 24) which are empowerment indicators as described in Table 4.1. All dependent variables are in binary forms with a value of one for 'empowered' and zero otherwise. The empirical model is regressed repeatedly with a different indicator as dependent variable for twenty four times.

2) Independent variables

The independent variables can be grouped into two categories: primary variables of

interest that are related to microcredit ($LOAN_i$) and control variables including those reflecting households' socio-economic features (H_{ij}), those capturing women's personal characteristics (F_{ij}), and a vector of village variables (V_j).

The microcredit-related variable $LOAN_i$ is a categorical variables denoting the cumulative loan amount that the woman respondent has borrowed from RCCs and takes value 0, 1, 2, and 3 [where $LOAN_i$=0 for no loan (non-borrowers), $LOAN_i$=1 for amount 30,000 yuan or less, $LOAN_i$=2 for amount more than 30,000 yuan but less than 60,000 yuan, $LOAN_i$=3 for amount 60,000 yuan or more[38]]. The $LOAN_i$ variable is hypothesised to positively influence women's empowerment measured by the twenty-four indicators (dependent variables): a woman's participation in a microcredit programme is likely to enhance her opportunity to access economic and social resources and consequently give her impetus to be empowered in different manners. Therefore, as the loan amount borrowed from the microcredit programme grows (indicating a growing involvement in the programme), the probability of being empowered is expected to increase (Zaman, 1999).

Household-specific variables (H_{ij}) include household annual income (HAI), major occupation of household head ($HHOCP$), household size ($HHSZ$), and the number of income earners in the household ($EARNER$). HAI and $HHOCP$ are included in the regression model as a proxy for household socio-economic status, while $HHSZ$ and $EARNER$ reflect household composition. The purpose of using these household level variables is to test whether the socio-economic factors and/or demographics of a household have any effects on women's empowerment. There are no explicit expectations on the signs of coefficients for this set of variables in relation to empowerment indicators.

V_j is a vector of village dummy variables specifying the village surveyed (for example,

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[38] For the categorical variable, the smallest category (i.e., $LOAN_i$=0 for non-borrwer) is specified as a reference category and the contrast type is specified as an 'indicator'. The 'indicator' thus creates a set of dummy variables indicating the presence or absence of the category membership.

'1' if the woman is from Heping village and '0' otherwise). The purpose of using village dummies is to control for the location effects that might bias the impact estimation. There are no explicit expectations on the signs of coefficients linked to these dummies in relation to empowerment indicators.

Female-specific variables (F_{ij}) include woman's age (*AGE*), woman's educational background (*EDU*), woman's contribution to family support[39] (*CTRN*), and woman's owning of male children (*MCHILD*). It is expected that *EDU*, *CTRN*, and *MCHILD* are positively related to a woman's empowerment: as a woman obtains more education, she becomes more literate and is more likely to be well-informed, which might allow her to be more empowered particularly in terms of knowledge-based dimensions (e.g., legal knowledge). Furthermore, contribution to family support is supposed to enhance a woman's intra-household status, which in turn might positively influence her empowerment at household level such as a greater role in household decision-making and making household purchases independently. Finally, having one or more male children is a crucial factor in improving a woman's status within a household due to the strong preference for male children and thus is expected to have a positive effect on empowering the woman within the household. There is no specific expectation on the relationship between women's empowerment and *AGE*. The variables used in the empirical models are listed in Appendix 2 with a detailed description at each.

4.4 Description of the study area

This research was conducted in the rural areas of Hubei Province situated in the central part of China. For administrative purposes, Hubei Province is divided into 13 prefecture-level divisions and four directly administered county-level divisions, which in turn can be subdivided into 1,235 township-level divisions (Hubei Yearbook, 2007).

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[39] The 'contribution' variable is constructed based on women's response to the question 'whether you spend money on family expenses if you own money'. A positive response is coded as '1' and a negative response is coded as '0'.

The total rural population in Hubei is about 35.38 million (59% of the total population in the province) which comprises of 9.95 million households (National Bureau of Statistics of China – NBSC, 2007). Hubei is one of the largest agricultural provinces in China, where rural households are geographically dispersed in both plain and mountainous areas and engaged in various agricultural production, such as crops, aquatic products, and livestock. However, the frequent occurrence of natural disasters (such as drought and flood) in the province throughout the year severely damages the agricultural production especially in the areas with poor farming infrastructure such as irrigation facilities. This leaves farmers as a disadvantaged group in terms of improving their livelihood because they depend solely on agriculture as their means of living (Hou, 2006).

There are a total of 1,470 RCC branches located in towns throughout Hubei and at least 60% are engaged in micro-financing. RCC initiated microcredit programme in the Province in 2002 (RCC Hubei Head office, 2008). According to the statistics from RCC Hubei Head Office, the amount of micro loans granted to rural households by RCCs has totalled 10.1 billion yuan as of end of 2006 and 4.28 million rural households have obtained micro loans, accounting for 43% of the total rural households in Hubei.

4.5 Data sources and data description

The data in our study include both primary and secondary data sources. Primary data were collected through survey interviews using a structured questionnaire. A pre-test of the questionnaire was conducted with a random sample of 20 farmers in China (12 males and 8 females) to evaluate the clarity, consistency, and appropriateness of the survey questions. Changes and revisions were made according to the comments suggested by the 20 respondents, and the questionnaire was personally administered to the rural households in Hubei Province between November 2008 and January 2009. The survey questionnaire was divided into six sections. The first section was designed

to gather information on the respondent's accessibility to microcredit provided by RCC. Section two focused on the respondents who are borrowers of RCC microcredit programme while Section three focused on the non-borrower respondents only. Section four and five were designed to understand how RCC's microcredit affects the respondent's household welfare and the respondent's empowerment (for women respondents only) respectively. Information of the respondent's demographic and socio-economic characteristics was addressed in the final section (see Appendix 5).

The primary data were collected via the survey questionnaire. Household characteristics, such as age, gender, household size, etc., are used to identify key household-level factors influencing households' accessibility to RCC microcredit. These household characteristics also serve as control variables in the impacts analyses (welfare and empowerment) of RCC microcredit. The responses from female respondents to the questions in the empowerment impact section are used to construct the women empowerment indicators used as dependent variables in assessing the empowerment impact of RCC microcredit (see Table 4.1).

In addition, pertinent secondary data of all sampled households were obtained from the selected RCC branch offices. The secondary data comprises household characteristics (such as age, household size, etc.) in the pre-programme period; household annual income and annual total consumption in both the pre- and the post-programme periods; and household accumulative micro-loan amounts in post-programme period only. Data on household characteristics and annual income/consumption were obtained from the RCC branch offices through the annual rural household census[40]. Data on accumulative loan amounts were obtained from the borrower information filed by the RCC branch offices.

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[40] The yearly rural household census conducted by RCC branch offices helps to identify potential clients with credit demand. The income and consumption data collected from the census also provide crucial information to RCC officials on the efficiency of their microcredit programmes in improving household living conditions.

Ashenfelter (1978) cautions that estimates of the impact of a programme on earnings may be biased upward if the period immediately prior to participation in the programme is associated with a decline in earnings (also known as an 'Ashenfelter dip'). A standard approach to solving this problem, when using DD method, is to set the pre-programme time period early enough to avoid the dip (Perry and Maloney, 2007). The earliest year in which the selected RCCs began to implement the microcredit programme is 2004 (see sample selection in the following section). Consequently, our research excludes the year immediately prior to 2004 but used 2002 as the year of pre-programme data for empirical analysis. Year 2008 was chosen as the post-programme period. Specifically, a two-period (2002/08) household panel dataset was used in the DD model for welfare impact analysis with income/consumption as welfare measures. Accumulative loan amounts reflect the extent of the household involvement in microcredit programmes, which are the primary independent variables of interest used in impacts analyses (welfare and empowerment) of microcredit.

4.6 Sample selection

The sampling framework in this research includes two groups of rural households: a group of households who have borrowed from RCC microcredit programme, referred as the borrowing group; and a group of households who have never borrowed from RCC's microcredit programme, referred to as the non-borrowing group. A major objective of this research is to assess the impact of the RCC microcredit programme on rural households, it is thus necessary to obtain a sample containing a sufficient number of rural households borrowing from RCC's programme throughout Hubei Province. Accordingly, a multi-stage stratified random sampling technique was applied to draw the household sample. This type of sampling technique involves a process of stratification or segregation, followed by random selection of subjects from each stratum. It ensures that each important segment of the population is better represented and provides more valuable and differentiated information of each group

in the sample compared to simple random sampling (Sekaran, 2003). Further, stratified sampling yields more precise estimates at a national level by dividing the population into more homogeneous strata, compared to the case where population is not divided in this way (SSA, 2003). Our research reaches 'household' through a systematic process from selection of townships, to villages, and finally to households. The detailed sample selection process is discussed as follows.

In the first stage of the sampling process, sample townships were selected on the basis of the availability of the RCC microcredit programme. A list of rural townships was obtained from RCC Hubei Head Office, indicating in which townships a RCC microcredit programme was available, as well as the programme operation duration and geographic location of these townships. Due to time and resources constraints, only ten townships were selected from the 768 townships hosting the RCC microcredit programme. The selected townships are Xugu, Yezhou, Jianshi, Xianfeng, Xinchong, Fenghuang, Yaojiaji, Anshan, Husi, and Wulijie. The RCC microcredit programme has been operating in Xugu, Xinchong and Fenghuang townships since 2004; while the other townships have had a RCC programme for less than three years since 2006. In addition, three of the ten townships are located in mountain areas (i.e., Jianshi, Xianfeng and Anshan) and the rest are situated in plain areas, which represents Hubei townships in terms of geographic features of the Province.

Following the selection of sample townships, sample villages are selected. A total of five villages from each selected township are randomly chosen from a list of villages (the list was provided by the administrative office in each selected township). A total of 50 villages were included.

The selection of sample rural households was accomplished in the final stage of sampling process. The sample households were divided into two groups: borrowing group versus non-borrowing group. A list of borrowers was obtained from each RCC township office in the selected township, which contained basic information on the

borrowers, such as gender of borrower, from which village, borrowing frequency, amount of each single loan, accumulative loan amounts, etc. Following this, a total of 328 borrowers were randomly selected to participate in the interview. A certain proportion of female borrowers were included in the borrower sample to assess the women empowerment impact of microcredit. There were a total of 64 females out of the 328 selected borrowers. The borrower respondents in our research are heads of households because RCC micro loans are issued to the households under the name of household heads. For the selection of the non-borrowing group, a list of rural households was obtained from the village committee office in each selected village, which provided information on all households residing in the village including status and gender of household members. A total of 96 household heads from non-borrowing households were selected for the survey, of which 28 were female household heads.

In total, 424 households were included in the sample, including 328 borrowing households and 96 non-borrowing households. In terms of gender, 332 male household heads and 92 female household heads were interviewed in the survey.

4.7 Sample size

The desired sample size is calculated based on the formula given by Selvanathan, Selvanathan, Keller, and Warrack (2007, p. 465):

$$n = \left[\frac{z_{\alpha/2} \sqrt{\hat{p}\,\hat{q}}}{B} \right]^2 \qquad\qquad (4.36)$$

where: n is the desired sample size;

$\hat{p}$ is sample proportion, and $\hat{q} = 1 - \hat{p}$;

B is acceptable error margin.

The problem faced in solving n is that the values of $\hat{p}$ and $\hat{q}$ are unknown since the sample has not yet been determined. As suggested by Selvanathan et al. (2007),

let $\hat{p} = \hat{q} = 0.5$ because the product of $\hat{p} \; \hat{q}$ can reach the maximum value given $\hat{p} = 0.5$. Therefore the desired sample size derived from equation (4.36) is 385, estimated with a confidence level of 95% (i.e., $z_{\alpha/2} = 1.96$) and an acceptable error margin of 0.05. The sample size must be larger than the calculated sample response to take into account sample attrition. Literature indicates that sample response rates based on survey questionnaires are normally between 60% and 90% (see for example, Atieno, 2001; Coleman, 1999; Husain, 1998). The survey interview in our study is conducted with the help of a group of trained survey assistants. Using a conservative estimated response rate of 80%, the calculated working sample size for our study was 482 (=385/0.8). In practice, the working sample size was 500 and the real sample size used for empirical analyses was 424.

CHAPTER 5

RESEARCH RESULTS AND FINDINGS

This chapter discusses the empirical findings of the credit accessibility model, welfare impact model and empowerment impact model. The chapter is structured as follows: Section 5.1 presents the main characteristics of the sampled rural households and micro loans provided by Rural Credit Cooperatives (RCCs) respectively. Section 5.2 discusses the estimated results of the credit accessibility model. Household-level factors that influence households' accessibility to RCC microcredit are identified and explained. Section 5.3 and 5.4 discuss the estimated results of the welfare impact model and empowerment impact models respectively. The empirical relationships between RCC microcredit and outcomes investigated (i.e., household welfare and women empowerment) are also discussed.

5.1 Characteristics of households and micro loans

5.1.1 Characteristics of the rural households

This section discusses the characteristics of the sampled rural households, including demographics and socio-economic characteristics. The discussions are based on the data collected from the surveyed questionnaires, including results and findings from a descriptive analysis (i.e., compare means, frequency tables, etc.).

Table 5.1 summarises the primary household variables used in this research for the whole sample according to the status of respondents' access to microcredit[41]. The t-test is used to test whether the mean values of household characteristics between the two groups, borrower group and non-borrower group, are statistically different, and the Chi-square test is to test the relationship (independent or not) between the non-metric household variables and access to microcredit. Our results show the t-test results are not statistically significantly at the 10 percent level, except for *household*

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[41] Throughout this chapter, "borrowers" or "borrowing households" refer to those who have obtained micro loans from RCCs, and "non-borrowers" or "non-borrowing households" refer to those who did not obtain RCC's micro loans.

asset value. In addition, the households' access to microcredit is strongly associated with *Gender*, *Education*, *Self-employment*, *Farm size*, *Geographic location*, *Distance*, *Savings*, *Aversion to debt*, and *Alternative credit source* because the Chi-square tests on these variables are all significant at the 10 percent level or better.

Out of the 424 sampled household heads, 328 are microcredit borrowers of RCC. In terms of gender, the sample comprises 332 (78.3%) male household heads and 92 (21.7%) female household heads. Approximately 79.5% of the sampled male household heads are borrowers of RCC microcredit programme and 69.6% of the sampled female household heads are engaged in the micro borrowing. However, the borrowers group mainly consists of males (see Table 5.1).

The age of the respondents ranges from 24 to 72 years old and the overall mean age for the sample is around 41 years old. When grouped into different age categories, a substantial proportion (76.3%) of the borrower respondents fall into the 36-55 years old category while majority (73.9%) of the non-borrower respondents belong to 24-45 years old category. The average age of the borrower and non-borrower respondents' is very similar.

The survey respondents are divided into three groups with respect to educational attainment, including those without education, those with secondary school education or less, and those with post-secondary education. It can be seen from Table 5.1 that the vast majority of the respondents have obtained some education and only 3.8% of the respondents reported having no education. The proportion of without education for the borrowers is only 1.8%, much lower than that for the non-borrowers (10.4%). Approximately 92.4% of the borrowers and 80.2% of the non-borrowers have acquired secondary education or less (including primary, middle and high school). However, the proportion of non-borrowers with post-secondary education (college and university) is higher than that of borrowers (9.4% versus 5.8%).

Approximately 29.3% of the surveyed households have three or fewer family members and only 2.1% have seven or more members in their families. In addition, more than 70% of the borrowing households, as well as non-borrowing households, reported to have four or more family members and the survey results do not show much variation in the average household size between the two group households (see Table 5.1).

Our survey results reveal that only a small proportion (24.3%) of the respondents is engaged in self-employment. The results also suggest that the borrower respondents are more likely to take up self-run business compared to the non-borrower respondents (26.5% versus 18.7%). The χ^2 test (equals 3.92) indicates a strong association between households' access to microcredit and self-employment engagement.

The economic dependency ratio (EDR), calculated as the ratio of household members without income to household income earners, reflects the economic activity of a household. Households with higher EDRs will be more financially stressed than those with lower ratios. According to this ratio, the non-borrowing households appear to be relatively more economic active than the borrowing households because the proportion of non-borrowing households with EDRs higher than 1.0 is lower than that of the borrowing households (16.7 versus 22.6). The t-test (equals -0.73) does not suggest a significant mean difference between the two group households.

Table 5.1 Profile of the respondents (Borrowers and Non-Borrowers)

	Non-Borrower (N_1=96)		Borrower (N_2=328)		All respondents (N_3=424)		Statistical test
	Count (n_1)	% to N_1	Count (n_2)	% to N_2	Sub-total (N_4=n_1+n_2)	% to N_4	
Demographics							
Gender							
Male	68	70.8	264	80.5	332	78.3	$\chi^2 = 4.07^{**}$
Female	28	29.2	64	19.5	92	21.7	
Total		100.0		100.0		100.0	
Education Level							
No education	10	10.4	6	1.8	16	3.8	$\chi^2 = 17.183^{***}$
Secondary school or less	77	80.2	303	92.4	380	89.6	
Post secondary	9	9.4	19	5.8	28	6.6	
Total		100.0		100.0		100.0	
Age (in years)							
24-35	32	33.3	72	21.9	104	24.5	
36-45	39	40.6	171	52.2	210	49.6	
46-55	16	16.7	79	24.1	95	22.4	
56-65	6	6.3	6	1.8	12	2.8	
66-72	3	3.1	0	0.0	3	0.7	
Total		100.0		100.0		100.0	
Mean	41.02		41.28		41.22		t = -0.22
Household Size							
1-3	27	28.1	97	29.6	124	29.3	
4-6	65	67.7	226	68.9	291	68.6	
7-10	4	4.2	5	1.5	9	2.1	
Total		100.0		100.0		100.0	
Mean	4.18		4.16		4.17		t = 0.12
Self-employment							
Yes	16	18.7	87	26.5	103	24.3	$\chi^2 = 3.92^{**}$
No	80	83.3	241	73.5	321	75.7	
Total		100.0		100.0		100.0	
Socio-economics							
Economic dependency ratio							
r<=1	80	83.3	254	77.4	334	78.8	
r>1	16	16.7	74	22.6	90	21.2	
Total		100.0		100.0		100.0	
Mean	0.84		0.90		0.4		t = -0.73

Table 5.1 Profile of the respondents (Borrowers and Non-Borrowers) (Cont.)

	Non-Borrower (N₁=96)		Borrower (N₂=328)		All respondents (N₃=424)		Statistical test
	Count (n₁)	% to N₁	Count (n₂)	% to N₂	Sub-total (N₄=n₁+n₂)	% to N₄	
Income (in yuan)							
<=50,000	76	79.1	261	79.6	337	79.5	
50,001-100,000	19	19.8	56	17.1	75	17.7	
>100,000	1	0.1	11	3.3	12	2.8	
Total		100.00		100.00		100.00	
Mean	31,867		52,619		47,920		t = -1.19
Main income sources[1]							
Agriculture	77	80.2	246	75.0	323	76.2	$\chi^2 = 3.76$
Non-agriculture	5	5.2	9	2.7	14	3.3	
Both	14	14.6	73	22.3	87	20.5	
Total		100.0		100.0		100.0	
Assets (in yuan)							
400-15,000	51	53.1	241	73.5	292	68.8	
15,001-24,950	45	46.9	87	26.5	132	31.2	
Mean	13,667		12,278		12,592		$t = 2.46^{**}$
Farm Size (in mu)							
10 or less	83	86.5	233	71.0	316	74.5	$\chi^2 = 9.30^{***}$
More than 10	13	13.5	95	29.0	108	25.5	
Total		100.0		100.0		100.0	
Land Holding Status							
Contracted	85	88.5	304	92.7	389	91.7	$\chi^2 = 2.23$
Leased	11	11.5	24	7.3	35	8.3	
Total		100.0		100.0		100.0	
Other Characteristics							
Geographic Location							
Mountainous	62	64.6	164	50.0	226	53.3	$\chi^2 = 6.35^{**}$
Non-mountainous	34	35.4	164	50.0	198	46.7	
Total		100.0		100.0		100.0	
Distance (in li)							
1-10	51	53.1	205	62.5	256	60.4	$\chi^2 = 13.97^{***}$
11-20	30	31.3	108	32.9	138	32.5	
>20	15	15.6	15	4.6	30	7.1	
Total		100.0		100.0		100.0	
Savings							
Yes	59	61.5	139	42.4	198	46.7	$\chi^2 = 10.86^{***}$
No	37	38.5	189	57.6	226	53.3	
Total		100.0		100.0		100.0	

Table 5.1 Profile of the respondents (Borrowers and Non-Borrowers) (Cont.)

		Non-Borrower (N_1=96)		Borrower (N_2=328)		All respondents (N_3=424)		Statistical test
		Count (n_1)	% to N_1	Count (n_2)	% to N_2	Sub-total ($N_4=n_1+n_2$)	% to N_4	
RCC Shareholding								
	Yes	29	30.2	63	19.2	92	21.7	$\chi^2 = 5.29^{**}$
	No	67	69.8	265	80.8	332	78.3	
	Total		100.0		100.0		100.0	
Official Status								
	Yes	14	14.6	43	13.1	57	13.4	$\chi^2 = 0.14$
	No	82	85.4	285	86.9	367	86.6	
	Total		100.0		100.0		100.0	
Aversion to Debt								
	Yes	54	56.3	79	24.1	133	31.4	$\chi^2 = 35.69^{***}$
	No	42	43.7	249	75.9	291	68.6	
	Total		100.0		100.0		100.0	
Alternative Credit Source								
	Yes	88	91.7	188	57.3	276	65.1	$\chi^2 = 38.56^{***}$
	No	8	8.3	140	42.7	148	34.9	
	Total		100.0		100.0		100.0	

Note: 1. Data are summarised from the information obtained on 'household main income sources' and 'other income sources' in the survey questionnaire.
*, **, and ***, represent the 10%, 5%, and 1% significance level, respectively.

The household annual income is divided into three levels in the sample (see Table 5.1). The annual income for most of the borrowing households, as well as the non-borrowing households, is no higher than 50,000 yuan, with 79.6% and 79.1% of group respondents respectively having income below 50,000 yuan. The mean annual income for the borrowing households is 20,752 yuan higher than that of the non-borrowing households, but this difference is not statistically significant based on the t-test result. A total of 323 respondents (76.2%) rely on agriculture (crop farming, livestock raising, fishery, etc.) as their major source of income while only 14 of the respondents (3.3%) are engaged in non-agricultural income-generating activities. Approximately 22.3% of the borrowing households earn income from both agricultural and non-agricultural activities, whereas 14.6% of the non-borrowing

households source their income from non-agricultural activities in addition to agriculture production.

The household asset value[42] of the respondents varies from 400 yuan to 24,950 yuan and the overall mean asset value is 12,592 yuan. Our result shows that the borrowing households tend to possess relatively low value assets since the majority (73.2%) of them own assets valued at less than 15,000 yuan. In contrast, almost half of the non-borrowing households possess assets worth more than 15,000 yuan. The mean household asset value of the non borrowers is higher than that of the borrowers (13,667 yuan versus 12,278 yuan) and the mean difference is statistically significant at the 5 percent level (see Table 5.1).

None of the respondents own farmland. The overwhelming majority (91.7%) of the respondents contract their farming land from villages while 8.3% farm on leased land. In terms of farm size, up to three quarters of the respondents work on farms no larger than 10 mu. In addition, the proportion of borrowing households who work on large farms (larger than 10 mu) is 29%, which is more than two times higher than that of the non-borrowing households (13.5%). This implies that households with larger farm sizes are more likely to become RCC's microcredit borrowers.

The geographic distribution of the respondents in Table 5.1 shows that nearly two thirds of the non-borrowing households live in mountain regions. In addition, the proportion of the borrowing households who live within 10 lis from the nearest RCC branch is higher than that of the non-borrowing households (62.5 versus 52.1) and the share of the borrowers living more than 20 lis from the RCC branches is lower compared to the non-borrowers (4.6 versus 15.6). This suggests that households who live physically closer to RCC branches are more likely to access RCC's microcredit.

Less than half of the respondents have saving accounts in RCC branches. Compared

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[42] The household asset values in this research exclude the value of the house and farmland.

to the borrowers, the non borrowers appear to be more inclined to deposit money with RCCs (61.5% versus 42.4%). In addition, the majority (78.3%) of the respondents do not hold RCCs shares with a relatively higher proportion of shareholding observed in the non-borrower group. Similarly, a small portion (13.4%) of the respondents has one or more family members working as government official(s). Approximately 14.6% of the non-borrowing households have family member(s) with official status, which is slightly higher than that of the borrowing households (13.1%).

The frequency distributions of *Aversion to debt* and *Alternative credit source* in Table 5.1 show that the non-borrower respondents are generally more averse to having debt and more able to access alternative credit sources when they need to borrow, compared to the borrower respondents.

5.1.2 Characteristics of micro loans

Table 5.2 provides some general information on the micro loans obtained by the respondents from RCCs. With regard to the maximum amount of a single loan, all micro loans acquired by the borrowers are in small amounts. The shares of the borrowers who could borrow no more than 10,000 yuan, between 10,001 and 20,000 yuan, and between 20,001 and 30,000 yuan are almost identical (about 29%). Only a small portion (13.7%) of the borrowers obtained micro loans with a single amount above 30,000 yuan. In addition, the average total loan amount borrowed by the households is 44,012 yuan.

Table 5.2 Characteristics of micro loans

	All Borrowers (N=328)	
	Sub-total	% to N
Single Loan Amount		
<=10,000 yuan	96	29.3
10,001-20,000 yuan	92	28.0
20,001-30,000 yuan	95	29.0
>30,000 yuan	45	13.7
Total		100.0
Cumulative loan amount (mean value in yuan)	44,012	
Loan Term		
Short term (<=1 year)	165	50.3
Medium term (1-3 years)	163	49.7
Total		100.0
Collateral		
Yes	26	7.9
No	302	92.1
Total		100.0
Collateral Form		
Mortgage Property	2	0.6
Chattel Mortgage	2	0.6
Promissory Note	10	3.0
Co-signer	12	3.7
Total	26	7.9
Loan Processing Time		
Within 1week	293	89.3
More than 1week	35	10.7
Total		100.0
Payment Frequency		
Weekly	6	1.8
Monthly	76	23.2
Semi-annually	45	13.7
Annually	201	61.3
Total		100.0
Loan Purpose		
Agricultural activities only	238	72.6
Non-agricultural activities only	9	2.7
Both	81	24.7
Total		100.0

Table 5.2 also shows that no borrower has received long term micro loans. About half of the micro loans obtained by the borrowers are characterised as short term (within one year). In addition, the overwhelming majority (92.1%) of the micro loans do not require collateral. With regard to the loans issued with a collateral requirement, the collateral pledged to RCCs include mortgage property, chattel mortgage, promissory notes and co-signer[43] (see Table 5.2).

In general the RCC loan processing time is short since 89.3% the borrowers are granted micro loans within one week from their loan application submission. In addition, Table 5.2 shows that the main purpose of obtaining micro loans by the borrowing households is to finance their agricultural activities including farm cropping, livestock raising, produce processing, and farming machinery purchases. The majority (72.6%) of the borrowers used their micro loans for agricultural purposes and 2.7% for non-agricultural purpose (such as financing self-run enterprises, household consumption, children's education, etc.). Approximately 25% of the borrowers invested the loans in both agricultural and non-agricultural activities.

Finally, most (61.3%) of the borrowers repay their loans annually and the micro loans are seldom repaid weekly (less than 2 percent). The repayment schedule of RCC micro loans is established according to the type of the loan-funded activity (IFAD, 2001). Most of the micro loans in our research are invested in agricultural production and hence the repayment structure is closely linked to the production cycle. For the loans used to develop small-scale self-employed activities, the repayment period is relatively short (e.g., monthly or semi-annually) since these activities can generate income on a more flexible schedule. This finding is similar to Yehuala (2008) and Wu's (2001) studies, who found that the payment period of production loans is one year or longer, while loans for non-agricultural activities such as self-run business and

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[43] Since all the micro loans in this study are issued to individuals rather than in group forms which can provide 'social collateral', RCCs may put additional collateral requirement on some risky borrowers to cover the loss of non-performing loans.

handicrafts are usually repaid within less than one year on an irregular basis (for example, three months or seven months).

5.2 Factors influencing household accessibility to microcredit

5.2.1 Empirical results of credit accessibility model

A logistic regression analysis (Equation 4.14) was conducted to investigate household-level factors that influence households' accessibility to microcredit and was estimated using a maximum likelihood estimation technique. Table 5.3 presents the estimated results of the logistic model.

Overall the logistic model successfully predicts the possibility of households' microcredit access at 82.31 percent. The likelihood ratio test has a Chi-square statistic equal to 130 with 18 degrees of freedom and fails to accept the null hypothesis that the parameter estimates for the model are equal to zero, at the 1 percent level of significance. It can be concluded that the explanatory power of the logistic model is satisfactory and the model can be used to explain the probability of accessing RCC's microcredit by the rural households.

The significant positive sign on the *Income* variable indicates that households with higher annual income have higher probability of accessing RCC microcredit. One possible reason for this result is that high income households tend to have more investment opportunities, leading to stronger potential need for credit support. High-income households may also be more confident in repaying loans if they borrow. Therefore, they are more inclined to access microcredit. On the contrary, the significant negative sign on the *Assets* variable implies that households' accessibility to microcredit decreases with increased asset values. This is because assets correspond to a household's initial capital. Households with higher asset values may be less budget constrained and therefore less likely to access microcredit.

The significant positive sign on *Education*$_{(2)}$ dummy variable indicates that households who have acquired secondary school education or less have higher probability to access microcredit than the uneducated households, holding other factors constant. In contrast, a significant but negative relationship is found between variable *Household size* and households' accessibility to microcredit, suggesting that larger households are less likely to borrow from RCC's microcredit programme. This is possibly because larger-size households tend to have low repayment capacity resulting from the smaller future expected income per capita, which lowers the probability of borrowing. This finding contradicts Ho (2004) and Vaessen (2001), who conclude that the probability of accessing formal credit increases with household size.

The estimated coefficients of variables *Distance*$_{(3)}$, *Attitude*, and *Alternatives* are all negative and significantly different from zero at the 1% level. Holding other factors constant, the households residing more than 20 lis away from RCC branches have significantly lower probability of accessing RCC microcredit compared to those who live within 10 lis of RCC branches, mainly due to the perceived high borrowing costs arising from the travelling expenses and time opportunity costs. In addition, an adverse attitude towards having debt decreases the likelihood of accessing any type of credit by households, including microcredit. Furthermore, the availability of other credit sources (such as informal credit) also tends to reduce the probability of borrowing from RCC microcredit programme. This finding is consistent with Vaessen (2001) who observes that many poor households are more willing to use informal credit owing to low transaction costs and flexible loan contracts.

The empirical results show that the variables *Self-employment* and *Official status* are significant at the 95% confident level. As hypothesised, the probability of accessing microcredit increases when households become involved in self-employed businesses apart from agriculture production. This can be explained by the higher capital requirement for investing in self-run enterprises. *Official status* is also a contributor to

households' access to microcredit. One possible reason is that households with members working as village or township officials have greater need of credit for off-farm investment and thus have higher probability of accessing microcredit. Households with members working as local officials may also access RCC's microcredit easier due to their good relationship with the local financial institutions such as RCCs.

Economic dependency ratio, *Savings,* and *Shareholding* are found to significantly influence households' accessibility to microcredit but have unexpected signs. The estimated coefficient of *Economic dependency ratio* is positive, implying that the households who are less economic active have higher probability of being engaged in RCC microcredit programme. One possible explanation for this unexpected sign is that households with higher dependency ratios have fewer family members taking up income-generating activities and thus are more inclined to rely on loans for household activities such as consumption and children's education due to insufficient income. As a result, they are more likely to access RCC's microcredit. The inverse relationship between *Savings* and households' accessibility suggests that households who deposit money with RCCs have lower chances to access RCC's microcredit. This is possible since these households are able to access their savings in RCCs when they need financial support, which in turn weakens the likelihood of borrowing micro loans from RCCs[44]. Similarly, the households who bought shares in a RCC are likely to have more surplus money in their own control, which reduces their intentions to borrow. This might account for the negative relationship between *Shareholding* and households' access to RCC's microcredit.

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[44] Savings in RCCs are not compulsory to collateralise the micro loans issued. Instead, households can deposit money voluntarily and access savings freely.

Table 5.3 Logit estimates for households' accessibility to microcredit

Independent Variables[1]	Estimated Coefficients	Standard Error	Wald Statistics	Marginal Effect[2]
Age	0.0103	0.0191	0.2874	0.0011
Gender	-0.3710	0.3288	1.2726	-0.0437
Location	-0.4565	0.4477	1.0398	-0.0392
Household size	-0.2262*	0.1356	2.7851	-0.0236
Farm size	0.7010	0.4375	2.5667	0.0548
Income (in 1,000 yuan)	0.0117**	0.0059	3.8842	0.0012
Self-employment	0.7000**	0.3605	3.7672	0.0547
Dependency ratio	0.5353**	0.2255	5.6339	0.0558
Assets (in 1,000 yuan)	-0.0617**	0.0303	4.1265	-0.0064
Savings	-1.2124***	0.3624	11.1588	-0.1895
Attitude	-1.1050***	0.3046	13.1609	-0.1676
Alternatives	-2.1137***	0.4512	21.9483	-0.1002
Official status	1.0596**	0.4707	5.0668	0.0724
Shareholding	-1.0391***	0.3694	7.9128	-0.1544
Dummy variables[3]				
(Distance)				
Distance$_{(2)}$	-0.2071	0.3162	0.4290	-0.0230
Distance$_{(3)}$	-1.4804***	0.5525	7.1785	-0.2495
(Education)				
Education$_{(2)}$	1.1641*	0.6811	2.9214	0.1797
Education$_{(3)}$	0.6809	0.8935	0.5808	0.0536
Constant	3.6876**	1.4357	6.5976	

McFadden R-squared		0.2878
Log likelihood		-161.5214
LR statistic		130.5594***
Degree of Freedom		18
Total observations		424

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	39	310	349
% of correct	40.63	94.51	82.31
No. of incorrect	57	18	75
% of incorrect	59.38	5.49	17.69

Note: 1/. Dependent variable=1 if household has accessed microcredit and zero otherwise;
2/. Marginal effect is at the mean value. For binary variable, marginal effect is P|1-P|0;
3/. To avoid a multicollinearity problem, a dummy variable is dropped in each group.
*, **, ***, represent the 10%, 5%, and 1% significance level, respectively.

Table 5.3 shows that the coefficients of the remaining explanatory variables: *Age*, *Gender*, *Location*, *Distance$_{(2)}$*, *Education$_{(3)}$*, and *Farm size*, are not significantly different from zero, and they do not have significant effects on households' access to microcredit. In addition, the estimated sign on *Age* contradicts the hypothesised sign, while the others have the expected signs.

Based on the estimated results, twelve variables are found to have significant influences on households' accessibility to RCC's microcredit, including *Distance2*, *Household size*, *Education1*, *Income*, *Self-employment*, *Economic dependency ratio*, *Assets*, *Savings*, *Attitude*, *Alternatives*, *Official status* and *Shareholding*. Except for *Age*, *Economic dependency ratio*, *Savings*, and *Shareholding*, most of the explanatory variables have signs as hypothesised (see Table 5.3).

It has been argued that the estimated logistic coefficients obtained by maximum likelihood estimation do not generate a direct economic interpretation, and the sign of an estimated coefficient only provides the direction of the effect of that explanatory variable on the probability of a success (i.e., an observation at value one) (Greene, 2003; Train, 1986). To address this limitation, marginal effects – that is, the change in the predicted probability associated with changes in the explanatory variables are calculated (Greene, 2003).

Table 5.3 also presents the marginal effects for the regressors of the logit model. For example, the marginal effect of *Household size* indicates that an additional member increase in the family would decrease the probability of accessing microcredit by 2.36 percent on average. In addition, the probability of borrowing from RCC microcredit programmes would increase by 0.12 percent on average with every 1,000 yuan increase in *Income*. By contrast, an additional 1,000 yuan increase in *Assets* would reduce households' probability of accessing RCC microcredit by 0.64 percent. The marginal effects of both *Income* and *Assets* on the probability of accessing microcredit are minimal. Furthermore, the marginal effect of *Economic dependency ratio* shows

that on average a one percent increase in the ratio would change the probability of borrowing from the programme by 0.0558 percent.

The results indicate that the probability of accessing microcredit is decreased by 24.95 percent for households who live more than 20 lis away from RCC branches compared to those living within 10 lis from RCC branches (see Table 5.3). Conversely, households who have obtained secondary school education or less are 17.97 percent more likely to borrow from the microcredit programme than uneducated households (see Table 5.3).

The marginal effect of *Self-employment* shows that the probability of being a microcredit borrower would rise by 5.47 percent when the household is engaged in self employment. Similarly, the probability of accessing microcredit for households with members working as local officials increases by 7.24 percent. However, the marginal effects of *Attitude* and *Alternatives* suggest that the probability of accessing microcredit would decrease by 16.76 percent when the household holds a negative attitude towards debt, and by 10.02 percent when the household can find alternative credit sources other than RCC microcredit. In addition, if the household is a *Shareholder* of RCC, the probability of borrowing from RCC microcredit programme would be considerably reduced by 15.44 percent.

In summary, the empirical results from the logistic regression reveal that household income, self-employment and official status are three contributors to households' accessibility to microcredit because they imply a higher credit demand resulting from the higher capital requirements (on/off farm), which in turn raises the likelihood of accessing microcredit by households. Conversely, household assets and savings can be used as proxies for household initial capital, and a higher value of either of them can potentially decrease the probability of accessing microcredit by the households. The probability of accessing microcredit would be substantially reduced if the households are averse to have debt or can access alternative credit sources. The results

also imply that households with higher education levels and/or living nearer to the RCC branches are more likely to access microcredit.

5.2.2 Other factors affecting household accessibility to microcredit

Some qualitative information gathered from the surveyed questionnaires is discussed in this section to investigate factors, other than those discussed in the empirical model, that also affect households' access to microcredit.

Knowledge of RCC microcredit programme

From the total 96 non-borrower respondents, 28 respondents reported that they had no knowledge about the microcredit programme operated by RCC. Three main reasons were found for such lack of knowledge. One of the most cited reasons was the lack of understanding of the concept 'microcredit' (60.7%). This was followed by the inadequate promotion of the microcredit programme by RCC (21.4%) and the unawareness of the RCC branches nearby (17.9%).

Need to borrow

The survey results show that 77% (n=74) of the total non-borrower respondents had no need to borrow money in the past two years. This further confirms that credit demand determines households' access to microcredit to a large extent. For the other 22 non-borrowers who signalled credit needs, 18 had applied for micro loans from RCCs but were rejected, and four had resorted to either formal lenders (e.g., Agricultural Bank of China) or informal lenders (e.g., friends, relatives).

Reasons for loan rejection

Table 5.4 exhibits the major reasons why the micro loan applications were rejected from the respondents' own perspective. Approximately 55.6% of the 18 non-borrower respondents who had been rejected from accessing microcredit reported that their loan applications were denied because the loan officers from RCC branches perceived them as risky in repaying loans due to low household income. Similarly, 55.6% of the

respondents attributed their loan denials to the inadequate collateral or the inability to find loan guarantors. On the other hand, creditworthiness potentially influences the households' access to microcredit since about 33% considered their failures in securing micro loans as a result of the blemished credit history due to the previous loan defaults. Furthermore, approximately 28% report that the difficulty in meeting the required documents by the RCC loan officers also prevented them from accessing microcredit.

Table 5.4 Reasons for loan rejection

Reasons	Non-borrower respondents (n=18)	
	Count	% to n
1. Insufficient income to repay the loans	10	55.6
2. Bad credit history due to previous defaults	6	33.3
3. Lack of collateral or co-guarantor	10	55.6
4. Difficulty in preparing required documents	5	27.8

Note: Total responses do not tally with the number of respondents due to multiple answers.

Reasons for not applying for micro loans

The non-borrower respondents were also asked to state whether they needed to borrow in the future and if they did, would they apply for micro loans from RCCs. For non-borrower respondents (n=96), 83 signalled borrowing intentions in the future. In addition, 53 of the respondents expressed that they would give priority to RCC micro loans if they had credit needs. The remaining 30 respondents indicated that they would not apply for RCC micro loans when they need to borrow. Table 5.5 presents the major reasons for not applying for the micro loans.

Table 5.5 Reasons for not applying for micro loans

Reasons	Non-borrower respondents (n = 30)	
	Count	% to n
1. Insufficient household income	20	66.7
2. Bad credit record	8	26.7
3. Lack of collateral	10	33.3
4. Interest rate on RCC's micro loan is too high	15	50.0
5. Difficulty in meeting the required documents	13	43.3
6. The loan application process takes too much time	8	26.7
7. Much easier to access informal lenders	15	50.0

Note: Total responses do not tally with the number of respondents due to multiple answers.

Household income is a determinant of the households' future borrowing from RCC microcredit programmes where 66.7% of the households would not borrow because their meagre income is not sufficient to repay loans. Interest rate is another crucial factor that restrains the households from applying micro loans since 50% voiced that the interest rate from RCCs is too high. Similarly, 15 non-borrower respondents prefer informal loans over RCC micro loans because the former can be easily obtained. In addition, the complicated application procedure adopted by RCCs in terms of documentation requirements and processing time also makes the households shy away from applying for micro loans. It is worth nothing that 33.3% of non-borrower respondents would not apply for micro loans due to the lack of proper collateral. Furthermore, approximately 26.7% non-borrower respondents would not apply for micro loans in view of their poor credit records.

We can conclude that the households' limited access to microcredit can be largely attributed to the low or zero credit needs of the households. Household income and available alternative credit sources (e.g., informal credit) are found to significantly influence households' borrowing decisions, and consequently, influence households' access to microcredit. This confirms the empirical findings from the logistic regression. On the other hand, institutional-level factors such as interest rate, documentation requirements and loan processing time can potentially harm the

households' access to microcredit: leading to either loan rejection or reluctance to apply. This is consistent with Umoh (2006) and Atieno's (2001) findings who note that the access problem is mainly created by the lending policies of financial institutions. Furthermore, our findings imply that there is an imperative for RCCs to enhance promotion of their microcredit programmes among the rural households and make the households fully aware of the features of microcredit (e.g., collateral free). This might help improve the access to microcredit by rural households.

5.3 Microcredit and welfare impact

The welfare of the rural households is measured in terms of household annual income and annual consumption. This research estimates the average impact of microcredit on the households' welfare and the empirical analysis is based on the difference-in-difference (DD) approach. Section 5.3.1 and 5.3.2 discuss the empirical results obtained from the standard DD analysis and adjusted DD analysis respectively. Section 5.3.3 investigates the client target of RCC microcredit programme.

5.3.1 Impact estimation with standard difference-in-difference method

This research estimates the welfare impact of microcredit using the standard DD approach based on Equation (4.30). In the standard DD framework, the treatment variable, or microcredit variable, is of binary form signifying households' participation in the programme (1=yes, 0=otherwise). In addition, the estimated model is a logarithmic function where the dependent variable is the natural logarithm of the welfare indicator such as annual income or consumption. This makes the estimates less sensitive to outlying observations on the dependent variables (Wooldridge, 2007). Accordingly, the coefficient (γ) of the treatment variable, when multiplied by 100, measures the approximate average percentage change in the household outcomes (income or consumption) with respect to the treatment variable (Wooldridge, 2007; 2002). Table 5.6 shows the standard DD impact estimates.

Table 5.6 Standard DD estimates of microcredit impact on household welfare

Outcome Variables(Y_{it})	Borrowing Households (N=328)			Non-borrowing Households (N=96)			*DD impact estimator*
	Year 2002	Year 2008	*Differences (2002-08)*	Year 2002	Year 2008	*Differences (2002-08)*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
							$\hat{\gamma}_{sdd}$
	$Y_{B,02}$	$Y_{B,08}$	$D_1 = Y_{B,08} - Y_{B,02}$	$Y_{N,02}$	$Y_{N,08}$	$D_2 = Y_{N,08} - Y_{N,02}$	$= D_1 - D_2$
Log of annual income	4.177	4.500	0.323***	4.080	4.349	0.269***	0.053*
	(0.018)	(0.018)	(0.025)	(0.043)	(0.040)	(0.059)	(0.032)
Log of annual consumption	3.974	4.241	0.267***	3.885	4.123	0.237***	0.030
	(0.016)	(0.018)	(0.024)	(0.037)	(0.035)	(0.051)	(0.029)

Note: Entries represent means of log household annual income and log household annual consumption for the borrowing group and non-borrowing group respectively;
Numbers in parentheses are standard errors;
*, **, *** represent the 10%, 5% and 1% significance level for the *t*-test, respectively.

The results in Table 5.6 show that the household welfare measured by household annual income (HAI) and household annual consumption (HAC) has been substantially improved for the borrowing group between 2002 and 2008 (column 3 in Table 5.6). For example, the average HAI for the borrowing households has risen by roughly 32% over six years and is statistically significant at the 1% level. Similar positive and significant change is also evident in the average HAC for the borrowing households during the same period. It should be noted however that the significant improvement in HAI and/or HAC for the borrowing group could be a combined result of time influence and microcredit programme impact. To isolate the true programme impact on the borrowing households, the potential time trend must be controlled for. The average outcome changes for the non-borrowing group between 2002 and 2008 are used to approximate the time trend suffered by the borrowing group (column 6 in Table 5.6). After differencing the mean gains between the two groups, the standard DD estimation suggests that the average HAI for the borrowing households rises by 5.3% as a direct result of programme participation and this positive impact is statistically significant at the 10% level. On the other hand, the standard DD estimation implies that the average HAC is roughly increased by 3% for the borrowing households simply due to participating in the microcredit programme.

However, the positive impact of microcredit on household consumption is not statistically significant (column 7 in Table 5.6).

Based on the standard DD estimation, the impact of microcredit programmes on the participants' household annual income is positive and marginally significant. However, the positive effect of microcredit on the household consumption is not statistically significant. The standard DD estimation assumes that no variables other than treatment variables would affect the trend of outcome investigated (Y_{it}) between the borrowing and non-borrowing groups. This assumption can be violated if the two groups of households are different and unbalanced in the household characteristics that are probably associated with Y_{it}. Therefore, the standard DD method without controlling for other variables is likely to yield biased impact estimates.

5.3.2 Impact estimation with adjusted difference-in-difference method

To address the potential deficiency of the standard DD method, this study also evaluated the welfare impact of RCC microcredit using the adjusted DD strategy (see Equation 4.33). In the adjusted DD estimation, the treatment variable (M_{it}) takes on two forms: a binary variable similar to that in the standard DD analysis; or a continuous variable denoting cumulative loan amount borrowed by households in 2008. In addition to the treatment variable, a set of household characteristics is included in the regression equation to correct for the observed differences between the two groups. Similarly, the adjusted DD strategy uses the natural logarithms of HAI and HAC as dependent variables in the regression and estimates an average percentage effect of microcredit. Furthermore, the fixed effects method is adopted to control for the households' unobserved heterogeneities that affect both households' participation in the programme (or receipt of credit) and the welfare outcome investigated (i.e., selection bias). Table 5.7 presents the fixed effects regression results when the treatment variable in Equation (4.33) is a binary variable.

Table 5.7 Fixed effects estimation of the impact of programme participation

	Dependent variable	
	Log of household annual income (HAI)	Log of household annual consumption (HAC)
Intercept	4.2630***	4.1597***
	(0.4751)	(0.4319)
Year dummy (2008)	0.1664**	0.1427**
	(0.0664)	(0.0604)
Control variables (X_{it})		
Age squared	0.0002	0.0002
	(0.0001)	(0.0001)
School-age children	0.0148	0.0067
(in number)	(0.0239)	(0.0217)
Household size	0.0005	-0.0291
(in numbers)	(0.0889)	(0.0808)
Earner	0.0496	0.0265
(in numbers)	(0.0323)	(0.0293)
Treatment variable (M_{it})		
Programme participation	0.0514	0.0289
(binary variable)	(0.0322)	(0.0293)
F-statistics (423,418)	5.18***	5.31***
Household fixed effects	Jointly significant	Jointly significant
R-squared	0.8711	0.8705
Total observations	848	848

Note: Numbers in parentheses are standard errors;
         *, **, *** represent the 10%, 5% and 1% significance level for the *t*-test, respectively.

The regression results in Table 5.7 show that participating in the microcredit programme on average increases the borrowing households' annual income by 5.14% and annual consumption by 2.89%, compared to the non-borrowing group. Unfortunately, the adjusted DD estimation fails to demonstrate a significant impact of programme participation on either welfare indicator investigated. It can be seen that after controlling for household characteristics, the adjusted DD estimates of the impact of programme participation differ slightly from those of the standard DD analysis. This might imply that the observed differences between the borrowing households and non-borrowing households do not substantially influence the trend of

the outcomes investigated (Abadie, 2005a).

This study also uses the cumulative loan amounts borrowed by the households as a better measure of their involvement in RCC microcredit programme (i.e., M_{it} in Equation 4.33 is a continuous variable denoting loan size) and estimates the average impact of additional credit amount borrowed on the borrowing households (Nguyen et al., 2007; Alexander, 2001). The results are summarised in Table 5.8.

Table 5.8 Fixed effects estimation of the impact of micro loan

	Dependent variable	
	Log of household annual income (HAI)	Log of household annual consumption (HAC)
Intercept	4.2976[***]	4.2012[***]
	(0.4454)	(0.4105)
Year dummy (2008)	0.1315[**]	0.1059[**]
	(0.0590)	(0.0544)
Control variables (X_{it})		
Age squared	0.0001	0.0001
	(0.0001)	(0.0001)
School-age children	0.0175	0.0090
(in number)	(0.0224)	(0.0207)
Household size	-0.0173	-0.0463
(in numbers)	(0.0833)	(0.0768)
Earner	0.0615[**]	0.0360
(in number)	(0.0304)	(0.0280)
Treatment variable (M_{it})		
Cumulative borrowings	0.0029[***]	0.0023[***]
(in 1,000 yuan)	(0.0004)	(0.0003)
F-statistics (423,418)	5.72[***]	5.80[***]
Household fixed effects	Jointly significant	Jointly significant
R-squared	0.8861	0.8824
Total observations	848	848

Note: Numbers in parentheses are standard errors;
*, **, *** represent the 10%, 5% and 1% significance level for the *t*-test, respectively.

The results in Table 5.8 reveal that micro loans provided by RCCs have a positive and significant impact on household welfare outcomes. On average an additional 1,000 yuan in the borrowing raises a household's annual income by 0.29% and annual consumption by 0.23%. Since the average total loan amount borrowed by the borrowing households is 44,012 yuan (see Table 5.2), the results imply that on average, the borrowing households increase their annual income and consumption by approximately 12.76% and 10.12% respectively, compared to the non-borrowing households. Thus, we can argue that the households will benefit more as they become more involved in the programme (signified by the growing loan size). The empirical findings of the impact of borrowings are consistent with the findings of Nguyen et al. (2007) and Pitt and Khandker (1998), who show positive and significant relationships between the loan size and a set of household outcomes including income and consumption.

Overall the explanatory power of the fixed effects model is satisfactory (see R-squared in Table 5.7 and 5.8). In addition, an F-test was performed to test the null hypothesis that the coefficients of household fixed effects (h_i) are all zero. The F-statistics in both Table 5.7 and 5.8 are statistically significant at the 1% level and therefore strongly reject the null hypothesis in favour of the fixed effects model in correcting for selection bias in the impact estimation.

In general, the empirical findings based on the adjusted DD approach confirm the findings in the microfinance literature that microcredit can improve the households' welfare such as income and consumption. The impact estimates of the *Programme participation* (binary variable) are somewhat disappointing because the impact is not statistically significant for either outcome variable investigated. When using the *Cumulative borrowings* to better express the involvement in microcredit programme by the households, the impact estimates are improved: the impacts of cumulative loan amount on both outcomes investigated are statistically significant at the 1% level.

Although the impact of micro loans on welfare is pronounced from the statistical perspective, it is not significant in an economic sense. As documented in Table 5.8, the coefficient (γ) values of variable *Cumulative borrowings* are small (0.0029 in income impact and 0.0023 in consumption impact), compared to the coefficients of other variables such as *Earner* (0.0615 and 0.036). Since the coefficient γ (when multiplied by 100) measures the percentage change in the household outcomes, the small values suggest a small or economically insignificant effect of microcredit on the real levels of household income and consumption (Niño-Zarazúa, 2007).

5.3.3 Poverty targeting of RCC microcredit programme

In this study a household is defined as poor if the per capita annual income is below the official poverty threshold published by the National Bureau of Statistics of China (NBSC). We use two poverty lines in our study: low poverty line and low income line (also called the relative poverty line)[45]. The low poverty line has been traditionally considered to be too low compared to the growing national GDP per capita and lags behind the poverty threshold set by the World Bank. To reflect the stable improvement in households' living standards, the Chinese government has set another poverty line, i.e., the low income line, since 2000. To better analyse the depth that RCC programmes reach the poor, both the poverty line (PL) and low income line (LIL) are adopted in our study to identify the poverty status of the households.

Using the sample data the poverty targeting of the RCC programme is projected in Table 5.9. The upper panel of the Table 5.9 examines the poverty incidence across the sample in the post-programme period (i.e., 2008). It shows slight poverty incidence in the sample: only two households (2.1%) are hard-core poor using the low poverty line, or five households (5.2%) live in the relative poverty according to the low income line. Nevertheless, no borrowing household in the sample is classified as poor using either the official poverty line or the low income line. This implies that the RCC microcredit programme does not primarily focus on the poor population alone.

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[45] For details of the construction of the two poverty lines, see NBSC (2004).

Nguyen et al. (2007) cautions that using the poverty status of households in the post-programme period can lead to an inaccurate analysis of the programme targeting. Households who obtained micro loans may increase their income and/or consumption, and thus lift themselves out of poverty. Therefore, the poverty status of the households in 2002 (i.e., before the programme implementation) is also examined and the results are reported in the lower panel in Table 5.9. The results do not show much variation compared to the poverty examination in 2008. When using the low poverty line, the poor account for only 0.3% of the borrowing households and 6.3% for the non-borrowing households. When classified by the low income line, only 1.8% of the borrowing households and 8.4% of the non-borrowing households are poor. The results suggest that a large proportion of the borrowing households were not poor before they participated in the microcredit programme.

Table 5.9 Poverty status of the sampled households by type and year

	Borrowing Households		Non-borrowing households		Total	
	Count	Share (%)	Count	Share (%)	Count	Share (%)
Poor by PL 2008[1]	0	0	2	2.1	2	0.5
Poor by LIL 2008[2]	0	0	5	5.2	5	1.2
Sample size	328		96		424	
Poor by PL 2002[1]	1	0.3	6	6.3	7	1.7
Poor by LIL 2002[2]	6	1.8	9	8.4	15	3.5
Sample size	328		96		424	

Note: 1. The low poverty line in 2008 and 2002 are 786 yuan and 627 yuan, respectively;
2. The low income line in 2008 and 2002 are 1,067 yuan and 869 yuan, respectively.

There are two main reasons why the RCC microcredit programme does not explicitly target the poor population. First, the main goal of the RCC microcredit programme is to facilitate the credit accessibility by Chinese rural households as required by the People's Bank of China (PBC). According to the PBC (2001), there is no specific client target requirement for the RCCs and micro loans of RCCs are issued to

households who are registered as rural residents and engaged in land farming and other agriculture-related business. Unlike the microcredit programmes provided by NGOs or government agencies, which are specifically designed to reduce poverty by providing loans to the poor only, the RCC programmes have been carried out to increase the provision of credit services in rural areas and their participants are traditionally rural middle-income households (Du, 2005, 2004; Sun, 2003; Druschel, 2002). Second, RCCs are a formal financial institutions that assume sole responsibility for the profits and losses. To ensure the financial viability of the microcredit programme, RCCs emphasise loan repayment performance and are likely to exclude poor households who may not be able to use credit effectively and repay loans punctually from participating in the microcredit programme (Cheng, 2006; Du, 2005). As Du (2005) concludes, while the NGO and government microcredit programmes pay more attention to poverty alleviation to achieve social development, the RCC microcredit programme focuses on business sustainability and risk management.

5.4 Microcredit and women empowerment

5.4.1 Descriptive statistics of the explanatory variables

Table 5.10 provides the descriptive statistics of the explanatory variables used in the empirical models for both women borrowers (n=64) and women non-borrowers (n=28). The table shows a strong association (significant χ^2 value) between *family support contribution* and group type (borrower/non-borrower). The women borrowers are more able to contribute to their family support than the women non-borrowers (76.6% versus 50.0%). This is possible since the women borrowers are expected to earn independent income through loan-supported income-generating activities, which can be used to meet family expenses. In addition, the results show that the relationship between *education attainment* and group type is not independent, indicating that the women borrowers are more likely to be educated than the non-borrowers (96.9 versus 89.3), whereas the non-borrowers tend to have achieved a

higher level of education such as post-secondary education than the borrowers (14.3 versus 4.7). Moreover, the women borrowers on average have more income earners (*Earner*) in their families when compared to the non-borrower women, and the t-test result shows a significant mean difference at the 10 percent level in *Earner* between the two groups. Furthermore, the frequency distribution of the villages shows that the non-borrower women are mostly concentrated in *Villages 4* and *5* (28.6 and 25.0 percent respectively) where the women borrowers dwell least (4.7 and 6.3 percent respectively). The statistical test results in Table 5.10 shows no significant mean difference between the two groups' women in regards to *Age*, *Annual income,* and *Household size*, and group type is independent with *Male children* and *Household occupation*.

Table 5.10 Descriptive statistics of explanatory variables in empowerment models

Variables		Non-borrower	Borrower	Statistic test
Personal Characteristics				
Age		41.1	39.8	$t = -0.623$
Family support contribution				
	Yes	50.0	76.6	$\chi^2 = 6.367^{**}$
	No	50.0	23.4	
	Total	100.0	100.0	
Male children				
	Yes	75.0	78.1	$\chi^2 = 0.108$
	No	25.0	21.9	
	Total	100.0	100.0	
Education attainment:				
Uneducated		10.7	3.1	$\chi^2 = 5.084^{*}$
Secondary school or less		75.0	92.2	
Post-secondary		14.3	4.7	
Household Characteristics				
Annual income (in 1,000 yuan)		25.2	71.4	$t = -0.96$
Household head occupation				
	Agriculture	89.3	90.6	$\chi^2 = 0.04$
	Non-agriculture	10.7	9.4	
	Total	100.0	100.0	

Table 5.10 Descriptive statistics of explanatory variables in empowerment models (Cont.)

Variables	Non-borrower	Borrower	Statistic test
Household size	4.18	4.31	$t = -0.468$
Earner	2.64	2.14	$t = 1.956^{*}$
Village Dummies			
Village 1 (% of Yes)	0.0	17.2	$\chi^2 = 23.467^{***}$
Village 2 (% of Yes)	14.3	10.9	
Village 3 (% of Yes)	7.1	14.1	
Village 4 (% of Yes)	28.6	4.7	
Village 5 (% of Yes)	25.0	6.3	
Village 6 (% of Yes)	10.7	14.1	
Village 7 (% of Yes)	7.1	14.1	
Village 8 (% of Yes)	7.1	18.8	
No. of observations	28	64	

Note: Entries for variables *Age*, *Annual income*, *Household size*, and *Earner* are mean values;
*, **, ***, represent 10%, 5%, 1% significance level, respectively.

The results in Table 5.10 suggest some selection bias especially with respect to the *Family support contribution*, *Education*, *Earner*, and village dummies, which justifies the inclusion of these variables in the empirical models to correct for the potential bias in the impact estimation.

5.4.2 Impacts of RCC microcredit on different empowerment indicators

In this study, women empowerment is measured by twenty four indicators (E_i) that can be grouped into five dimensions including control over financial assets, mobility, purchase making ability, decision making power, and freedom/legal awareness (see Table 4.1). The impact of microcredit on different aspects of women empowerment is estimated using the logistic regression model (Equation 4.34) and the coefficients estimates are summarised in Table 5.11. Each row in Table 5.11 represents a separate logistic model with a different dependent variable (i.e., empowerment indicator) and same explanatory variables listed in Table 5.10. Given the large number of estimates involved, and since the effects of other explanatory variables (such as female and household characteristics) on empowerment are not of interest to this study, Table

5.11 only reports the results for the primary variables related to microcredit (see the complete coefficients estimates in Appendix 4).

It can be seen from Table 5.11 that the coefficients of loan dummy variables *LOAN1*, *LOAN2*, and *LOAN3* have the expected positive signs in most of the empowerment models except for *PARNT*, *DESHOUS*, and *DESBIR*. In the models with *PARNT* and *DESHOUS* as dependent variables, the coefficients of the three loan variables show a negative impact of RCC microcredit on these two empowerment indicators. In the model with *DESBIR* as dependent variable, the coefficients are negative for *LOAN1* and *LOAN2*, but positive for *LOAN3*, implying that borrowing from RCC's programme has a mixed impact on this indicator. Table 5.11 also shows that both *LOAN*2 and *LOAN3* have significant impacts on eleven empowerment indicators including *CINC, CSAV, CITY, UTENS, FURNT, LIVSK, DESEDU, DESLVSK, DESEQP, DESCSM,* and *DESACCT*. In addition, *LOAN2* has a significant effect on indicators such as *JEWL* and *DESLAND*, and *LOAN3* has a significant impact on indicators, such as *EQUIP, FABUSE, FCTCEP, FARMAG,* and *LMAGE*. In contrast to *LOAN2* and *LOAN3*, *LOAN1* is found to have a significant effect on indicator *DESBIR* only.

Table 5.11 Coefficient estimates of micro loan variables in empowerment models

Dependent variables (E_i)	Microcredit variable $LOAN_i$ (denoting different loan categories)					
	LOAN1 (<30,000 yuan)		LOAN2 (30,000-60,000 yuan)		LOAN3 (>60,000 yuan)	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
Control over financial assets						
CINC	1.232	0.985	1.581*	0.859	2.257**	0.957
CSAV	1.649	1.111	2.142**	0.979	2.364**	1.047
Mobility						
CITY	1.081	1.051	1.980**	0.877	2.202**	0.948
PARNT	-1.431	0.996	-1.355	0.839	-0.585	0.949
Purchase making ability						
UTENS	0.670	0.949	1.775**	0.796	2.244**	0.914
CLOTH	0.588	0.955	0.981	0.816	1.434	0.904
FURNT	1.133	0.947	2.235***	0.836	2.376**	0.928
JEWL	0.911	1.083	1.402*	0.776	1.402	0.864
LIVSK	1.240	1.232	1.737*	0.893	2.869***	1.035
EQUIP	1.437	1.083	1.459	0.973	1.892*	1.064
Involvement in decision making						
DESHOUS	-1.406	0.974	-1.216	0.854	-0.144	0.923
DESEDU	0.993	0.978	1.815**	0.895	2.283**	0.993
DESLAND	1.040	1.154	1.389*	0.798	1.101	0.878
DESCRP	0.989	0.923	0.759	0.781	1.474	0.905
DESLVSK	1.070	1.168	2.637**	1.043	3.122**	1229
DESEQP	1.315	1.051	1.976**	0.878	2.100***	0.982
DESCSM	1.063	0.996	1.566*	0.827	1.799*	0.939
DESACCT	2.261	1.455	2.273**	0.963	2.443**	1.053
DESBIR	-2.741**	1.065	-1.062	0.815	0.805	0.947
Freedom/legal awareness						
FABUSE	0.184	0.966	0.240	0.827	1.857*	0.991
FCTCEP	0.781	0.997	0.991	0.775	1.549*	0.853
FARMAG	0.659	0.977	1.163	0.741	1.801**	0.876
LMAGE	0.298	0.951	0.758	0.827	1.907**	0.969
LDIVC	1.326	0.946	0.995	0.840	0.851	0.963
Total observations			92			

Note: *, **, *** represent the 10%, 5% and 1% significance level, respectively

The overall model fit is evaluated for each of the twenty four logistic models and the goodness-of-fit statistics are summarised in Table 5.12. The likelihood ratio (LR) statistics reject the null hypothesis that the parameters for the model are equal to zero at the 5 percent significance level or better for most of the twenty four models except for models *UTENS*, *DESCRP* and *DESCSM*. The null hypothesis is rejected at the 10 percent significance level in these three models. The overall correct prediction is higher than 75 percent in most of the models with the highest percentage observed in *DESLVK* model (87 percent). The McFadden R-squared is also highest in *DESLVK* model (0.3694) but is lowest in *DESCRP* model (0.2252). This implies that the logistic model employed in this study is effective in predicting the probability of female empowerment related to involvement in making family decision on purchasing livestock (*DESLVK*) but may be relatively less effective in predicting female involvement in deciding what crops to grow (*DESCRP*). In general, the empirical models fit the data well and can be used to predict the probability of women empowerment in different aspects.

Table 5.12 Goodness-of-fit statistics for the empowerment models

	LR Statistic	McFadden R-squared	Overall Predicted Percentage Correct
Models:			
CINC	30.15**	0.2487	77.2
CSAV	40.85***	0.3294	78.3
CITY	34.53**	0.2804	80.4
PARNT	37.50***	0.2949	76.1
UTENS	29.68*	0.2367	77.2
CLOTH	30.45**	0.2535	78.3
FURNT	31.69**	0.2493	76.1
JEWL	36.65***	0.2877	79.3
LIVSK	38.00***	0.3232	75.0
EQUIP	38.98***	0.3315	80.4
DESHOUS	36.60***	0.2878	75.0
DESEDU	43.95***	0.3489	78.3
DESLAND	40.09***	0.3153	82.6
DESCRP	27.92*	0.2252	75.0
DESLVSK	39.01***	0.3694	87.0
DESEQP	40.90***	0.3208	78.3
DESCSM	27.87*	0.2465	77.2
DESACCT	38.99***	0.3692	84.8
DESBIR	33.07**	0.2651	82.6
FABUSE	35.56**	0.2803	75.0
FCTCEP	31.18**	0.2459	75.0
FARMAG	33.16**	0.2622	75.0
LMAGE	38.77***	0.3108	79.3
LDIVC	30.29**	0.2679	82.6

Note: *, **, *** the represent 10%, 5% and 1% significance level, respectively.

The predicted probabilities of empowerment manifested by the twenty four indicators are calculated to illustrate the levels of empowerment experienced by women borrowers with different cumulative loan sizes and by women who never borrow. The results are presented in Table 5.13. The magnitude of the impacts of RCC microcredit on female empowerment is obtained by comparing the empowerment levels between the non-borrower women and women borrowers in different loan size categories, where the empowerment levels of non-borrower women are used as a reference category to mimic the empowerment status of women borrowers had they not

participated in the microcredit programme[46]. The following discussion of how RCC's microcredit influences the female empowerment is based on the empirical results in Table 5.11 and 5.13.

1) Control over financial assets

Borrowing from a RCC microcredit programme has a positive and significant impact on female control over financial resources such as income and savings, and the impact increases with the cumulative loan size. For example, holding other factors constant, the probability of controlling own income (*CINC*) for the women with loan size between 30,000-60,000 yuan is 33 percent higher than for the non-borrowers, and the difference is significant at the 10 percent level. Such probability would be increased by 49 percent for women who have borrowed over 60,000 yuan in total compared to the non-borrowers and this is significant at the 5 percent level. Similarly, the probability of controlling over own savings (*CSAV*) for the women who have borrowed 30,000-60,000 yuan and more than 60,000 yuan in total is 48 percent and 53 percent higher than the non-borrowers respectively, and both differences are significant at the 5 percent level.

2) Mobility

The RCC microcredit however does not influence the mobility indicators in the same direction. On the one hand, the probability of going to the city alone (*CITY*) is greater for the women borrowers than that of the non-borrowers. For example, women with cumulative loans between 30,000-60,000 yuan and greater than 60,000 yuan are 27 and 29 percent more likely to go to city alone than the non-borrowers respectively, and both differences are significant at the 5 percent level. On the other hand, the chance of visiting parent home without asking for consent (*PARNT*) is lower for the women borrowers than that of the non-borrowers. For example, women with total loan size less than 30,000 yuan are 5 percent less likely to be able to visit their

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[46] The estimated differences in the probabilities between women borrowers (but with different loan sizes) can also be obtained from Table 5.13, but the statistical significance of these differences cannot be tested using the empirical models.

parent's home freely compared to non-borrowers. The negative impact of the micro loans is not statistically significant.

The predicted probabilities of empowerment in terms of the two mobility indicators are relatively high in our study. For example, the probability of independently travelling to the city is over 60 percent and 80 percent for the non-borrowers and borrowers respectively (see Table 5.13). This is in sharp contrast to Zaman's (1999) findings where the probability of going alone to a downtown market is lower than 15 percent for both the non-borrowers and borrowers. A possible reason for the difference in findings is that women in Muslim and Hindu societies such as Bangladesh suffer from the Purdah norms which restrict their freedom of travelling inside and outside villages to a large extent (Hashemi et al., 1996). Purdah however is not a custom in modern China and there is no social criterion limiting Chinese women's (including rural women's) mobility.

3) Ability to make purchases independently

The results show that the RCC microcredit has a positive impact on all "purchase making ability' indicators and the impact increases with loan sizes. In addition, the positive impact appears to be statistically significant on all indicators except for *CLOTH*. For example, assuming all else equal, the probability of independently purchasing utensils (*UTENS*) for the family is 2.6 times higher for the women borrowers in the '30,000-60,000 yuan' category and 2.9 times greater for the women with more than 60,000 yuan in cumulative loans (both significant at the 5 percent level) compared to non-borrowers. Borrowing between 30,000-60,000 yuan or more than 60,000 yuan from RCC would double the probability of women purchasing furniture independently (*FURNT*) compared to the non-borrowers and is significant at the 5 percent level. Similarly, the microcredit appears to have significant impact on the female ability of independently purchasing livestock (*LIVSK*) when women have borrowed more than 30,000 yuan from RCC. The likelihood of purchasing jewellery alone (*JEWL*) is only 12 percent for the women non-borrowers, but this is

significantly raised to 35 percent if the women have borrowed more than 30,000 but less than 60,000 yuan. Furthermore, microcredit has a significant impact on the women's ability to independently make significant purchases such as farming machinery (*EQUIP*) until they have borrowed greater than 60,000 yuan in total. The probability of purchasing clothes independently (*CLOTH*) for a woman is not significantly influenced by microcredit, and it varies little with the cumulative loan size.

Table 5.13 Predicted probabilities of empowerment for women in different groups

	Non-borrower	Borrower		
		L<30,000	30,000-60,000	L>60,000
Models:				
CINC	0.16	0.40	0.49	0.65
CSAV	0.20	0.57	0.68	0.73
CITY	0.66	0.85	0.93	0.95
PARNT	0.98	0.93	0.94	0.97
UTENS	0.27	0.42	0.69	0.78
CLOTH	0.92	0.96	0.97	0.98
FURNT	0.43	0.70	0.88	0.89
JEWL	0.12	0.25	0.35	0.35
LIVSK	0.49	0.77	0.85	0.94
EQUIP	0.26	0.60	0.60	0.70
DESHOUS	0.81	0.51	0.55	0.78
DESEDU	0.29	0.52	0.71	0.80
DESLAND	0.13	0.30	0.37	0.31
DESCRP	0.53	0.75	0.70	0.83
DESLVSK	0.67	0.86	0.97	0.98
DESEQP	0.07	0.21	0.34	0.37
DESCSM	0.78	0.91	0.94	0.96
DESACCT	0.34	0.830	0.832	0.85
DESBIR	0.95	0.56	0.87	0.98
FABUSE	0.42	0.47	0.48	0.82
FCTCEP	0.08	0.16	0.19	0.30
FARMAG	0.33	0.49	0.62	0.75
LMAGE	0.73	0.79	0.85	0.95
LDIVC	0.45	0.75	0.68	0.65

Note: Predicted probabilities are calculated at the mean or median value for all control variables.

4) Involvement in family decision making process

Six 'involvement in family decision-making' indicators including *DESEDU*, *DESLAND*, *DESLVSK*, *DESEQP*, *DESCSM* and *DESACCT* are positively and significantly influenced by the RCC microcredit. For example, borrowing between 30,000-60,000 yuan from RCC would almost triple the probability of a woman's involvement in deciding farmland lease (*DESLAND*) compared to a non-borrower and this is significant at the 10 percent level. Women who have borrowed between 30,000-60,000 yuan in total are also 42 percent (significant at the 5 percent level) more likely to get involved in deciding children's education (*DESEDU*) than non-borrowers and the difference in probability rises to 51 percent (significant at the 5 percent level) when women have a total loan amount greater than 60,000 yuan from RCC microcredit programme. Compared to non-borrowers, women with loan sizes between 30,000-60,000 yuan or greater than 60,000 yuan are about 30 percent more likely to be involved in deciding what livestock to buy (*DESLVSK*) and this is significant at the 5 percent level. The probability of being involved in deciding what farming machinery to buy (*DESEQP*) is very low and only 7 percent for non-borrowers. This rises to 37 percent when women have borrowed in excess of 60,000 yuan and the impact is significant at the 1 percent level. Furthermore, borrowing between 30,000-60,000 yuan and more than 60,000 yuan significantly raises the probability of women involvement in deciding what consumer durables to buy (*DESCSM*) by 16 and 18 percent respectively compared to the non-borrowers. The probability of making joint decisions on opening saving accounts at bank (*DESACCT*) is also increased significantly when women have borrowed 30,000 yuan or more but the probability varies little with loan size.

The empirical results also reveal that the RCC microcredit has a negative impact on female participation in making decision on house repair/construction (*DESHOUS*) but such impact is not statistically significant at the 10 percent level. For example, the probability of such decision involvement is 30 percent lower for women with cumulative loan size below 30,000 yuan than for non-borrowers. However, the impact

of the microcredit on women's involvement in deciding to have a child (*DESBIR*) is not clear. On the one hand, the probability of making joint decisions on having a child would be reduced by about 40 percent for women with loan sizes less than 30,000 yuan compared to non-borrowers, and is significant at the 5 percent level. On the other hand, such probability would be slightly higher for women who have borrowed in excess of 60,000 yuan than that of non-borrowers, but this is not statistically significant. The RCC micro loans do not significantly influence women's involvement in family decisions on what crops to grow (*DESCRP*) based on the empirical results.

5) Freedom/legal awareness

Borrowing from RCC microcredit programme has a positive and significant impact on the 'freedom/legal awareness' indicators, such as *FABUSE*, *FCTCEP*, *FARMAG*, and *LMAGE*, and the impacts rise steadily with cumulative loan sizes. For example, women who have borrowed more than 60,000 yuan from RCC are twice as likely to understand that women have the rights to protest against domestic abuse (*FABUSE*) compared to the non-borrowers and is significant at the 10 percent level. The probability of being aware of the use of contraception (*FCTCEP*) is only 8 percent for the non-borrowers, but the probability would be significantly raised to 30 percent as women's cumulative loan sizes grow over 60,000 yuan. Furthermore, women borrowers borrowing more than 60,000 yuan in total would raise the probability of knowing that parents should not arrange marriage for children (*FARMAG*) and the probability of being aware of the minimum legal marriage age (*LMAGE*) by 42 and 22 percent respectively when compared to the non-borrowers, and both impacts are significant at the 5 percent level. The probability of knowing the legal means of divorce (*LDIVC*) is also positively affected by the loan variables, but the impacts are not statistically significant.

A potential limitation in assessing the impact of RCC microcredit on the 'freedom/legal awareness' indicators is that these indicators reflect female perceptions of empowerment rather than their real behaviours. Whether any of the awareness

would be actually put into practice is unknown. However, it can be argued that stronger legal or freedom knowledge plays important roles in arousing women's consciousness of fighting for their rights within the household domain or even at higher levels such as community and society (Zaman, 1999).

In addition to microcredit, the empirical results indicate that some dimensions of empowerment are also significantly influenced by other variables such as *AGE*, *EARNER*, *MCHILD,* and *Village* dummies (see Appendix 4). *AGE* has a significantly positive association with most 'purchase making ability' indicators including *CLOTH*, *LIVSK,* and *EQUIP* (see Appendix 4-3), implying that age is a determinant in female ability to make independent purchases. In addition, *EARNER* is positive and significant in both mobility models (see Appendix 4-2), suggesting that women with more income earners in the families have more freedom of mobility. One possible reason is that as the number of income earners within the family increases, the probability of women's involvement in income-generating activities also rises. This may give women more opportunities to travel rather than staying at home, and thus expands women's mobility.

Moreover, *MCHILD* is positive and significant in both 'control over financial assets' models (see Appendix 4-1), suggesting that having one or more male children in the family has a positive and significant effect on a woman's ability to control her own financial assets such as income and savings. This is likely especially in families that prefer male to female children (like the patriarchal tradition). Furthermore, *Village* dummy variables are significant in most of the empowerment models, indicating that the female empowerment is also significantly influenced by the geographic locations where the women reside. For example, women who live in villages adjacent to urban areas would have more chances to travel to the city, and thus would be more empowered in terms of mobility, compared to women living in remote regions.

However, it is difficult to draw general conclusions for the remaining variables in the

models with respect to their impacts on women empowerment because their impacts are insignificant in most of the empowerment models. These variables have minimal or no influences on the indicators within the empowerment dimensions (see Appendix 4). Overall, *cumulative borrowing* is the only variable that has significant positive impact on almost every empowerment dimension investigated.

5.4.3 Conclusion- microcredit impact on women empowerment

Overall, our empirical findings confirm the findings in previous studies such as Hashemi et al. (1996), Zaman (1999), and Pitt et al. (2003), suggesting that microcredit has a positive and significant impact on women empowerment manifested cross various dimensions. First, the empirical results suggest that the use of microcredit leads women to having a greater control over their own financial assets such as income and savings, which is referred as economic empowerment in the literature. This finding is important since the literature indicates that economic empowerment always forms the base of female empowerment in other dimensions (Ansoglenang, 2006; Mayoux, 2002; Zaman, 1999). In addition, microcredit borrowing strengthens women's familial standing represented by their greater role in the family decision-making process. Participation in microcredit programmes also augments women's autonomy in making not only small purchases (such as utensils) but also large purchases (such as farming machinery). Furthermore, even after controlling for knowledge-related variables such as education level, being a microcredit borrower contributes greatly to enhancing women's freedom and legal awareness. However the impact of microcredit on women's freedom of mobility is dubious based on our empirical results.

The empirical findings also imply that there is a threshold loan size beyond which microcredit can have significant effect on one or some dimensions of women empowerment. For example, in this study, for most indicators related to control over financial assets, ability to make purchase and involvement in family decision-making, the loan threshold appears to be 30,000 yuan. In other words, significant impact on

these indicators emerges until women's borrowings reach 30,000 yuan or above. On the other hand, the threshold loan size beyond which the level of empowerment manifested by women's freedom/legal awareness begins to rise significantly is 60,000 yuan. The finding is similar to the findings by Zaman (1999) that women's borrowing should at least reach a certain amount to allow for a significant effect of microcredit on the female empowerment such as asset control.

Our empirical findings also reveal that microcredit not only has positive and significant impacts on female empowerment, such impacts also increase as the cumulative loan sizes grow larger. This finding helps to address the self-selection bias issue in the impact assessment. It is possible that women who are already relatively more empowered even in the absence of the microcredit programme tend to participate in the programme than others. However, the significant coefficients of the cumulative loan size variables on the empowerment indicators investigated suggest that the microcredit programme can further empower women who participate in it: the level of a woman's empowerment is likely to rise as she becomes more involved in the programme (reflected by the growing loan sizes), compared to her starting-level (i.e., the level of empowerment in the non-borrowing status). In other words, a true programme impact can be reflected by this upward trend in women's empowerment along with their involvement in the programme (Osmani, 2007; Hashemi et al., 1996).

CHAPTER 6

SUMMARY AND CONCLUSIONS

This chapter summarises the research. Section 6.1 presents a summary of the research objectives, data and methodology, and major findings. The implications of the research findings are discussed in Section 6.2. Section 6.3 discusses the research limitations and Section 6.4 provides recommendations for future research.

6.1 Summary and major findings

Chinese agriculture is dominated by small farms and farmer households are the basic units of agricultural production. A large number of farmers are still trapped in poverty. Limited access to formal financial services, credit in particular, is an important constraint in expanding farmers' production, which restrains farmers from improving their living conditions. Credit inaccessibility in the rural areas thus impedes the development of the rural sector, which potentially decelerates the development of the Chinese rural economy.

Microcredit was introduced to China as an efficient anti-poverty programme, aiming to facilitate credit access by farmers and mitigate rural poverty in China. However, the impacts of microcredit on China rural households' livelihoods are not well documented. In addition, despite the efforts made by the Chinese government to support and popularise the implementation of microcredit, the access to institutional credit including microcredit by the rural population remains insufficient.

The purpose of this research was to assess the impact of microcredit on household welfare measured by household income and consumption in rural China. This research also evaluated the impact of microcredit on women empowerment manifested in various dimensions. Furthermore, it examined the key factors that influence the accessibility of microcredit by rural households in China. Consequently, the findings of this research enrich the existing literature on microfinance in China.

This research focused on the microcredit provided by the Rural Credit Cooperative (RCC), the largest microcredit provider in China. Both primary and secondary data are used in this research. The primary data were collected through survey interviews using a structured questionnaire. Using stratified random sampling technique, a total of 424 rural households (usable sample) from 50 villages in 10 townships in Hubei Province were included in the sample, which were grouped into borrowers and non-borrowers. The survey questionnaire was personally administered to the rural households between November 2008 and January 2009. Moreover, pertinent secondary data of all sampled households were obtained from the selected RCC branches. The primary data, together with secondary data, form a two-year household panel dataset used in the welfare impact analysis. The women empowerment impact of microcredit and households' accessibility to microcredit are analysed using cross-sectional data.

The impact of microcredit on household welfare is analysed using the difference-in-difference (DD) approach to control for selection bias in the impact assessment. The microcredit impact on women empowerment is examined using a logistic regression and the selection bias is addressed in two ways. First, the empirical models adjust for selection bias by controlling for female personal characteristics (such as age and education level) and household characteristics (such as income and household size). Second, a cumulative borrowing variable is included in the empirical models to test whether the microcredit impact on empowering women increases with women's involvement in the programme. All sampled households in this research are selected from villages where the microcredit programme is available to minimise the potential non-random programme placement bias in the impact assessments. Logistic regression is also employed to identify the factors influencing households' accessibility to microcredit

Table 6.1 summarises the estimated results of the empirical models. In summary, the

results on households' accessibility to microcredit show that:

- Households with higher annual income (*Income*) have higher probability of accessing microcredit (see Table 5.3) because they tend to have more investment opportunities, leading to stronger potential need of credit support. Higher income households are more inclined to access credit because they are more capable to repay loans than low-income households.

- Households who are involved in self-run businesses (*Self-employment*) apart from agricultural production are more likely to access microcredit due to higher capital requirement for investing in self enterprises (see Table 5.3).

- The official status of family member(s) (*Official status*) is also a contributor to households' access to microcredit (see Table 5.3). For example, households with member(s) working as village or township officials may have greater need of credit for off-farm investment and thus have higher probability of accessing microcredit. The results on *Income*, *Self-employment,* and *Official status* imply that credit demand arising from on/off farm capital requirement is an important determinant of households' accessibility to microcredit. Households with higher demand for credit are more inclined to borrow and thus more likely to access credit including microcredit.

- Household assets (*Assets*) and *Savings* can be used as proxies for household initial capital and both negatively influence households' accessibility to microcredit (see Table 5.3). This is because households with higher asset values and/or having bank deposits may be less financially constrained and thus less likely to borrow.

- Holding shares of RCC (*Shareholding*) has a negative influence on households' accessibility to microcredit (see Table 5.3) because households who bought shares of RCC are likely to have more surplus money in their own control, which reduces their intentions to borrow.

- An adverse attitude towards having debt (*Attitude*) tends to decrease the likelihood of accessing any type of credit by households, including microcredit (see Table 5.3).

- The probability of accessing microcredit would be substantially reduced if the households can access *Alternative* credit sources such as informal credit (see Table 5.3).

- There is a negative relationship between *Household size* and household's accessibility to microcredit (see Table 5.3). This result suggests that the larger households are less likely to borrow from RCC microcredit programmes because they tend to have low repayment capacity resulting from the smaller future expected income per capita.

- The positive relationship between *Economic dependency ratio* and households' access to microcredit (see Table 5.3) implies that households who are less economically active have a higher probability of borrowing from the microcredit programme mainly due to insufficient income for household activities such as consumption and children education.

- Households' accessibility to microcredit differs according to their education level (*Education*), as well as the physical distances (*Distance*) between their residence and RCC branches. In general, households with higher education levels and/or residing nearer to the RCC branches have better chances to access microcredit (see Table 5.3).

- The qualitative analysis of household accessibility to microcredit also shows that households may be denied access to microcredit if they have a blemished credit history (see Table 5.4). Furthermore, households' accessibility to microcredit can be potentially weakened by the institutional factors such as interest rate, documents requirement and loan processing time (see Table 5.5).

With respect to the evaluation of the impacts of microcredit on rural households, the following conclusions can be drawn:

- *Programme participation* (binary variable) has a positive impact on both welfare measures: household annual income (HAI) and annual consumption (HAC). However, such positive impacts are not statistically significant except for HAI in the standard DD estimation (see Table 5.6). Furthermore, the results of the

standard and adjusted DD approach differ slightly (see Table 5.6 and 5.7). This might imply that the observed differences between the borrowing households and non-borrowing households do not substantially influence the trend of the outcomes investigated.

- *Cumulative borrowings* (continuous variable) have a positive and significant impact on HAI and HAC respectively (see Table 5.8). The results imply that the households will benefit more as they become more involved in the microcredit programme (characterised by the growing loan size). However, the results imply that the impacts of micro loans on the welfare might not be significant in an economic sense.

- *Cumulative borrowings* also have a positive and significant impact on women empowerment demonstrated in various dimensions (see Table 5.11).

- The use of microcredit leads women to have a greater control over their own financial assets such as income and savings, resulting in economic empowerment of women. This is important since economic empowerment forms the base of women empowerment in other dimensions.

- As the loan sizes grow, women are more actively involved in making family decisions (e.g., children education, opening bank account). This result implies that women's position within the family is strengthened through the microcredit borrowing.

- Women's autonomy in making purchases (e.g., utensils, farming machinery) and women's legal and freedom awareness also increase with loan size. However, the results show that the impact of micro loans on women's freedom of mobility is dubious.

- The results imply that there is a threshold loan size beyond which microcredit can have significant effect on one or some dimensions of women empowerment.

- The results further show that some dimensions of women empowerment are significantly influenced by other variables, such as women's age (*AGE*), having male children (*MCHILD*), the number of earners in the family (*EARNER*), and residence location (*Village dummies*) (see Appendix 4). For example, *EARNER*

and *MCHILD* show a positive and significant effect on a woman's freedom of mobility and control over her own financial assets such as income and savings, respectively (see Appendix 4-2 and 4-1). The variable *Village* dummies show a significant effect on most of the empowerment models. Furthermore, women's age (*AGE*) is found to have a mixed effect on women's ability to make independent purchases (see Appendix 4-3). *AGE* has a positive and significant impact on the female ability to independently purchase livestock (*LIVSK*), farming machinery (*EQUIP*) and clothes (*CLOTH*). One possible explanation is that as a woman's age increases, she becomes more self-confident or self-dependent (Osmani, 2007), which in turn augments women's independence in making purchases. In addition, the sampled women in the research were selected from rural areas and the dominant occupation as reflected in the sample is related to agriculture such as crop farming and raising livestock (see Table 5.10). Thus it can be argued that as women's age increases, they are more likely to engage in agricultural activities, which enhances the opportunities for women to purchase production inputs (such as livestock and farming machinery) independently. However, women's ability to independently purchase jewellery (*JEWL*), utensils (*UTENS*), and furniture (*FURNT*) appears to be negatively influenced by their age according to the results. This might be because women are likely to form their own families as their age increase, and they tend to buy household items (such as kitchen utensils and furniture) with their family members rather than by themselves. To some extent, this decreases the opportunities for making independent purchases by women.

Table 6.1 Factors affecting credit accessibility, household welfare, and women empowerment

Factors	Credit accessibility	Household welfare	Women empowerment
Household characteristics			
Income	(+)	• Dependent variable in welfare models	UC
Self-employment	(+)	NI	NI
Official status	(+)	NI	NI
Assets	(-)	NI	NI
Savings	(-)	NI	NI
Shareholding	(-)	NI	NI
Attitude	(-)	NI	NI
Alternative credit	(-)	NI	NI
Household size	(-)	(0)	UC
Dependency ratio	(+)	NI	NI
Education	(+)	NI	UC
Distance	(-)	NI	NI
Age	(0)	(0)	UC
Income earners	NI	• (+) on HAI in adjusted DD analysis	• (+) in 'Mobility' models
Having male child	NI	NI	• (+) in 'Control over financial assets' models
Village dummies	NI	NI	• (+) or (-)
Programme variables			
Programme participation	NI	• (+) only on HAI in standard DD analysis	NI
Cumulative borrowings	NI	• (+) on both HAI and HAC in adjusted DD analysis	• (+) in 'Control over financial assets' models; • (+) in 'Purchase making ability' models; • (+) in 'Decision making involvement' models except for *DESHOUS* and *DESCRP*; • (+) in 'Legal/freedom awareness' models; • (+) in mobility model *CITY* but (-) in *PARNT*

Note: 1. (+), (-), and (0) represent positive, negative, and no significant impact, respectively;
2. 'NI' means that the variable is not included in the model; 'UC' means the impact of the variable on women empowerment is uncertain.

- Female and household characteristics (such as age and family size) are used as control variables in the empirical models to help isolate the pure impact of microcredit on women empowerment measured by the empowerment indicators. The results show that the impacts of these control variables on different dimensions of women empowerment are ambiguous (see Appendix 4). Previous empirical studies on the empowerment impact of microcredit focus on explaining the relationship between the microcredit variable (which is the primary variable of interest) and women empowerment indicators (e.g., mobility, independence to make purchase), but does not provide reasons why the control variables influence the empowerment indicators (see for example, Pitt et al., 2003; Zaman, 1999; Hashemi et al., 1996). Following the previous literature, this research does not attempt to explain the relationship between the control variables and empowerment indicators.

6.2 Implications of the research findings

The findings of this research have important implications for academics, rural households, RCCs, and policy makers. *For academics*, the research findings on the welfare impact of microcredit show that microcredit borrowing has a significant impact on improving households' welfare measured by income and consumption. However, since this research estimates an average percentage effect, the results indicate that such impact might not be significant economically (i.e., the impacts on the real levels of income and consumption are minimal). In addition, the results show that the main beneficiaries of China's microcredit programmes are non-poor households. Therefore, the significant impacts of microcredit on increasing household income and consumption do not necessarily mean that microcredit can reduce (material) poverty in China since the programme does not target the poor population. This, however, may be unique to the case of China because the microcredit programmes (operated by the RCCs) focus primarily on expanding credit access in rural areas and thus do not specifically target the poor. In comparison, microcredit

programmes in Bangladesh, for example, are implemented especially for poverty alleviation purposes. They have effectively targeted the poor (represented by the high participation rates of the poor) and improved the poor's living conditions, and as a result, have contributed greatly to rural poverty reduction in Bangladesh (see Khandker, 2005; Pitt and Khandker, 1998).

The results from empowerment models show that microcredit is a powerful instrument in promoting women empowerment on various aspects ranging from economic security (i.e., control of financial resources) to awareness of social/legal issues (for example, rights to protest against domestic abuse, minimum legal marriage age, etc.). This indicates that microcredit programmes such as RCC's programme can transform the participants (especially women) from a passive acceptor of credit to a responsive and dynamic agent in economic and non-economic areas of life. The research findings also reveal that microcredit can make a significant impact on women empowerment until women's cumulative borrowings reach a certain amount. Since the cumulative loan size is used as a proxy of women's involvement in the microcredit programme, the findings imply that microcredit does not necessarily empower a woman who newly joins the programme.

This research also estimates the level of empowerment for women with different cumulative loan sizes and non-borrower women as well. The results indicate that the level of a woman's empowerment is likely to rise as she becomes more involved in the programme compared to the empowerment level in the non-borrowing status. This is important because it means that microcredit programmes can further empower women who participate in them regardless of their initial levels of empowerment, which provides a way of addressing the selection bias issue in the impact assessment using cross-section data. This is comparable to Hashemi et al.'s (1996) study who include 'the length of programme membership', another measure of women's participation in microcredit programmes, to address the selection bias issue, and reveal that a woman's level of empowerment increases as she stays longer in the

programme.

The results of the credit accessibility analysis indicate that rural households (especially the poor) and women in China have limited access to institutional credit including the microcredit provided by RCCs. From the demand side, this can be largely attributed to the low or lack of credit demand by households for either agricultural production or off-farm activities, where the demand for credit is determined by a number of household-related factors (e.g., income and family size). This is comparable to Yehuala (2008) and Bokosi's (2004) findings, which indicate that household characteristics (e.g., age and educational level) play important roles in households' access to credit via their demand for credit. The results also indicate that poor households have restricted access to microcredit because they effectively ration themselves out of the credit market for reasons such as inability to provide collateral and low repayment capacity arising from their poor wealth situation (e.g., low/unstable income, little/no cash savings, etc.). This is supported by Cheng (2006) who find households who think they cannot repay micro loans, i.e., risk-rationed households, normally have very low demand for microcredit and thus tend to have poor access to microcredit. The findings of this research thus favours Evans et al.'s (1999) argument that simply expanding microcredit programmes in rural areas would not increase credit access by the rural households when the heterogeneous nature of this population leads to the differential opportunities of accessing microcredit.

The results further indicate that microcredit is not a substitute for informal credit and households are likely to borrow from informal credit when the need for credit arises. This is because when the loan size is comparable between microcredit and informal credit (both lend in small amounts), informal credit possesses some merits that microcredit lacks, such as flexible loan contracts and simple lending processes, which make informal credit more attractive to the households. This view is shared by Tsai (2004) who finds that microfinance is not a perfect substitute for informal finance in both rural China and India. Tsai (2004) argues that various forms of credit (for

example, formal, informal, and microcredit) are not functionally equivalent for potential borrowers with different preferences in terms of loan characteristics (such as, loan size, duration, interest rate, etc.) and loan conditions (such as, collateral requirement). Both institutional design and lending methodology of different forms of credit affect their relative attractiveness to potential borrowers with particular needs.

The research findings show that rural households' access to microcredit is largely restricted by their low demand for credit. Therefore, to facilitate their access to microcredit, households should be encouraged to create investment opportunities in on/off farm activities. This is considered as an efficient way of increasing households' demand for credit (see Cheng, 2006). In addition, the research findings suggest that households who are actively engaged in the microcredit programme and effectively invest the micro loans in income-generating activities can improve their livelihoods. Since the borrowers in this research are generally middle-income households with relatively stronger economic backgrounds, the findings imply that microcredit programmes may not equally benefit the poor (especially the ultra-poor) who lack income (or means of repayment) or simply borrow for consumption smoothing rather than investment purposes. This view is also embodied in earlier studies (such as Islam, 2007; Cheng, 2006; Maclsaac, 1997), which indicate that microcredit programmes are not appropriate in helping the (extremely) poor who cannot effectively use loans. Instead, these people should be provided with other forms of support before they can make use of loans, which are important in helping the poor build up capital and increase their repayment capacity. These supports include small grants, infrastructure improvement, health care, and employment and education training.

The research results show that supply-side factors such as interest rates, documentation requirements, and loan processing time can impair households' access to microcredit. Similar findings are also found in other studies (see Yehuala, 2008; Atieno, 2001; Evans et al., 1999), which reveal that households' difficulty in accessing credit is often created by lending institutions through their lending policies.

Therefore, RCCs should improve their micro lending policies (such as simplifying lending procedures) and re-design their micro loan products to allow for more flexible terms and conditions to better suit the diverse needs of the local rural households. These flexible services help make RCC's microcredit more accessible by the rural households, especially the worse-off households who are more disadvantaged in dealing with risks. The need to introduce product innovations for microcredit programmes is also highlighted by Islam (2007) who claims that these innovations (especially client-responsive loan products) are deemed to be more desirable by the poor whose living conditions are generally associated with uncertainty and vulnerability because these flexible services can help them smooth consumption and thus reduce vulnerability.

The research results show that the primary lending scheme of the RCC microcredit programme is individual lending without collateral requirement. Group lending, however, is uncommon in the RCC programme. This is in sharp contrast to the Grameen Bank (GB) programme or GB-style programmes where group lending schemes are widely adopted to overcome problems created by information asymmetry and control for default risk in the absence of collateral (see Vigenina and Kritikos, 2004; Aghion and Morduch, 2000; Morduch, 1999). Like other microcredit programmes which lend on individual basis (see for example, Vigenina and Kritikos, 2004; Morduch, 1999), the RCC programme uses alternative mechanisms to mitigate credit risks and ensure loan repayment. Specifically, the RCC programme centres on the borrower screening process and uses a credit rating scheme to select borrowers (see also Yang, 2006; Xie, Xu, Cheng, and Shen, 2005; Sun, 2003). Although this mechanism is efficient in controlling for default risks since only households with relatively strong repayment capacities and satisfactory creditworthiness are granted loans, it also effectively excludes poor households who are actually creditworthy but rated as high risk in repaying loans from accessing micro loans (as evidenced in this research, non-poor households are the primary borrowers of the RCC programme). While group-based microcredit programmes effectively target poor people, lending to

non-poor or wealthy people is common in individual-based programmes (see Vigenina and Kritikos, 2004; Morduch, 1999). Therefore, as suggested in Vigenina and Kritikos (2004), it would be good for RCC to use a combination of individual and group lending approaches in its microcredit programme where group loan contracts now can be offered to higher risk households (either poor or with blemished credit history). This mixed lending approach would help RCC expand its programme outreach especially to the poor population, and at the same time, ensure RCC's lending security.

In addition, the results indicate that the households' inadequate access to microcredit can be due to their poor knowledge of RCC's microcredit programme. Thus, to improve households' accessibility to microcredit, there is an imperative for RCC to enhance promotion of its microcredit programme among the rural households and make the households fully aware of the features of microcredit (e.g., collateral free). This can be done through village meetings (or social gatherings) and mass media such as radio and newspaper.

The strong link between repayment capacity (perceived by the households) and access to microcredit indicates that increasing households' repayment capacity helps increase their access to microcredit. Hence, it is important for RCC to combine its micro loans with other services or products that help improve the efficiency of loan use, which in turn helps build up the households' confidence in repaying loans. A useful service is to provide borrowing households with an evaluation of the profitability of the loan-supported projects. Other services may include agricultural technical extension, off-farm business introduction and training in cash flow and risk management.

For policy makers, to further expand the access to credit by rural households, legislation reforms on secured-transactions in rural financial markets should be accelerated. The reforms should highlight the legally acceptable forms of collateral. A good example is the legalisation of using the contractual rights on farmland as

collateral by farmers when applying for formal loans. This is because farmland in China is owned by collectives rather than individuals and thus farmers lack proper collateral for borrowing. Correspondingly, the reforms of the regulatory and legal system of rural land management must be promoted to increase land tenure security for farmers and formalise land transactions including transfer, rental, and leasing. This will provide lenders with formal procedures for claims against property and enforcement of financial contracts, and consequently, increase lenders' willingness to transact with rural people.

New credit policy is also required to allow the existing rural financial institutions (RFIs) to provide unsecured loans to potentially productive activities. Group lending is efficient in reducing the high overhead costs associated with small lending (see for example, Hermes, Lensink, and Mehrteab, 2005; Besley and Coate, 1995). It also promotes the building-up of good credit culture and helps achieve acceptable loan repayment performance. Therefore, group lending methods should be popularised among RFIs in their unsecured transactions to minimise the operational risks.

To ensure or increase financial services in rural areas, there is a crucial need to formulate an integrated approach to reform the Chinese rural financial system, with the aims of developing well-functioning rural financial markets and improving financial performance and efficiency of RFIs. This requires a clear demarcation of the functions between commercial and policy finance. Specifically, the policy financial business such as agricultural development lending business operated by the Agricultural Bank of China (ABC) or RCC should be transferred to the policy bank, i.e. the Agricultural Development Bank of China (ADBC), while the commercial loans operated by the ADBC should be devolved to the ABC or RCCs. The less confusion regarding their own responsibilities in rural financing, the more efficiently these RFIs can meet the financial demands of the rural people.

In addition, the reform on restructuring the RCCs into rural commercial banks with a

clear property rights system (namely, shareholding system) should be implemented with caution. This is because regional economic development in China is uneven, and hence, the demand for financial services by rural households and enterprises varies from area to area. In the economically underdeveloped areas, especially in remote and impoverished areas, farmers usually require credit in small amounts for maintaining simple production and do not have the ability to bear the risks arising from the commercialised operation of the RCCs. Therefore, farmers in these areas need credit cooperatives that offer mutual aid, rather than profit-oriented commercial banks. The development of RCCs is closely linked to the growth of the rural sector, which in turn determines China's rural economic development. Therefore, to effectively promote China's rural economy, reform of RCCs in different regions should be adapted to local economic circumstances and the actual funding requirements of farmers and rural enterprises. Moreover, the transformation of RCCs into commercial banks or the overemphasis on pursuing profit will undermine their microfinance business. Therefore, policy makers should take into account such issues when reforming RCCs.

Furthermore, reforms should be introduced to promote agricultural insurance innovations in rural areas. Agricultural insurance such as crop insurance provides farmers with a means of risk management in their production and helps them stabilise their household incomes. As a result, agricultural insurance is beneficial to farmers' access to credit: it can motivate farmers to demand more capital for expansion of production; on the other hand, it protects farmers from production losses in case of bad harvests, and thus, increases RFIs' willingness to lend to farmers.

However, it should be noted that China's agriculture is characterised by small-scale farming operations which take place in different climatic regions. Consequently, the high underwriting costs associated with small size farms makes the implementation of conventional crop insurance difficult. Alternative insurance instruments, such as index-based weather insurance (IWI) (see Skees, 2008a and b), should be introduced and popularised among Chinese farmers. A number of merits of IWI, such as simpler

information requirements and low administrative costs, make IWI superior to conventional crop insurance and appealing for policymakers in lower income countries, especially those with small farm-size (Skees, 2008a). In particular, the contracts of IWI are flexible since they can be in small or micro size and tailored to farmers' individual weather needs. This makes IWI more affordable to small (especially poor) farmers, and thus, farmers are more willing to adopt it to manage their production uncertainties (Turvey, Kong and Belltawn, 2009).

The findings of the research indicate that informal credit plays an important role in meeting the credit needs of Chinese rural households. This includes not only households who fail to obtain financial support through formal channels (such as RCC's microcredit programme), but also those who may be able to obtain formal credit but choose to borrow from informal lenders due to the potential merits of informal lenders (example, flexible lending schemes). This implies that the existence of informal finance may not simply be a result of insufficient supply of formal credit or credit rationing by formal institutions. It is likely that the different lending approaches adopted by formal and informal lenders make them cater to distinct groups of borrowers with various concerns. This is another main reason for the persistent co-existence of formal and informal finance in many developing countries including China (see, Zhang and Fang, 2005; Tsai, 2004; Floro and Ray, 1997).

Policymakers in China should re-evaluate the role of the informal financial sector in rural credit delivery and formulate new policies regarding the development of informal finance. For example, rather than trying to eliminate informal finance, it would be more appropriate to reinforce the linkages between the formal and informal financial sectors in China. Better linkages between the two sectors enable one sector to overcome its own weaknesses by drawing from the other's strengths, such as banks can make use of the outreach and local knowledge of informal lenders while informal lenders can benefit from formal lenders' strong resource mobilisation ability and wide networks across the region. Consequently, strengthening the association between the

formal and informal sectors helps expand credit delivery and improve the overall efficiency of the financial system, and hence, accelerates the development of the Chinese rural economy.

The significant impacts of microcredit on the economic and non-economic aspects of households' livelihoods found in this research demonstrate the potential influence of microcredit programmes on Chinese rural economic and social development. Therefore, policy makers should be motivated to establish supportive regulatory environments in which the microfinance sector can gain sustainable development. It would be appropriate to legally permit non-financial institutions (NFIs) including NGOs to provide some form of financial services including microcredit. This expands NFIs' ability to raise funds for their microfinance businesses from multiple sources such as the public deposits and financing support from the People's Bank of China (PBC), and therefore, helps them to achieve sustainable development. Since most of the NGO-led microfinance programmes in China have concentrated explicitly on poverty alleviation (see Du, 2005; Park et al., 2004), the sustainable development of NGOs' programmes will help expand the outreach of these programmes and thus realise nationwide poverty reduction.

Governmental interventions in setting interest rates of micro loans should be removed and different types of microfinance organisations (government agencies, NGOs and financial institutions) should be allowed to establish micro-lending rates in accordance with their own business objectives (e.g., reducing poverty or increasing credit supply) and financial performance. In short, market-determined interest rates should be favoured. It has also been documented in Fernando (2006) and Helms and Reille's (2004) studies that microfinance institutions (MFIs) (for example, GB in Bangladesh and Bank Rakyat Indonesia) that are free to set interest rates based on their own institutional factors and market characteristics are likely to realise both (financial) sustainability and high growth in programme outreach. By contrast, in countries (such as China and Vietnam) where setting of interest rates is not liberalised,

MFIs generally fail to achieve sustainable development. Furthermore, preferential tax policies (for example, reducing income tax) should be adopted to decrease the operating costs of microfinance businesses, and hence, enhance the enthusiasm of microfinance institutions for providing microfinance services.

6.3 Research limitations

There are a number of limitations in this research related to sample selection, data, and estimation techniques. These include:

- The scope of this research is restricted to one province in China. Data used in this research is collected from a small-scale household survey covering different areas within the province. Therefore, the results of this research may not be applicable to the whole country. In addition, this research focuses on the microcredit programme implemented by the RCCs only. Therefore, the results cannot represent the characteristics (such as client target) and economic/social influences of the overall Chinese microfinance sector which consists of different types of institutions with different business goals and objectives.

- Only the data and information of current microcredit borrowers are collected. There is no information and data on households who were once borrowers but dropped out during the survey time. Therefore, this research estimates the impacts of microcredit by comparing outcomes between current borrowers and those who never borrow. This may lead to an overestimate (if the dropped-out households are mainly failures) or underestimate (if the dropped-out households are mainly successes) of impact.

- This research uses the 'non-borrowers group' as the comparison group in the impact assessments and uses the outcomes (such as income and consumption) of non-borrowers to approximate the counterfactual outcomes of borrowers in the absence of programme participation. In case where the non-borrowers sample used does not provide an accurate comparison group to the borrowers group, the reliability of the impact estimation results will be reduced, especially in the

models using cross-sectional data. Unfortunately, this research does not examine the appropriateness of the use of the comparison group.

- Households' welfare (such as income and/or consumption) is likely to be affected by family shocks, such as hospitalisation and wedding. Unfortunately, information related to such shocks in both the pre- and post-programme periods is not available and is thus not included in the models. This may reduce the accuracy of impact estimations. As such, this research neglects the influence of family shocks on households' accessibility to microcredit.

- This research adopts a fixed-effects method to address selection bias in impact estimations. A limitation of using the fixed-effects method is that it only controls for fixed unobserved characteristics that affect both households' programme participation and outcomes investigated, and thus it may yield biased impact estimations if such unobserved characteristics vary over time.

- The empowerment indicators used in this research have been constructed largely on the basis of the universally accepted empowerment indicators documented in the literature while taking into account the local culture of the sampled areas. Therefore, the results of this research may not provide a complete picture of how microcredit has influenced the rural women's empowerment since some context-specific information may have been omitted.

- This research only demonstrates a significant impact of microcredit on improving participants' welfare while the poverty reduction potential of microcredit has not been investigated. Moreover, it is possible for microcredit to have impacts on other household outcomes such as access to health care services, educational attainment, and nutritional levels. However, such impacts have not been addressed in this research.

- Both the borrowing costs and repayment incentives (and thus the efficiency of loan use) are likely to vary according to the type of lending contract (individual or group loan) that households have entered into. Therefore, the impacts of microcredit may also be different between individual borrowers and group borrowers. Unfortunately, the models used in this research cannot differentiate

such impacts.

6.4 Recommendations for future research

To make the research findings more generalisable, the research scope should be enlarged to include households in other regions of the country, such as Eastern China (more economically developed) and Western China (relatively underdeveloped), and the household sample size should be increased accordingly. Furthermore, a number of variables can be added to the models to improve the performance of the models. This includes information on family shocks (see Cheng, 2006; Alexander, 2001; Zeller, 1994), health status of the household head (see Ho, 2004; Li et al., 2004; Evans et al., 1999; Zaman, 1999), financial assistance received (see Nguyen et al., 2007), village infrastructure (see Islam and Harris, 2008; Nguyen et al., 2007), and outstanding loans from other sources (see Diagne and Zeller, 2001; Garikipati, 2006).

To provide a comprehensive understanding of Chinese microcredit, a systematic evaluation of the different types of microcredit programmes implemented in China should be conducted. This may include investigations of client targeting, impacts on participants and operational performance for each type of programme. Future research should also be extended to examine the poverty reduction potential of microcredit which is the major concern of the Chinese policy makers in developing the microcredit programme. Furthermore, it would be ideal for future research to conduct exploratory analyses to identify the impacts of microcredit on other household outcomes (except income and consumption), or impacts at higher levels such as communities and regions.

For assessing the women empowerment impact of microcredit, future research should conduct ethnographic studies in the sampled areas and develop empowerment measures through extensive observation and personal interviews with women respondents and/or local programme staff. This is useful to construct context-specific

empowerment measures, and thus, enhance the validity and reliability of the impact estimation.

To improve the efficiency or accuracy of impact estimation, the following attempts should be considered:

1. Households who have dropped out from the microcredit programme should be identified and included in the sample as previous borrowers. Accordingly, empirical models should be adjusted to differentiate non-borrowers, previous borrowers and current borrowers to allow for impact comparisons between the three different groups.

2. A more accurate 'control group' that better resembles the borrowers in the absence of microcredit programmes should be established. A propensity-score (PS) matching method can be adopted to select the control group. The basic idea of the PS method is to match each programme participant with a non-participant who has nearly the same probability of participating in the programme, based on the observed characteristics (see for example, Dehejia and Wahba, 2002; Baker, 2000; Rosenbaum and Rubin, 1983). A potential problem of using this matching method arises from the estimation of the propensity score (or participation probability), which is sensitive to the specification adopted (Dehejia and Wahba, 2002). As a result, the impact estimates may be inconsistent due to different specifications used for estimating the propensity score.

3. Furthermore, where panel (or longitudinal) data is available, an instrumental variables method can be used in combination with the fixed-effects method to control for time-varying unobservable factors (see for example, Khandker, 2005). However, finding instruments that directly affect programme participation without influencing the outcomes investigated is difficult.

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APPENDICES

Appendix 1   Description of Variables Used in Welfare Impact Analyses

Variables	Type of variables	Description of variables
HAI	Continuous	Log of household annual income
HAC	Continuous	Log of household annual consumption
AGE	Continuous	Age of household head squared
SCHILD	Continuous	Number of children in school-age in the household
HHSZ	Continuous	Household size
EARNER	Continuous	Number of income earners in the household
YEAR	Dummy	Year indicator equal to '1' for 2008 and '0' otherwise
PARTN	Dummy	Programme participation indicator equal to '1' for 'yes' and '0' otherwise
CUMUL	Continuous	Total loan amount borrowed by the household

Appendix 2   Description of Variables Used in Women Empowerment Impact Analyses

Variables	Type of variables	Description of variables
LOAN	Categorical	Total loan amount borrowed by the woman, equal to '0' for no loan, '1' for 30,000 yuan or less, '2' for between 30,000 and 60,000 yuan, and '3' for more than 60,000 yuan
HAI	Continuous	Household annual income
HHOCP	Dummy	Occupation of household head equal to '1' for 'agriculture' and '0' otherwise
HHSZ	Continuous	Household size
EARNER	Continuous	Number of income earners in the household
AGE	Continuous	Age of the surveyed woman
EDU	Categorical	Educational attainment of the surveyed woman, equal to '0' for no education, '1' for secondary school or less and '2' for post-secondary
MCHILD	Dummy	Woman's owning of male children equal to '1' for 'yes' and '0' otherwise
CTRN	Dummy	Woman's contribution to family support equal to '1' for 'yes' and '0' otherwise
V1	Dummy	Village indicator taking value '1' for women from village one and '0' otherwise
V2	Dummy	Village indicator taking value '1' for women from village two and '0' otherwise
V3	Dummy	Village indicator taking value '1' for women from village three and '0' otherwise
V4	Dummy	Village indicator taking value '1' for women from village four and '0' otherwise
V5	Dummy	Village indicator taking value '1' for women from village five and '0' otherwise
V6	Dummy	Village indicator taking value '1' for women from village six and '0' otherwise
V7	Dummy	Village indicator taking value '1' for women from village seven and '0' otherwise
V8	Dummy	Village indicator taking value '1' for women from village eight and '0' otherwise

Appendix 3   Construction of the Empowerment Indicators

The twenty four empowerment indicators were developed according to the women's responses to the survey questions (see Section 5 in Appendix 5). All indicators are in binary form, with value '1' for 'empowered' and value '0' otherwise:

1. The answers to the questions to '*control over financial assets*' and '*mobility*' are in binary format (yes or no), with the 'yes' responses labelled as 'empowered'. Therefore, the empowerment indicators for these two dimensions (whether women have control over the given financial assets and whether women can travel to the given places by themselves) are developed based on the responses to the questions, with value '1' for 'yes' and '0' for 'no';

2. To examine the '*ability to make purchase independently*', women were shown with a list of items and asked to choose the items they could purchase independently. For each chosen item, the woman is classified as 'empowered' and the indicator showing whether the woman can make independent purchase for that particular item is given a value of '1'. If the given item is not chosen, the empowerment indicator then takes a value of '0'

3. The responses are transformed into binary variables where necessary. For example, for questions to '*involvement in household decision-making*', answers 'wife' and 'both (which means wife and husband)' are merged into one category of 'empowered'. Therefore the indicators (whether women are involved in the family decision making process) take a value of '1' for response either 'wife' or 'both', and a value of '0' otherwise. Similarly, for questions related to '*relative freedom from household domination*' and '*legal awareness*', responses 'disagree' and 'neutral' are combined into one category as well. Hence the indicators (whether women are aware of the freedom/legal issues) are equal to '1' for answers 'agree' (empowered) and '0' for either 'disagree' or 'neutral'.

Appendix 4 Complete coefficients estimates of empowerment models

Appendix 4-1 Control over financial assets

Logit Model 1: Control Over Own Income (CINC)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.2324	0.9845	1.2518	0.2107
LOAN2*	1.5805	0.8594	1.8391	0.0659
LOAN3**	2.2566	0.9570	2.3579	0.0184
HAI	-0.0014	0.0030	-0.4591	0.6461
HHOCP	1.0268	1.0650	0.9641	0.3350
HHSZ**	0.6864	0.3408	2.0139	0.0440
EARNER	-0.5305	0.3953	-1.3421	0.1796
AGE	0.0481	0.0486	0.9886	0.3229
EDU1	-0.6139	1.6441	-0.3734	0.7089
EDU2	0.4312	2.1214	0.2033	0.8389
MCHILD*	1.5041	0.7870	1.9113	0.0560
CTRN	1.1049	0.6869	1.6086	0.1077
V1	-0.5716	1.0854	-0.5267	0.5984
V2**	2.4341	1.1459	2.1241	0.0337
V3	0.1140	1.0542	0.1082	0.9139
V4	1.6765	1.2257	1.3678	0.1714
V5	-0.7046	1.1920	-0.5911	0.5545
V6	-0.6716	1.2401	-0.5416	0.5881
V7	0.2126	1.0689	0.1989	0.8423
Constant**	-8.2279	3.9638	-2.0758	0.0379
McFadden R-squared				0.2487
Log likelihood				-45.5294
LR statistic				30.1465
Prob. (LR stat.)				0.0499
Degree of Freedom				19
Total observations				92

Classification table			
	Dependent=0	Dependent=1	Overall
No. of correct	49	22	71
% of correct	84.5	64.7	77.2
No. of incorrect	9	12	21
% of incorrect	15.5	35.3	22.8

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 2:   Control Over Own Savings (CSAV)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.6493	1.1106	1.4851	0.1375
LOAN2**	2.1419	0.9789	2.1881	0.0287
LOAN3**	2.3637	1.0471	2.2573	0.0240
HAI*	0.0280	0.0156	1.8001	0.0718
HHOCP	0.8796	1.0507	0.8372	0.4025
HHSZ	-0.1704	0.3770	-0.4521	0.6512
EARNER**	0.9454	0.4772	1.9813	0.0476
AGE	0.0417	0.0492	0.8476	0.3967
EDU1	2.8755	1.8365	1.5657	0.1174
EDU2	3.4021	2.3117	1.4716	0.1411
MCHILD*	1.3370	0.7893	1.6939	0.0903
CTRN	0.9666	0.6894	1.4020	0.1609
V1	-0.7066	1.2760	-0.5538	0.5797
V2	1.8800	1.2505	1.5034	0.1327
V3	1.5155	1.2252	1.2369	0.2161
V4	0.3508	1.4035	0.2500	0.8026
V5	-0.9081	1.2809	-0.7090	0.4784
V6	1.6793	1.2757	1.3164	0.1880
V7	1.2257	1.1859	1.0335	0.3014
Constant***	-12.1592	4.3313	-2.8073	0.0050
McFadden R-squared				0.3294
Log likelihood				-41.5732
LR statistic				40.8482
Prob. (LR stat.)				0.0025
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	46	26	72
% of correct	83.6	70.3	78.3
No. of incorrect	9	11	20
% of incorrect	15.4	29.7	21.7

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Appendix 4-2 Mobility

Logit Model 3:　Go To City Alone (CITY)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.0814	1.0506	1.0293	0.3033
LOAN2**	1.9804	0.8771	2.2578	0.0240
LOAN3**	2.2021	0.9477	2.3236	0.0201
HAI	-0.0008	0.0034	-0.2344	0.8147
HHOCP	-1.9065	1.2264	-1.5546	0.1200
HHSZ	-0.2696	0.3301	-0.8166	0.4141
EARNER*	0.7596	0.4221	1.7995	0.0719
AGE	-0.0210	0.0441	-0.4757	0.6343
EDU1	1.0907	1.8319	0.5954	0.5516
EDU2	-0.3800	2.0693	-0.1836	0.8543
MCHILD	0.7600	0.7008	1.0845	0.2782
CTRN**	1.3357	0.6650	2.0087	0.0446
V1	-1.1443	1.2303	-0.9301	0.3523
V2	-0.7959	1.1610	-0.6855	0.4930
V3	-1.0097	1.2001	-0.8414	0.4001
V4	0.2585	1.3080	0.1977	0.8433
V5	-0.0229	1.3397	-0.0171	0.9864
V6**	-3.0026	1.2773	-2.3508	0.0187
V7	-0.9335	1.1623	-0.8032	0.4219
Constant	-0.2981	3.6701	-0.0812	0.9353
McFadden R-squared				0.2804
Log likelihood				-44.3107
LR statistic				34.5349
Prob. (LR stat.)				0.0159
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	24	50	74
% of correct	66.7	89.3	80.4
No. of incorrect	12	6	18
% of incorrect	33.3	10.7	19.6

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 4:   Visit Parent Home Without Asking For Consent (PARNT)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	-1.4315	0.9960	-1.4372	0.1506
LOAN2	-1.3556	0.8389	-1.6158	0.1061
LOAN3	-0.5854	0.9493	-0.6167	0.5374
HAI**	0.0391	0.0161	2.4270	0.0152
HHOCP	-0.4153	0.9893	-0.4198	0.6746
HHSZ*	-0.6446	0.3369	-1.9130	0.0557
EARNER***	1.2404	0.4801	2.5834	0.0098
AGE	0.0045	0.0436	0.1042	0.9170
EDU1	-0.1039	1.5562	-0.0667	0.9468
EDU2	-2.4880	2.0259	-1.2282	0.2194
MCHILD	-0.1580	0.6981	-0.2263	0.8209
CTRN	0.7402	0.6754	1.0958	0.2732
V1**	-3.2107	1.3651	-2.3520	0.0187
V2	-1.7460	1.1688	-1.4938	0.1352
V3**	-3.6966	1.5087	-2.4501	0.0143
V4	-2.1477	1.3795	-1.5569	0.1195
V5	-1.4070	1.2500	-1.1256	0.2603
V6**	-3.1314	1.2820	-2.4426	0.0146
V7	0.5475	1.3090	0.4183	0.6757
Constant	1.4721	3.4026	0.4326	0.6653
McFadden R-squared				0.2950
Log likelihood				-44.8217
LR statistic				37.5042
Prob. (LR stat.)				0.0069
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	31	39	70
% of correct	72.1	76.1	76.1
No. of incorrect	12	10	22
% of incorrect	27.9	23.9	23.9

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Appendix 4-3 Purchase making ability

Logit Model 5:   Independently Purchase Utensils (UTENS)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.6703	0.9490	0.7064	0.4800
LOAN2**	1.7748	0.7964	2.2284	0.0259
LOAN3**	2.2437	0.9143	2.4541	0.0141
HAI	0.0009	0.0021	0.4427	0.6580
HHOCP	-0.3023	0.9409	-0.3213	0.7480
HHSZ	-0.2701	0.3166	-0.8530	0.3936
EARNER	0.1320	0.3727	0.3542	0.7232
AGE	-0.0499	0.0395	-1.2641	0.2062
EDU1	1.3040	1.5264	0.8543	0.3930
EDU2	1.5279	1.9124	0.7989	0.4243
MCHILD	-0.2564	0.6553	-0.3913	0.6956
CTRN	-0.3862	0.6168	-0.6262	0.5312
V1	0.5122	1.1118	0.4607	0.6450
V2	0.4306	1.0532	0.4088	0.6827
V3	-1.7298	1.1093	-1.5593	0.1189
V4	0.0036	1.0347	0.0035	0.9972
V5	1.4999	1.1655	1.2869	0.1981
V6	-0.5197	0.9999	-0.5197	0.6032
V7	0.0413	1.0167	0.0406	0.9676
Constant	1.4617	3.0910	0.4729	0.6363
McFadden R-squared				0.2367
Log likelihood				-47.8619
LR statistic				29.6765
Prob. (LR stat.)				0.0561
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	26	45	71
% of correct	66.7	84.9	77.2
No. of incorrect	13	8	21
% of incorrect	33.3	15.1	22.8

Note: ** represents 5% significance level.

Logit Model 6: Independently Purchase Clothes (CLOTH)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.5878	0.9554	0.6153	0.5384
LOAN2	0.9813	0.8163	1.2021	0.2293
LOAN3	1.4335	0.9041	1.5855	0.1129
HAI	0.0007	0.0071	0.0969	0.9228
HHOCP	-0.9823	1.0060	-0.9764	0.3289
HHSZ	-0.5327	0.3626	-1.4693	0.1418
EARNER	0.3556	0.4101	0.8671	0.3859
AGE**	0.1070	0.0450	2.3780	0.0174
EDU1	1.5243	1.5120	1.0082	0.3134
EDU2	1.5253	1.8875	0.8081	0.4191
MCHILD**	1.4217	0.7030	2.0225	0.0431
CTRN*	1.1789	0.7034	1.6760	0.0937
V1**	-2.7964	1.3757	-2.0327	0.0421
V2	-0.7468	1.2352	-0.6046	0.5454
V3**	-3.3950	1.3885	-2.4452	0.0145
V4*	-2.3892	1.3486	-1.7716	0.0765
V5**	-2.6198	1.3095	-2.0006	0.0454
V6*	-2.1300	1.2742	-1.6717	0.0946
V7	0.7004	1.5094	0.4640	0.6427
Constant	-3.5209	3.3178	-1.0612	0.2886
McFadden R-squared				0.2535
Log likelihood				-44.8210
LR statistic				30.4482
Prob. (LR stat.)				0.0464
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	21	51	72
% of correct	63.6	86.4	78.3
No. of incorrect	12	8	20
% of incorrect	36.4	13.6	21.7

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 7:   Independently Purchase Furniture (FURNT)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.1333	0.9470	1.1968	0.2314
LOAN2***	2.2348	0.8364	2.6720	0.0075
LOAN3**	2.3760	0.9279	2.5605	0.0105
HAI	0.0012	0.0030	0.4024	0.6874
HHOCP	0.3053	0.9843	0.3102	0.7564
HHSZ	-0.2032	0.3195	-0.6360	0.5248
EARNER	-0.0725	0.3720	-0.1948	0.8455
AGE	-0.0671	0.0420	-1.5980	0.1101
EDU1	-1.1965	1.6481	-0.7260	0.4679
EDU2	-1.4465	1.9740	-0.7328	0.4637
MCHILD	0.4591	0.6703	0.6849	0.4934
CTRN	0.5503	0.6210	0.8863	0.3755
V1**	-2.3494	1.0867	-2.1620	0.0306
V2	0.9329	1.2021	0.7760	0.4377
V3*	-1.8120	1.0501	-1.7255	0.0844
V4	-0.0314	1.1006	-0.0285	0.9772
V5	-0.2558	1.1707	-0.2185	0.8270
V6	-0.5828	1.0936	-0.5329	0.5941
V7	-1.4535	1.0768	-1.3498	0.1771
Constant	3.2622	3.2147	1.0148	0.3102
McFadden R-squared				0.2493
Log likelihood				-47.7280
LR statistic				31.6916
Prob. (LR stat.)				0.0338
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	34	36	70
% of correct	79.1	73.5	76.1
No. of incorrect	9	13	22
% of incorrect	20.9	26.5	23.9

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 8:   Independently Purchase Jewellery (JEWL)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.9106	1.0827	0.8410	0.4003
LOAN2*	1.4021	0.7764	1.8058	0.0709
LOAN3	1.4016	0.8637	1.6228	0.1046
HAI	0.0013	0.0018	0.7270	0.4672
HHOCP	-0.4991	1.0516	-0.4746	0.6351
HHSZ	-0.3880	0.3341	-1.1614	0.2455
EARNER	0.2808	0.3816	0.7358	0.4618
AGE	-0.0829	0.0437	-1.8966	0.0579
EDU1	1.1095	1.5140	0.7328	0.4637
EDU2	-0.6584	1.9465	-0.3383	0.7352
MCHILD	-0.5550	0.6698	-0.8286	0.4073
CTRN	-0.2231	0.6124	-0.3644	0.7156
V1**	2.2202	1.1171	1.9876	0.0469
V2	0.1304	0.9859	0.1322	0.8948
V3	-1.6778	1.4185	-1.1828	0.2369
V4	0.0651	1.1523	0.0565	0.9550
V5**	2.5320	1.1001	2.3016	0.0214
V6*	1.8334	1.0544	1.7389	0.0821
V7**	2.0683	1.0513	1.9675	0.0491
Constant	2.4148	3.3036	0.7310	0.4648
McFadden R-squared				0.2877
Log likelihood				-45.3593
LR statistic				36.6465
Prob. (LR stat.)				0.0088
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	39	34	73
% of correct	81.3	77.3	79.4
No. of incorrect	9	10	19
% of incorrect	18.7	22.7	20.6

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 9:　Independently Purchase Livestock (LIVSK)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.2400	1.2323	1.0063	0.3143
LOAN2[*]	1.7372	0.8928	1.9457	0.0517
LOAN3[***]	2.8693	1.0350	2.7722	0.0056
HAI	0.0002	0.0025	0.0978	0.9221
HHOCP	0.5158	1.0647	0.4845	0.6281
HHSZ	0.4943	0.3591	1.3765	0.1687
EARNER	0.2726	0.4446	0.6132	0.5397
AGE[**]	0.1255	0.0526	2.3838	0.0171
EDU1	1.9238	2.1514	0.8942	0.3712
EDU2	1.6002	2.3826	0.6716	0.5018
MCHILD	0.9779	0.7783	1.2566	0.2089
CTRN	0.9963	0.6649	1.4985	0.1340
V1	-1.5182	1.2658	-1.1994	0.2304
V2	1.1601	1.1769	0.9858	0.3242
V3	-0.5687	1.2109	-0.4697	0.6386
V4[**]	3.8542	1.6563	2.3270	0.0200
V5	0.5600	1.3626	0.4110	0.6811
V6	1.8444	1.3005	1.4182	0.1561
V7	-1.5730	1.1923	-1.3193	0.1871
Constant[***]	-12.2480	4.5712	-2.6794	0.0074
McFadden R-squared				0.3232
Log likelihood				-39.7890
LR statistic				37.9973
Prob. (LR stat.)				0.0059
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	18	51	69
% of correct	58.1	83.6	75.0
No. of incorrect	13	10	23
% of incorrect	41.9	16.4	25.0

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Logit Model 10: Independently Purchase Farming Machinery (EQUIP)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.4370	1.0826	1.3273	0.1844
LOAN2	1.4594	0.9726	1.5005	0.1335
LOAN3*	1.8922	1.0637	1.7789	0.0753
HAI	-0.0051	0.0154	-0.3327	0.7394
HHOCP*	2.7427	1.4723	1.8629	0.0625
HHSZ**	0.6996	0.3534	1.9799	0.0477
EARNER**	-1.4540	0.5645	-2.5756	0.0100
AGE*	0.0977	0.0542	1.8033	0.0713
EDU1	-1.1689	1.7596	-0.6643	0.5065
EDU2	1.1847	2.2322	0.5308	0.5956
MCHILD**	1.9873	0.9056	2.1944	0.0282
CTRN	0.9355	0.7508	1.2459	0.2128
V1**	-3.1940	1.4726	-2.1690	0.0301
V2	1.6504	1.1743	1.4054	0.1599
V3	-0.9931	1.1363	-0.8739	0.3822
V4	1.5262	1.3376	1.1410	0.2539
V5	-1.2984	1.2286	-1.0568	0.2906
V6	-1.7657	1.3399	-1.3177	0.1876
V7	-0.6524	1.1956	-0.5456	0.5853
Constant*	-8.8291	4.5061	-1.9594	0.0501
McFadden R-squared				0.3315
Log likelihood				-39.2984
LR statistic				38.9784
Prob. (LR stat.)				0.0044
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	53	21	74
% of correct	86.9	67.7	80.4
No. of incorrect	8	10	18
% of incorrect	13.1	32.3	19.6

Note: *, ** represent 10% and 5% significance level, respectively.

Appendix 4-4 Involvement in family decision making

Logit Model 11:   Involvement In Making Family Decision On House Repair/Construction (DESHOUS)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	-1.4061	0.9739	-1.4438	0.1488
LOAN2	-1.2159	0.8545	-1.4230	0.1547
LOAN3	-0.1441	0.9226	-0.1562	0.8759
HAI	0.0103	0.0141	0.7312	0.4647
HHOCP	0.0017	0.9191	0.0018	0.9985
HHSZ*	0.6001	0.3501	1.7138	0.0866
EARNER	0.0096	0.4111	0.0233	0.9814
AGE***	-0.1383	0.0478	-2.8910	0.0038
EDU1	-0.4962	1.8048	-0.2749	0.7834
EDU2	0.2832	2.2085	0.1282	0.8980
MCHILD	-0.5299	0.7578	-0.6992	0.4844
CTRN**	1.6159	0.6611	2.4442	0.0145
V1*	1.9782	1.2016	1.6463	0.0997
V2	-0.6088	0.9932	-0.6130	0.5399
V3	-0.3408	1.0664	-0.3195	0.7493
V4	0.7423	1.1781	0.6301	0.5286
V5	-1.0554	1.1664	-0.9048	0.3656
V6	-1.0992	1.1359	-0.9677	0.3332
V7	-0.7302	1.1635	-0.6276	0.5303
Constant	3.2292	3.3932	0.9517	0.3413
McFadden R-squared				0.2878
Log likelihood				-45.2762
LR statistic				36.5951
Prob. (LR stat.)				0.0089
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	30	39	69
% of correct	69.8	79.6	75.0
No. of incorrect	13	10	23
% of incorrect	30.2	20.4	25.0

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Logit Model 12: Involvement In Making Family Decision On Children Education (DESEDU)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.9930	0.9783	1.0151	0.3101
LOAN2**	1.8151	0.8954	2.0271	0.0427
LOAN3**	2.2829	0.9928	2.2995	0.0215
HAI	0.0013	0.0042	0.3080	0.7581
HHOCP	-0.7474	1.0161	-0.7355	0.4620
HHSZ	0.2582	0.3789	0.6814	0.4956
EARNER	-0.1850	0.4492	-0.4118	0.6805
AGE**	-0.1090	0.0485	-2.2489	0.0245
EDU1	0.2198	1.6955	0.1296	0.8969
EDU2	0.4037	2.1140	0.1910	0.8485
MCHILD	0.2415	0.7462	0.3236	0.7462
CTRN	-0.3318	0.7275	-0.4562	0.6483
V1	1.7777	1.3617	1.3055	0.1917
V2*	-4.1050	1.4458	-2.8392	0.0045
V3	0.4109	1.0939	0.3756	0.7072
V4	0.2919	1.1213	0.2603	0.7946
V5	-0.0134	1.1548	-0.0116	0.9908
V6	-0.5243	1.0632	-0.4931	0.6219
V7	0.9713	1.2594	0.7712	0.4406
Constant	3.3349	3.6812	0.9059	0.3650
McFadden R-squared				0.3489
Log likelihood				-41.0109
LR statistic				43.9475
Prob. (LR stat.)				0.0010
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	29	43	72
% of correct	72.5	82.7	78.3
No. of incorrect	11	9	20
% of incorrect	27.5	17.3	21.7

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 13: Involvement In Making Family Decision On Farmland Lease (DESLAND)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.0404	1.1543	0.9013	0.3674
LOAN2*	1.3892	0.7980	1.7409	0.0817
LOAN3	1.1009	0.8784	1.2534	0.2101
HAI	0.0020	0.0019	1.0712	0.2841
HHOCP	0.5703	1.0046	0.5677	0.5702
HHSZ**	-0.7479	0.3543	-2.1111	0.0348
EARNER	0.4307	0.3864	1.1146	0.2650
AGE	-0.0293	0.0448	-0.6529	0.5138
EDU1	0.1012	1.5389	0.0658	0.9476
EDU2	-1.6278	1.9423	-0.8380	0.4020
MCHILD**	-1.6934	0.7531	-2.2485	0.0245
CTRN	-0.1674	0.6299	-0.2658	0.7904
V1	1.6913	1.1365	1.4881	0.1367
V2	0.8082	1.0491	0.7704	0.4410
V3	-1.9140	1.4494	-1.3205	0.1867
V4	1.4731	1.1887	1.2393	0.2152
V5*	2.0053	1.1048	1.8151	0.0695
V6	0.4003	1.0782	0.3713	0.7104
V7***	3.3987	1.2126	2.8028	0.0051
Constant	2.5462	3.3785	0.7536	0.4511
McFadden R-squared				0.3153
Log likelihood				-43.5309
LR statistic				40.0856
Prob. (LR stat.)				0.0032
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	33	43	76
% of correct	76.7	87.7	82.6
No. of incorrect	10	6	16
% of incorrect	23.3	12.3	17.4

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Logit Model 14:   Involvement In Making Family Decision On What Crops To Grow (DESCRP)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.9888	0.9225	1.0718	0.2838
LOAN2	0.7583	0.7812	0.9708	0.3317
LOAN3	1.4735	0.9053	1.6276	0.1036
HAI	0.0040	0.0132	0.3071	0.7588
HHOCP	-0.8107	0.8924	-0.9084	0.3636
HHSZ	-0.0049	0.2961	-0.0164	0.9869
EARNER	-0.4957	0.3883	-1.2765	0.2018
AGE	-0.0231	0.0391	-0.5916	0.5541
EDU1	-0.8635	1.3971	-0.6181	0.5365
EDU2	-0.0447	1.7909	-0.0250	0.9801
MCHILD	-0.3488	0.6768	-0.5153	0.6063
CTRN	-0.4109	0.6351	-0.6469	0.5177
V1	1.2043	1.4246	0.8454	0.3979
V2**	-2.1612	1.0340	-2.0902	0.0366
V3	-0.5891	1.0275	-0.5734	0.5664
V4	-0.7447	1.0887	-0.6841	0.4939
V5	-0.4333	1.0601	-0.4087	0.6827
V6**	-2.1944	1.0712	-2.0486	0.0405
V7	0.3566	1.1671	0.3055	0.7600
Constant	4.3949	3.1573	1.3920	0.1639
McFadden R-squared				0.2252
Log likelihood				-48.0371
LR statistic				27.9202
Prob. (LR stat.)				0.0850
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	24	45	69
% of correct	64.9	81.8	75.0
No. of incorrect	13	10	23
% of incorrect	35.1	18.2	25.0

Note: ** represents 5% significance level.

Logit Model 15:   Involvement In Making Family Decision On What Livestock To Buy (DESLVSK)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.0703	1.1684	0.9161	0.3596
LOAN2**	2.6373	1.0428	2.5289	0.0114
LOAN3**	3.1218	1.2290	2.5401	0.0111
HAI	0.0007	0.0030	0.2485	0.8037
HHOCP	0.3792	1.0554	0.3593	0.7194
HHSZ	-0.2727	0.4354	-0.6262	0.5312
EARNER	-0.2898	0.5245	-0.5526	0.5805
AGE	-0.0041	0.0498	-0.0819	0.9347
EDU1*	3.0054	1.7291	1.7381	0.0822
EDU2	1.7219	2.2764	0.7564	0.4494
MCHILD	0.4953	0.9134	0.5423	0.5876
CTRN	0.4707	0.7886	0.5968	0.5506
V1	-0.9564	1.6515	-0.5791	0.5625
V2**	-3.3269	1.3466	-2.4706	0.0135
V3	-1.3041	1.2597	-1.0352	0.3006
V4	2.5307	1.7251	1.4670	0.1424
V5	2.1661	1.8064	1.1991	0.2305
V6	-1.2159	1.3472	-0.9026	0.3667
V7	-0.1471	1.5449	-0.0952	0.9241
Constant	-1.6846	3.6897	-0.4566	0.6480
McFadden R-squared				0.3694
Log likelihood				-33.2975
LR statistic				39.0144
Prob. (LR stat.)				0.0044
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	16	64	80
% of correct	66.7	94.1	87.0
No. of incorrect	8	4	12
% of incorrect	33.3	5.9	13.0

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 16: Involvement In Making Family Decision On What Farming Machinery To Buy (DESEQP)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.3151	1.0511	1.2511	0.2109
LOAN2**	1.9759	0.8778	2.2508	0.0244
LOAN3**	2.1002	0.9822	2.1383	0.0325
HAI	0.0018	0.0036	0.4984	0.6182
HHOCP	-0.2867	1.0572	-0.2712	0.7862
HHSZ	0.0272	0.3163	0.0861	0.9314
EARNER	0.4101	0.4484	0.9147	0.3603
AGE	-0.0571	0.0416	-1.3744	0.1693
EDU1	2.6831	1.8286	1.4674	0.1423
EDU2	0.2410	2.1232	0.1135	0.9096
MCHILD	-0.4877	0.7338	-0.6647	0.5063
CTRN**	-1.6054	0.7320	-2.1932	0.0283
V1**	3.4581	1.4469	2.3901	0.0168
V2	-1.0199	1.0869	-0.9384	0.3481
V3	1.4916	1.1246	1.3263	0.1847
V4	-1.0018	1.4399	-0.6958	0.4866
V5**	2.4789	1.1750	2.1097	0.0349
V6	0.6533	1.0356	0.6308	0.5282
V7	1.4913	1.0511	1.4188	0.1560
Constant	-1.7833	3.6709	-0.4858	0.6271
McFadden R-squared				0.3208
Log likelihood				-43.3002
LR statistic				40.8952
Prob. (LR stat.)				0.0025
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	37	35	72
% of correct	78.7	77.8	78.3
No. of incorrect	10	10	20
% of incorrect	21.3	22.2	21.7

Note: ** represents 5% significance level.

Logit Model 17:   Involvement In Making Family Decision On What Consumer Durables To Buy (DESCSM)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.0632	0.9962	1.0673	0.2858
LOAN2*	1.5660	0.8270	1.8935	0.0583
LOAN3*	1.7985	0.9387	1.9159	0.0554
HAI	-0.0004	0.0029	-0.1390	0.8895
HHOCP	-2.0644	1.3138	-1.5714	0.1161
HHSZ	-0.4565	0.3648	-1.2516	0.2107
EARNER	0.0458	0.4273	0.1072	0.9147
AGE	0.0429	0.0428	1.0007	0.3170
EDU1*	2.9428	1.7484	1.6832	0.0923
EDU2*	3.6120	2.1445	1.6843	0.0921
MCHILD	0.4677	0.7265	0.6438	0.5197
CTRN	-0.5732	0.7020	-0.8165	0.4142
V1	-0.9637	1.6317	-0.5906	0.5548
V2*	-2.4668	1.3416	-1.8387	0.0660
V3	-2.2278	1.3805	-1.6137	0.1066
V4	-1.8727	1.4278	-1.3116	0.1897
V5	-0.5629	1.4849	-0.3791	0.7046
V6*	-2.3931	1.3654	-1.7527	0.0797
V7	-0.8336	1.4527	-0.5738	0.5661
Constant	0.6406	3.6178	0.1771	0.8595
McFadden R-squared				0.2465
Log likelihood				-42.5975
LR statistic				27.8736
Prob. (LR stat.)				0.0859
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	14	57	71
% of correct	50.0	89.1	77.2
No. of incorrect	14	7	21
% of incorrect	50.0	10.9	22.8

Note: * represents 10% significance level.

Logit Model 18: Involvement In Making Family Decision On Opening Bank Account (DESACCT)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	2.2612	1.4550	1.5541	0.1202
LOAN2[**]	2.2729	0.9630	2.3601	0.0183
LOAN3[**]	2.4428	1.0529	2.3201	0.0203
HAI	0.0015	0.0108	0.1394	0.8891
HHOCP	-2.0419	1.5092	-1.3530	0.1761
HHSZ	0.2275	0.4353	0.5227	0.6012
EARNER	-0.2057	0.5294	-0.3886	0.6976
AGE	-0.0882	0.0587	-1.5021	0.1331
EDU1	0.9288	1.7829	0.5210	0.6024
EDU2	0.1953	2.3480	0.0832	0.9337
MCHILD[*]	1.4258	0.8125	1.7549	0.0793
CTRN	0.8639	0.7659	1.1279	0.2593
V1	1.6564	1.4309	1.1575	0.2471
V2	-0.6170	1.0799	-0.5713	0.5678
V3	2.1557	1.5885	1.3571	0.1748
V4[**]	3.7598	1.5928	2.3605	0.0182
V5	1.3698	1.4988	0.9139	0.3608
V6	0.1681	1.1703	0.1436	0.8858
V7	1.6227	1.4511	1.1183	0.2635
Constant	1.1089	4.2879	0.2586	0.7959
McFadden R-squared				0.3692
Log likelihood				-33.3116
LR statistic				38.9862
Prob. (LR stat.)				0.0044
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	15	63	78
% of correct	62.5	92.7	84.8
No. of incorrect	9	5	14
% of incorrect	37.5	7.3	15.2

Note: *, ** represent 10% and 5% significance level, respectively.

Logit Model 19: Involvement In Making Family Decision On When To Have A Child (DESBIR)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1[**]	-2.7408	1.0654	-2.5727	0.0101
LOAN2	-1.0625	0.8147	-1.3042	0.1922
LOAN3	0.8045	0.9474	0.8492	0.3958
HAI[*]	0.0231	0.0138	1.6766	0.0936
HHOCP	0.3070	1.0255	0.2994	0.7647
HHSZ	-0.0193	0.3092	-0.0624	0.9503
EARNER	0.0632	0.3865	0.1636	0.8701
AGE[*]	0.0727	0.0440	1.6507	0.0988
EDU1	2.3192	1.5690	1.4781	0.1394
EDU2	1.7466	1.8738	0.9321	0.3513
MCHILD	-0.8802	0.7325	-1.2016	0.2295
CTRN	0.1371	0.6680	0.2052	0.8374
V1	-2.1255	1.3311	-1.5968	0.1103
V2[**]	-2.3827	1.1580	-2.0577	0.0396
V3[*]	-2.1533	1.2197	-1.7654	0.0775
V4	-0.1628	1.2867	-0.1266	0.8993
V5[*]	-2.1892	1.2382	-1.7681	0.0770
V6[*]	-1.9932	1.1808	-1.6880	0.0914
V7	-0.3234	1.2807	-0.2526	0.8006
Constant	-3.1914	3.2539	-0.9808	0.3267
McFadden R-squared				0.2652
Log likelihood				-45.8324
LR statistic				33.0775
Prob. (LR stat.)				0.0236
Degree of Freedom				19
Total observations				92

Classification table			
	Dependent=0	Dependent=1	Overall
No. of correct	28	48	76
% of correct	73.7	88.9	82.6
No. of incorrect	10	6	16
% of incorrect	26.3	11.1	17.4

Note: *, ** represent 10% and 5% significance level, respectively.

Appendix 4-5 Freedom/legal awareness

Logit Model 20: Awareness of Women's Rights to Protest Against Domestic Abuse (FABUSE)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.1844	0.9660	0.1909	0.8486
LOAN2	0.2409	0.8273	0.2912	0.7709
LOAN3[*]	1.8578	0.9911	1.8744	0.0609
HAI	-0.0050	0.0135	-0.3699	0.7114
HHOCP[**]	3.1450	1.2917	2.4347	0.0149
HHSZ[**]	0.9267	0.3655	2.5354	0.0112
EARNER[**]	-0.9507	0.4155	-2.2883	0.0221
AGE[**]	0.1007	0.0460	2.1864	0.0288
EDU1	0.2742	1.5246	0.1799	0.8573
EDU2	0.8233	1.9234	0.4280	0.6686
MCHILD	0.8072	0.7429	1.0866	0.2772
CTRN	0.5162	0.6357	0.8121	0.4167
V1[*]	-2.0046	1.2021	-1.6676	0.0954
V2	1.5795	1.1412	1.3841	0.1663
V3	0.2302	1.0778	0.2136	0.8308
V4[*]	2.0544	1.2008	1.7109	0.0871
V5	0.1534	1.1483	0.1336	0.8937
V6	-0.9001	1.1575	-0.7776	0.4368
V7	-0.7276	1.1408	-0.6378	0.5236
Constant[***]	-10.5927	3.962866	-2.673	0.0075
McFadden R-squared				0.2804
Log likelihood				-45.6404
LR statistic				35.56176
Prob. (LR stat.)				0.0119
Degree of Freedom				19
Total observations				92

Classification table			
	Dependent=0	Dependent=1	Overall
No. of correct	40	29	69
% of correct	80.0	69.1	75.0
No. of incorrect	10	13	23
% of incorrect	20.0	30.9	25.0

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Logit Model 21:   Awareness of The Use of Contraception (FCTCEP)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.7809	0.9975	0.7828	0.4337
LOAN2	0.9909	0.7754	1.2779	0.2013
LOAN3[*]	1.5486	0.8531	1.8153	0.0695
HAI	0.0023	0.0050	0.4584	0.6466
HHOCP	-1.1174	1.0161	-1.0997	0.2714
HHSZ	0.1378	0.3307	0.4167	0.6769
EARNER	0.1754	0.3773	0.4647	0.6421
AGE	-0.0671	0.0430	-1.5596	0.1188
EDU1	2.4757	1.6060	1.5416	0.1232
EDU2	1.2881	1.8897	0.6816	0.4955
MCHILD[*]	-1.2109	0.6858	-1.7656	0.0775
CTRN	-0.4878	0.5882	-0.8293	0.4069
V1[*]	1.8065	1.0411	1.7352	0.0827
V2	1.2775	1.0020	1.2750	0.2023
V3	-0.2829	1.1792	-0.2399	0.8104
V4	1.7219	1.1018	1.5628	0.1181
V5[**]	2.6773	1.1204	2.3897	0.0169
V6[***]	3.1206	1.1866	2.6300	0.0085
V7[**]	2.2973	1.0400	2.2088	0.0272
Constant	-0.4991	3.282213	-0.15205	0.8791
McFadden R-squared				0.2459
Log likelihood				-47.8291
LR statistic				31.18438
Prob. (LR stat.)				0.0385
Degree of Freedom				19
Total observations				92

Classification table				
	Dependent=0	Dependent=1	Overall	
No. of correct	28	41	69	
% of correct	66.7	82.0	75.0	
No. of incorrect	14	9	23	
% of incorrect	33.3	18.0	25.0	

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Logit Model 22:   Awareness of The Incorrectness of Arranged Marriage (FARMAG)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.6593	0.9771	0.6748	0.4998
LOAN2	1.1633	0.7412	1.5693	0.1166
LOAN3**	1.8008	0.8764	2.0549	0.0399
HAI	0.0007	0.0017	0.4284	0.6684
HHOCP	-0.0317	0.9653	-0.0329	0.9738
HHSZ	-0.2341	0.3181	-0.7359	0.4618
EARNER	0.3114	0.3969	0.7846	0.4327
AGE	-0.0439	0.0412	-1.0665	0.2862
EDU1	1.9789	1.5330	1.2909	0.1967
EDU2	1.2219	1.8693	0.6537	0.5133
MCHILD	-0.6969	0.6869	-1.0145	0.3103
CTRN	-0.3396	0.6031	-0.5632	0.5733
V1	1.5723	1.3092	1.2009	0.2298
V2	-0.5809	0.9726	-0.5973	0.5503
V3**	-2.6078	1.3052	-1.9981	0.0457
V4	-0.6751	1.0479	-0.6443	0.5194
V5	0.9318	1.0595	0.8794	0.3792
V6	0.5862	1.0390	0.5642	0.5726
V7	0.3065	0.9982	0.3071	0.7588
Constant	0.4112	3.1974	0.1286	0.8977
McFadden R-squared				0.2622
Log likelihood				-46.6464
LR statistic				33.1572
Prob. (LR stat.)				0.0231
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	27	42	69
% of correct	65.9	82.4	75.0
No. of incorrect	14	9	23
% of incorrect	34.1	17.6	25.0

Note: ** represents 5% significance level.

Logit Model 23:   Awareness of The Minimum Legal Marriage Age (LMAGE)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	0.2977	0.9508	0.3131	0.7542
LOAN2	0.7580	0.8266	0.9169	0.3592
LOAN3**	1.9072	0.9689	1.9683	0.0490
HAI	-0.0013	0.0030	-0.4419	0.6586
HHOCP*	1.9228	1.1081	1.7353	0.0827
HHSZ	0.4383	0.3251	1.3484	0.1775
EARNER**	-0.9069	0.4359	-2.0808	0.0375
AGE*	0.1005	0.0517	1.9440	0.0519
EDU1	-0.9660	1.6265	-0.5939	0.5526
EDU2	0.4514	2.0770	0.2173	0.8279
MCHILD***	2.4102	0.8571	2.8119	0.0049
CTRN**	1.5634	0.7219	2.1658	0.0303
V1***	-3.3661	1.2825	-2.6246	0.0087
V2	0.9430	1.1511	0.8193	0.4126
V3	-1.7246	1.1291	-1.5274	0.1267
V4	1.0586	1.1714	0.9037	0.3661
V5*	-2.4175	1.2663	-1.9092	0.0562
V6**	-2.9707	1.3761	-2.1589	0.0309
V7	-1.3689	1.1655	-1.1745	0.2402
Constant*	-7.6881	3.972326	-1.93542	0.0529
McFadden R-squared				0.3108
Log likelihood				-42.9862
LR statistic				38.76988
Prob. (LR stat.)				0.0047
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	46	27	73
% of correct	85.2	71.1	79.4
No. of incorrect	8	11	19
% of incorrect	14.8	28.9	20.6

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Logit Model 24:   Awareness of The Legal Means Of Divorce (LDIVC)

Independent Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOAN1	1.3256	0.9461	1.4011	0.1612
LOAN2	0.9950	0.8401	1.1843	0.2363
LOAN3	0.8506	0.9626	0.8837	0.3769
HAI***	0.0647	0.0232	2.7878	0.0053
HHOCP	0.2062	1.0241	0.2013	0.8405
HHSZ	-0.0170	0.3610	-0.0470	0.9625
EARNER	0.1038	0.4087	0.2541	0.7994
AGE	-0.0239	0.0469	-0.5103	0.6098
EDU1	3.2056	1.9514	1.6427	0.1004
EDU2	3.3484	2.3340	1.4346	0.1514
MCHILD	-0.8239	0.7724	-1.0668	0.2861
CTRN**	-1.9700	0.7852	-2.5089	0.0121
V1*	2.6627	1.4966	1.7792	0.0752
V2	1.6082	1.1771	1.3662	0.1719
V3	1.2311	1.1907	1.0339	0.3012
V4	1.2161	1.1407	1.0661	0.2864
V5	1.0337	1.2127	0.8524	0.3940
V6**	3.4310	1.4168	2.4216	0.0155
V7	1.6689	1.1332	1.4727	0.1408
Constant	-3.7531	3.7630	-0.9974	0.3186
McFadden R-squared				0.2679
Log likelihood				-41.3890
LR statistic				30.2906
Prob. (LR stat.)				0.0482
Degree of Freedom				19
Total observations				92

Classification table

	Dependent=0	Dependent=1	Overall
No. of correct	15	61	76
% of correct	53.6	95.3	82.6
No. of incorrect	13	3	16
% of incorrect	46.4	4.7	17.4

Note: *, **, *** represent 10%, 5% and 1% significance level, respectively.

Appendix 5 Survey Questionnaire

Rural Credit Cooperative Microcredit Programme Survey

Instructions: For each question with brackets provided, please tick your answer(s); otherwise, please follow the instructions given to answer the questions.

Note: Make sure that the respondent is the head of a household living in the rural areas of Hubei Province before proceeding with the survey.

Section 1 Accessibility of Microcredit by Rural Credit Cooperative

1. Do you know about the microcredit programme operated by Rural Credit Cooperative (RCC)?

    a. YES   [   ]   b. NO   [   ]

    (If yes please go to Q3; if no, please go to Q2)

2. What are the reasons you do not know about RCC microcredit programme? (You can tick more than one)

    a. RCC bank in my township does not promote microcredit programme [   ]
    b. I don't know if any RCC bank exists in my township   [   ]
    c. I am not aware of microcredit programme   [   ]
    d. Other(s) please specify _____

3. What is the distance of the nearest RCC bank in your area?

    a. 1-5 kilometres   [   ]
    b. 6-10 kilometres   [   ]
    c. 11-15 kilometres   [   ]
    d. 16-20 kilometres   [   ]
    e. More than 20 kilometres   [   ]

4. Did you need to borrow money at any time in the last 2 years?

    a. YES   [   ]   b. NO [   ]

    (If yes, please go to Q5; if no, please skip to Q7).

5. If YES in Q4, were you able to borrow money?

    a. YES   [   ]   b. NO [   ]

    (If yes, go to Q6; If no, please proceed to Section 3).

6. What was your main source of credit?

    a. Formal lender   [   ]   b. Informal Lender [   ]

7. If NO in Q4, why not? (You can tick more than one)
   a. Had enough savings/earnings from other sources [   ]
   b. Received financial assistance from the government [   ]
   c. Afraid to borrow [   ]
   d. Didn't like to incur a debt [   ]
   e. Interest rates were not affordable [   ]
   f. Too many required documents to submit [   ]
   g. Uncertainty in paying the loan [   ]
   h. Other(s) please specify _____

Section 2 Borrowing Behaviour of Rural Households

1. Have you ever borrowed from RCC microcredit programme over the last 2 years?
   a. YES   [   ]   b. NO   [   ]
   (If yes, finish all the questions in this section; if no, please proceed to Section 3).

2. If YES in Q1, how many times did you borrow money from RCC microcredit programme in the last 2 years?
   a. Once [   ]
   b. Twice [   ]
   c. 3 times [   ]
   d. More than 3 times [   ]

3. What is the maximum single amount you can borrow from RCC microcredit programme?
   a. Less than 2,000 yuan [   ]
   b. Between 2,001 and 10,000 yuan [   ]
   c. Between 10,001 and 20,000 yuan [   ]
   d. Between 20,001and 30,000 yuan [   ]
   e. Between 30,001 and 50,000 yuan [   ]
   f. More than 50,000 yuan [   ]

4. Was the loan amount received adequate?
   a. YES   [   ]   b. NO [   ]

5. If inadequate, did you borrow from other credit sources?
   a. YES   [   ]   b. NO [   ]

6. If YES in Q6, where did you source your additional credit?

   Formal Sources
   a. Rural commercial Banks (e.g. Agricultural Bank of China) [   ]
   b. Government banks (e.g. Agricultural Development Bank of China) [   ]
   c. People's Org/NGOs/Coop [   ]
   d. Pawnshops [   ]
   e. Other lending institutions [   ]

f.   Other(s) please specify _____

Informal Sources

a.   Private Moneylenders (e.g. usurers)   [   ]

b.   Traders/Wholesalers or Retailers   [   ]

c.   Input suppliers/dealers   [   ]

d.   Friends/Relatives   [   ]

e.   Rural aid societies   [   ]

f.   Other(s) please specify _____

7.   What is the purpose of your micro loan?

Agricultural activities

a.   Farm cropping   [   ]

b.   Livestock raising   [   ]

c.   Produce processing   [   ]

d.   Purchase of farming machinery   [   ]

e.   Other(s) please specify _____

Non-agricultural activities

a.   To start self-run enterprise   [   ]

b.   To finance existing enterprise   [   ]

c.   To finance small-scale project   [   ]

d.   Basic household needs   [   ]

e.   To pay for children education   [   ]

f.   Emergencies (e.g. hospitalisation)   [   ]

g.   Housing (e.g. repair, construction)   [   ]

h.   Payment for other debts   [   ]

i.   Other(s) please specify_____

8.   What is the duration of your micro loan?

a.   3 to 6 months   [   ]

b.   7 to 12 months   [   ]

c.   1 to 2 years   [   ]

d.   2 to 3 years   [   ]

e.   More than 3 years   [   ]

9.   What is your mode of payment?

a.   Weekly   [   ]

b.   Monthly   [   ]

c.   Semi-annually   [   ]

d.   Annually   [   ]

e.   Other(s) please specify _____

10. Did your micro loan require collateral or security?
   a.   YES   [   ]   b. NO   [   ]

11. If YES in Q10, what kind of collateral or security is/are required?
   a.   Mortgage Property   [   ]
   b.   Chattel Mortgage (i.e. vehicles, farm equipment)   [   ]
   c.   Promissory Notes   [   ]
   d.   Co-signor/co-guarantor   [   ]
   e.   Deposits   [   ]
   f.   Other(s) please specify _____

12. What is the status of your existing loan?
   a.   Fully paid   [   ]
   b.   Current   [   ]
   c.   Past due   [   ]
   d.   Restructured   [   ]

13. How long did RCC bank take to process your loan application?
   a.   Less than a week   [   ]
   b.   1 week   [   ]
   c.   2 weeks   [   ]
   d.   3 weeks   [   ]
   e.   1 month   [   ]
   f.   More than a month   [   ]

14. Did any village committee member refer you to RCC bank?
   a.   YES   [   ]   b. NO [   ]

15. How long have you been a microcredit borrower of RCC bank?
   a. Less than 1 year   [   ]
   b. 1 to 2 years   [   ]
   c. 2 to 3 years   [   ]
   d. 3 to 4 years   [   ]

Section 3 Non-borrowers of RCC's Microcredit
1. Do you have intentions to borrow in the future?
   a.   YES   [   ]   b. NO   [   ]

2. If YES in Q1, what is the maximum amount you need to borrow?
   a.   Less than 2,000 yuan   [   ]
   b.   Between 2,001 and 10,000 yuan   [   ]
   c.   Between 10,001 and 30,000 yuan   [   ]
   d.   Between 30,001 and 50,000 yuan   [   ]

e.   More than 50,000 yuan   [   ]

3. Would you borrow from RCC microcredit programme?
    a. YES [   ]   b. NO [   ]

4. If NO in Q3, what are your reasons for not borrowing from RCC? (you can tick more than one)
    a.   Insufficient income/asset   [   ]
    b.   Incurred previous loan(s) (bad credit record)   [   ]
    c.   Had no collateral   [   ]
    d.   Had difficulty in meeting required documents   [   ]
    e.   The loan application process takes too much time   [   ]
    f.   I could access informal lenders much easier   [   ]
    g.   Other(s) please specify _____

Section 4 Welfare Impact of RCC's Microcredit — for All Respondents
1. What kind of production assets do you have?
    a.   Farm land   [   ]
    b.   Cow/buffalo   [   ]
    c.   Agricultural tool (reaping hook, plough, sprayer, etc)   [   ]
    d.   Tractor, machinery   [   ]
    e.   Fishing net, boat for fishing   [   ]
    f.   Other(s) please specify _____

2. Do you own a house?
    a.   YES   [   ]   b.   No, I rent it   [   ]

3. If YES in Q2, what kind of house do you have?
    a.   Brick house   [   ]
    b.   Wooden house   [   ]
    c.   Makeshift house   [   ]
    d.   Other(s) please specify _____

4. What kind of household assets do you have?
    a.   Savings   [   ]
    b.   Motorcycle   [   ]
    c.   Bicycle   [   ]
    d.   Telephone   [   ]
    e.   Household appliances (TV, radio, etc)   [   ]
    f.   Furniture   [   ]
    g.   Other(s) please specify _____

5. Did you receive any assistance from the government, NGOs, or aid agencies such as the United Nations in the last 2 years?

    a.   YES   [   ]   b.   NO [   ]

6. What kind of assistance did you receive?

    a.   Cash subsidies   [   ]

    b.   Inputs of agricultural production (e.g., fertiliser, pesticide, seeds) [   ]

    c.   Subsistence support (e.g., grain, vegetables, chicken, goat) [   ]

    d   Interest-subsidised loans for poverty alleviation (not micro loans) [   ]

    e.   Housing   [   ]

    f.   Other(s) please specify _____

7. What is/are your primary household incomes? (You can tick more than one)

    a.   Crop farming   [   ]

    b.   Livestock raising   [   ]

    c.   Processing produce (poultry, fish, rice, corn, etc) [   ]

    d.   Fishing   [   ]

    e.   Government workers   [   ]

    f.   Self-owned enterprise   [   ]

    g.   Small-scale project   [   ]

    h.   Migrant workers wages   [   ]

    i.   Other(s) please specify _____

8. Does your household have any subsidiary income?

    a.   YES   [   ]   b.   NO [   ]

9. If YES in Q8, what are your household subsidiary income sources?

    (You can tick more than one)

    a.   Rental of house/land   [   ]

    b.   Teaching   [   ]

    c.   Street selling (e.g. newspapers, fruits, cold drinks, etc.) [   ]

    d.   Handicrafts   [   ]

    e.   Junk collecting (e.g. bottles, boxes, etc.) [   ]

    f.   Poultry/fish processing   [   ]

    g.   Rice/corn milling   [   ]

    h.   Relief payment from government   [   ]

    i.   Remittance from other family member   [   ]

    j.   Other(s) please specify _____

Section 5   Women Empowerment Impact of RCC's Microcredit — For Women Respondents Only

Control over financial resources

1. Do you have your own income, which you can spend without your husband's permission?

    a. YES [   ]   b.   NO [   ]

2. Do you have your own savings, which you can decide how to utilise?
   a. YES [   ]   b. NO [   ]

3. Have you received money from parents/brothers/sisters or other relatives outside the household in the last 2 years?
   a. YES [   ]   b. NO [   ]

4. If YES in Q3, can you yourself decide how to use that remittance?
   a. YES [   ]   b. NO [   ]

5. If you can use your money (income, savings, or remittance) at your will, do you spend your money on your family expenses?
   a. YES [   ]   b. NO [   ]

6. Do you have any income generating activity which you yourself operate?
   a. YES [   ]   b. NO [   ]

7. If YES in Q6, do you have control over it?
   a. YES [   ]   b. NO [   ]

Mobility
1. Can you go to post office/bank/doctor, etc. on your own?
   a. YES [   ]   b. NO [   ]

2. If YES in Q1, how do you go to those places?
   a. Walk   [   ]
   b. Car   [   ]
   c. Bicycle   [   ]
   d. Bus   [   ]
   e. Other(s) please specify _____

3. Have you ever been to the city by your own in the last two years?
   a. YES [   ]   b. NO [   ]

4. Have you ever visited your parents or relatives even without your husband's permission in the last two years?
   a. YES[   ]   b. NO [   ]

5. What are the reasons you do not travel alone? (You can tick more than one)
   a. Because women are not allowed to go outside   [   ]
   b. Because of lack of safety   [   ]
   c. Because I go with husband or children   [   ]
   d. Because I go with a neighbour or relative   [   ]
   e. Other(s) please specify _____

Ability to make purchase independently

1. Which of the items listed below you made purchase independently in the last 2 years (you can tick more than one)

    a. Food   [   ]
    b. Ice-creams, candies, or cookies for your children   [   ]
    c. Utensils, pots and pans for the household   [   ]
    d. Household furniture   [   ]
    e. Clothing for your children   [   ]
    f. Clothing for yourself   [   ]
    g. Jewellery for yourself   [   ]
    h. Livestock   [   ]
    i. Farming equipment   [   ]
    j. Land (including mortgage)   [   ]

Role in household decision making

1. Who made the following major household decisions in the last 2 years?

	Wife	Husband	Both
a. House repair/construction	[ ]	[ ]	[ ]
b. Children education	[ ]	[ ]	[ ]
c. Agricultural land lease (in/out)	[ ]	[ ]	[ ]
d. What crops to grow	[ ]	[ ]	[ ]
e. Purchase of livestock	[ ]	[ ]	[ ]
f. Sale of livestock	[ ]	[ ]	[ ]
g. Purchase of farm machinery	[ ]	[ ]	[ ]
h. Purchase of consumer durables	[ ]	[ ]	[ ]
i. Open a bank account	[ ]	[ ]	[ ]
j. Apply for a loan	[ ]	[ ]	[ ]
k. To have a child	[ ]	[ ]	[ ]

Relative freedom from household domination and Legal awareness

Below is a series of statements pertaining to your overall perceptions of women's relative freedom from household domination and legal awareness. Please circle the number which most accurately reflects how strongly you agree or disagree with each statement on a scale of 1 to 5, where "**1" means "Strongly Disagree" and "5" means "Strongly Agree"**

	Strongly Disagree		Neutral		Strongly Agree
Overall perceptions of women's relative freedom from household domination *Relative freedom from household domination*					
1. Women should be able to visit their parents or other relatives even without their husbands' permission	1	2	3	4	5
2. It is not right for husband to beat his wife	1	2	3	4	5
3. Women should be able to voice or protest against domestic abuse	1	2	3	4	5
4. Women should initiate the discussion of birth numbers	1	2	3	4	5

with their husbands					
5. Women should initiate the discussion of birth control use with their husbands	1	2	3	4	5
6. Parents should not arrange marriage for their children	1	2	3	4	5
Legal awareness					
1. There should be a minimum age for women to be married	1	2	3	4	5
2. If necessary, women can divorce their husbands by legal mean	1	2	3	4	5
3. Women can seek legal protection when they or their children suffer from family violence and abuse	1	2	3	4	5

Section 6 Demographic and Socio-economic Characteristics of Respondents – for All Respondents

1. What is your gender?
   a. Male   [   ]   b.   Female   [   ]

2. Which age group do you belong to?
   a.   18 – 25 years old   [   ]
   b.   26 – 35 years old   [   ]
   c.   36 – 45 years old   [   ]
   d.   46 – 55 years old   [   ]
   e.   56 – 65 years old   [   ]
   f.   over 66 years old   [   ]

3. Do you belong to any ethnic minority group?
   a.   YES[   ]   b.   NO [   ]

4. Is your village located in the mountainous areas?
   a.   YES[   ]   b.   NO [   ]

5. What is your marital status?
   a.   Single/Never Married   [   ]
   b.   Married   [   ]
   d.   De factor relationship   [   ]
   e.   Divorced/Separated   [   ]

6. How many children do you have?
   a.   None   [   ]
   b.   1   [   ]
   c.   2   [   ]
   d.   3   [   ]
   e.   4   [   ]
   f.   Other(s) please specify _____

7. How many male children do you have?
    a. None   [   ]
    b. 1   [   ]
    c. 2   [   ]
    d. 3   [   ]
    e. 4   [   ]
    f. Other(s) please specify _____

8. What is your highest educational or professional qualification?
    a. No Education   [   ]
    b. Primary School   [   ]
    c. Middle School   [   ]
    d. High school   [   ]
    e. Vocational   [   ]
    f. College   [   ]
    g   Postgraduate degree   [   ]
    i. Other(s) please specify _____

9. What is your main occupation?
    a. Crop Farming   [   ]
    b. Livestock Raising   [   ]
    c. Fishery   [   ]
    d. Produce processing   [   ]
    e. Daily wage labour   [   ]
    f. Small Entrepreneur   [   ]
    g. Government workers   [   ]
    h. Retired   [   ]
    i. Unemployed   [   ]
    j. Other(s) please specify _____

10. The number of people living in your household is (please state):
    _____ persons

11. The number of income earners in your household is (please state):
    _____ persons

12. What is your annual household income?
    a. Less than 3,000 yuan   [   ]
    b. Between 3,001 yuan and 5,000 yuan   [   ]
    c. Between 5,001 yuan and 10,000 yuan   [   ]
    d. Between 10,001 yuan and 15,000 yuan   [   ]
    e. More than 15,000 yuan   [   ]

13. What is the average total annual consumption (food and non-food) of your household?
    a.   Less than 3,000 yuan   [   ]
    b.   Between 3,001 yuan and 5,000 yuan   [   ]
    c.   Between 5,001 yuan and 10,000 yuan   [   ]
    d.   Between 10,001 yuan and 15,000 yuan   [   ]
     e.   More than 15,000 yuan   [   ]

14. Are you a shareholder of RCC bank?
    a.   YES   [   ]   b.   NO   [   ]

15. Is any person in your household working as governmental official (e.g., in the village committee)?
    a.   YES   [   ]   b.   NO   [   ]

16. Do you have savings with RCC bank?
    a.   YES   [   ]   b.   NO   [   ]

17. Who make the important family decision in your household?
    a. Husband   [   ]   b. Wife [   ]   c. Both [   ]

18. What is the status of your land ownership?
    a.   Contracted land from the village   [   ]
    b.   Leased land   [   ]
    c.   Other(s) please specify _____

19. What is the size of your household farm land?
    a.   Less than 0.1 hectare   [   ]
    b.   Between 0.1 – 0.5 hectare   [   ]
    d.   More than 0.5 hectare   [   ]
    e.   Other(s) please specify _____

> *Your participation in this survey is greatly appreciated. Thank you for your time and if you have further comments about RCC microcredit programme, please feel free to comment in the space provided below. Once again, we assure you that your identity will remain **STRICTLY CONFIDENTIAL.***