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**Impact of differential access to credit on long and short term
livelihood outcomes: group-based and individual microcredit
in the Mekong Delta of Vietnam**

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Abstract

This paper investigates the differential impact of access to formal microcredit on household livelihood indicators for a case study in the Mekong Delta in Vietnam. The paper compares two different modes of household access to formal credit (individual loans and group based lending) and the effects of each system on indicators of household livelihood such as total income and expenditure (short term outcome indicators) and households' total assets, educational costs, healthcare costs, and food consumption (long term effects). For these indicators a comparison is made between borrowers (individual and group based) and non-borrowers in a sample of 325 households using propensity score matching methods. The findings confirm the impact of microcredit on household welfare for borrowers, both group-based and individual, and on long term livelihood aspects (expenditure levels on education and health care). Income and expenditure levels were significantly higher for group based borrowers than for non-borrowers. Group based borrowers are generally much less land-endowed and have a lower income than individual borrowers. This is due to the targeting of the formal credit institution, but interestingly, it also has an influence on the impact of the microcredit.

Key-words: Formal credit, propensity score matching, household livelihoods, individual and group based lending.

JEL: E5, G2, I3, O2

1. Introduction

Microfinance, pioneered by the Grameen Bank in Bangladesh, is considered as an institution specialized in responding to the credit needs of the poor (Morduch, 1999). Microcredit, as a sub-field of microfinance, plays a central role in empowerment of women (Momen and Begum, 2006), borrowers' output (Duong and Izumida, 2002), users' assets (Kaboski and Townsend, 2002), and average income (Chen and Snodgrass, 2001). However, the question of whether credit really benefits poor households depends on how poverty is defined and what kind of 'support' credit provides; that is, on the contribution it makes to improvements in household living standards. It also relates to the way the credit is obtained, what households have to pay for it and how it is used.

A number of empirical studies have highlighted the role of microcredit in raising household welfare levels and the reduction of poverty (Hossain and Diaz, 1997; Mourji, 2000; Islam, 2007; Swain et al., 2008; Ang, 2004). Credit has been found to provide a wide range of opportunities for improving household welfare as measured by per capita income, per capita expenditure and asset levels (Khandker, 2001). Hulme and Mosley (1996) show that when they have access to credit, poor people are likely to invest in livelihood strategies and break out of the poverty cycle. Zaman (1999) shows the positive impact of microcredit provided by the Bangladesh Rural Advancement Committee. Khandker (2005), Morduch and Haley (2002), Robinson (2001) all validate the importance of microfinance for poverty alleviation, as it offer opportunities for improvements in household productivity levels, and hence the smoothing of income and consumption (Robinson, 2001). A study by Pitt et al. (2003) found that credit lending to females had a large and significant impact on two out of three health measures for children (while male borrowing had no such effect).

Similar findings have emerged with specific reference to Vietnam. Quach et al. (2003) found that credit had a positive and significant long-term impact on household welfare in rural Vietnam by increasing per capita expenditure. Their results also show that although both formal and informal credit contribute to the alleviation of household poverty, the former has a relatively greater impact. Similarly, Cuong et al. (2007) and Duong and Izumida (2002) find a positive impact of credit on household income in Vietnam. Furthermore, Swain et al. (2008)'s study of microfinance and poverty reduction in Mekong Delta found that microfinance may lead to accumulation of assets and enable women to adopt livelihood strategies that lead to poverty reduction.

Not all studies, however, have reached these conclusions. Other studies have found no significant impact of microcredit on household welfare and poverty reduction. For instance, Coleman (1999) study of a microcredit programme in Thailand concludes that microcredit has no

impact on household income. Diagne and Zeller (2001) did not find any statistically significant impact of microcredit on household income in Malawi. Chowdhury (2008), in his study of poor households in Bangladesh, even suggests that the burden of debt actually makes households poorer.

All these impact evaluations attempt to answer the same question: can microcredit make a difference? It remains an important question in all areas where microcredit is available in its different forms with the aim of providing a platform for improving other programs or a benchmark for the creation of new credit programs, from both bank business and aid agency perspectives. The novelty of the study reported in this paper in the context of the existing literature is twofold. Firstly, we assess the impact of credit not only on main livelihood outcomes such as income and expenditure levels (as do previous studies), but also on long term livelihood investments such as expenditure on food, education and health care. Secondly, we compare the impact of two major credit provision vehicles - individual systems and group based systems.

The rural areas of the Mekong Delta are among the poorest regions of Vietnam, where the livelihoods of households have been affected by natural disasters such as floods, erosion, unpredictable rainfall, and other environmental disturbances (MDPA, 2004). This situation has led to calls for urgent action from the state and development partners to help to improve the lives of the poor in the region. While most non-poor farmers are in principle able to access formal credit, it is often not appropriately flexible or responsive to their financial needs (MDPA, 2004). Poor households have limited access to financial risk management instruments (savings, credit and insurance), which constrains their ability to cope with shocks and further increases their vulnerability (Ardington et al., 2004). The poor are often forced to borrow on informal markets to meet their credit demands (Montel et al., 1993), for both productive investment (Binswanger and Khandker, 1995), and consumption smoothing (Heidhues, 1995).

The aim of this paper is to analyze whether the outreach projects of the Vietnamese Bank of Agriculture and Rural Development (VBARD) and the Vietnamese Bank Social Policy (VBSP) have any effect on key-livelihood indicators for the beneficiaries, namely on levels of income, expenditure on food, education and health care. This research setting allows a comparison of these effects according to mode of access to credit. We compare the effects on borrowers who took out credit as individuals to those who borrowed in groups. By extending the outcome variables to include expenditure on food, education and health care, our analysis attempts to check for long-term effects on household livelihoods, beyond simply income and expenditure patterns.

2. Research area and data

The Mekong Delta is located in the southern part of Vietnam (Figure 1). It has a population of more than 17 million, occupying a land area of 40,600 square kilometers (GSO, 2009). The region receives rich alluvium nutrition from the Mekong River, which is very advantageous for agriculture, especially for rice production (Nguyen and Kawaguchi, 2002), the main cash crop of the region. Additionally, aquaculture has rapidly developed in this region with the export of raw and frozen fish products (in particular *Pangasius* species) to the rest of the world (Dang and Danh, 2008).

The data used in this paper were collected through a survey in which interviews were conducted among rural households in three of the delta's 13 provinces, namely Can Tho, Soc Trang, and Tra Vinh (Figure 1). These provinces were chosen because their distinct socio-economic characteristics make them representative of the provinces in the delta as a whole. Can Tho City is the most active economic, cultural, scientific and technological urban centre of the Mekong Delta. It also hosts the headquarters of an agricultural research institute that supports rice production in the region. However, as the focus of this study is on rural credit, we collected data from the rural district of Thoi Lai (which since have been divided into two new districts named Thoi Lai and Co Do). This district traditionally supplies agricultural products and services to the urban areas of Can Tho. The second province, Soc Trang, is more ethnically diverse than Can Tho. Its economy is based on agriculture and the area is more vulnerable to flooding. There, we collected data in district of Thanh Tri. Finally, the province of Tra Vinh was chosen for its distinctive rural characteristics. Within it, households were randomly selected from the Cau Ngang district, where most households are mainly employed in arable farming and seafood production.

Figure 1: Map of survey location



The sampling of the households was based on a combination of randomness and convenience, dictated mainly by their accessibility. Respondents were interviewed by the lead author and colleagues from Cantho University. Questions were designed to gather general information on households, their economic activities, including the outcomes of agricultural activities, and their access to credit and loan status. More specifically, during the interviews, general information such as age, education, ethnic group membership and household size, as well as data on the household's expenditure and asset levels, employment, agricultural activities and non-agricultural employment and self-employment were collected. In total 325 households were interviewed, of which 219 had access to credit, and 106 did not (Table 1).

Table 1: Distribution of borrowers and non-borrowers in the sample

Province	Non-borrowers	Individual borrowers	Group-based borrowers	Total
Can Tho	41	29	38	108 (33%)
Soc Trang	33	41	35	109 (34%)
Tra Vinh	32	36	40	108 (33%)
Total	106 (32.6%)	106 (32.6%)	113 (34.8%)	325 (100%)

Just like most developing countries, poverty in Vietnam is concentrated in rural areas, where about 90 % of the population live below the poverty line (VPA, 2002). The average monthly income and expenditure per capita in the Mekong Delta is 939,900 dongs² (45 US\$) and 703,300 dongs (34 US\$) respectively. These figures are lower than the averages for the whole country, which are 995,200 dongs (47.6US\$) and 792,500 dongs (38 US\$) respectively (GSO, 2009). In 2008 the region had a gini coefficient of 0.395 (GSO, 2009), lower than the average for Vietnam (0.434). Poverty levels in the region are especially high among the rural Khmer people and female headed households. They also vary between provinces. It is highest in Soc Trang and Tra Vinh, while Can Tho (along with Long An) has the fewest poor people (Figure 2).

In order to reduce poverty, the Vietnamese government implemented program 135,³ which aims to improve the socio-economic status of recognized ethnic minority groups in extremely poor communes and villages, and narrow the development gap between regions with high concentration of these groups and other regions (GSO, 2010) through VBARD and VBSP. Soc Trang and Tra Vinh are likely to benefit from such programs because they house many people from the Khmer ethnic group.

² 1 USD = 20,905 dongs from <http://www.vietcombank.com.vn/en/exchange%20rate.asp>

³ The program has its name from the Decrees Numbers 135/1998 QD-TTg and 134/2004QD-TTg of the government.

The Mekong Delta Poverty Analysis (MDPA, 2004) showed that one of the main causes of rural poverty is lack of access to land, a situation which recent government land policies have addressed. These are expected to have a positive impact on reducing poverty (Ravallion and Walle, 2008). Additional causes of high poverty levels in the Mekong Delta are low human capital and poor access to agricultural markets. The education system in the Mekong Delta is organized at provincial level includes everything from primary to university level. The education system is organized so that all households members of less than 18 years of age have equal opportunities to attend. In fact, though, investment by households in the Mekong Delta in education is much less than that in other regions (GSO, 2009). The education expenses of non-poor households in the Mekong Delta make up 3.3 percent of their total expenses. This is lowest proportion in the country. For the poor, it is only 2.5 percent of total expenses, the second lowest rate in the country.

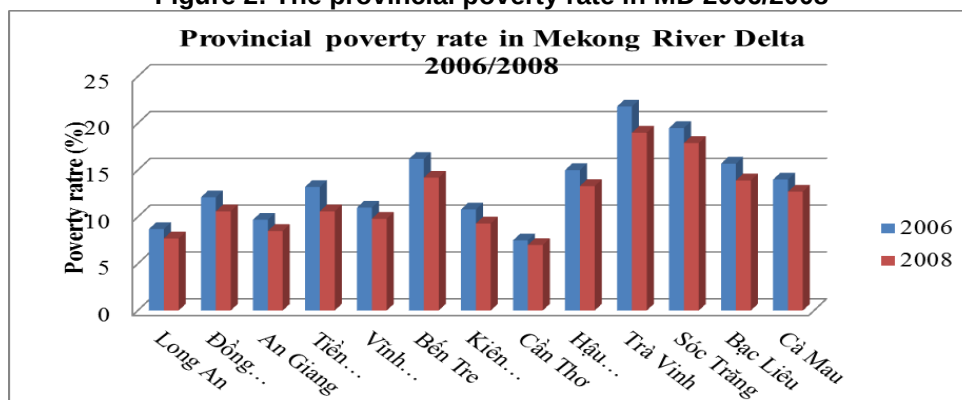
As reported by WHO (2001) the linkages between health and poverty reduction as well as long term economic growth are significant, much stronger than is generally understood. Thus, appropriate expenditure on health services may be considered a good indicator of poverty reduction and economic development. In this respect, Vietnam has achieved remarkable results for a country that has limited public resources and such a low per capita GDP. Recently, the importance of good health care facilities has been emphasized, leading to an increase in government funding up to 7 % of GDP (VPER, 2004). The MD authorities have focused heavily on healthcare investment, and all communes now have their own health centre (GSO, 2009). Households place a high value on healthcare services and their development.

Finally, it is important to give more information on the two banks studied in this paper. VBARD's target clients are rural households involved in agricultural activities. With large operating networks, VBARD has become the largest credit institution in Vietnam. Its total capital reached 267,000 billion dong in March 2007, with more than 2,200 branches all over the 64 provinces and cities of Vietnam (Agribank, 2008). It has a very broad reach, which extends even to the community level of administration, but most of its loans require collateral and are commercial (WB, 2009). It only provides collateral free loans to households that join liability groups and members of "guarantee groups"⁴ (Llanto, 2000). The need for collateral is the main reason preventing several small potential clients in the MD from getting access to its credit (Swain et al., 2008). Another obstacle is the inappropriate loan size set. The bank allows less than 50% of its loans to be small loans (defined as less than 5 million dong) (Putzeys, 2002).

⁴ Which are organized by mass organizations such as the Vietnamese Women's Union (VWU) or the Farmers' Association.

The other bank is VBSP, a non-profit organization bank whose main purpose is to implement government social policy lending. Most of its funds come from government funds but some also come from other banks and SBV, State Owned Commercial Banks and the ODA (Izumida, 2003). The biggest advantage of VBSP in reaching the poor is that it provides loans without collateral and low interest rates. Its lending policy is subject to production criteria but borrowings for daily consumptions are also permitted. Borrowers are required to present a plan on how they will use the requested funds. It currently runs more than ten different financial services,⁵ among which are loans for poor households, loans for jobs creation, loans for disadvantaged students, and loans for overseas workers. The operational network of the bank covers all 64 provinces, with 612 district transaction offices, 9,773 mobile transaction points and 190,000 Saving and Credit Groups (SCGs) among communities nationwide (VBSP, 2010). Besides VABRD and VBSP, available financial systems in the rural areas of Vietnam and Mekong Delta include People Credit Funds (PCF), money lenders, rotating savings and credit associations (ROSCAs), relatives, friends, and neighbors. However, these alternative informal institutions (Ngan, 2003) were not studied for this paper.

Figure 2: The provincial poverty rate in MD 2006/2008



3. Methodology

Measuring impact demands a careful analytical approach. A major problem in evaluating the impact of access to credit is endogeneity of programme participation in the output function. Selection bias may overestimate the impact due to unobserved characteristics such as higher-than-average motivation for higher income or ability in business activities. To overcome endogeneity, this paper uses a propensity score matching approach to analyze the potential effects of formal credit in the MD of Vietnam. This approach is used to assess the impact of access to and uptake of formal microcredit. The method used includes two logical steps of estimation. First, a probit model assesses the propensity score; that is the probability of the

⁵ More detail about these services can be found at the VBSP website (VBSP, 2010).

households' access to credit. Second, the difference in outcomes between borrowers and non-borrowers is measured by a matching method while controlling for the propensity scores. This procedure guarantees that a borrower is compared to a non-borrower with the same characteristics. The impact of credit is measured on income, total expenditure and total asset levels. Expenditure on health care and education are considered in separate models. As not all respondents reported expenditure on these two items (because there is no illness in the family, or no children that need to attend school), sub-samples were constructed for households which did.

3.1 Propensity score matching

As introduced by Rosenbaum and Rubin (1983), the propensity score is used to provide an alternative method for estimating treatment effects when treatment assignment is not random but can be assumed to be unconfounded. This method has been applied in a wide variety of fields (Heckman et al., 1998; Dehejia and Wahba, 1999; Moser, 2005; Smith and Todd, 2005). The propensity score is defined as the conditional probability of treatment given background variables. Normally a logit or probit function is used for this purpose, given that treatment is typically dichotomous (i.e., $D=1$ for the treated and $D=0$ for the control units) as follows:

$$P(x) = \text{Prob}(X_i|D_i=1, p(X_i)=p) = \text{Prob}(X_i|D_i=0, p(X_i)=p) = \text{Prob}(X_i|p) \quad (1)$$

Let Y_{1i} and Y_{0i} denote the potential outcomes under treatment and control groups respectively. Then treatment assignment is (conditionally) unconfounded if treatment is independent of potential outcome conditional on X .

Assumption 1: (Conditional Independence Assumption or CIA)

There is a set X of covariates (observable variables) such that after controlling for these, the potential outcomes are independent of the treatment status:

$$(Y_1, Y_0) \perp D | X \quad (2)$$

This means that after controlling for X , the treatment assignment is as good as random. This property is also known as unconfoundedness, or selection on observables. The CIA is crucial for correctly identifying the impact of the program, since it ensures that although treated and control groups differ, these differences may be accounted for in order to calculate the selection bias. This allows the control units to be used to construct a counterfactual for the treatment group.

Assumption 2: (Common Support Condition):

For each value of X , there is a positive probability of being both treated and control.

$$0 < P(X_i|D=1) < 1 \quad (3)$$

This equation implies that the probability of receiving treatment for each value of X lies between 0 and 1. By the rules of probability, this means that the probability of not receiving treatment lies between the same values⁶. A simple way of interpreting this formula is the following: the proportion of treated and control individuals must be greater than 0 for every possible value of X . The second requirement is also known as the overlap condition, because it ensures that there is sufficient overlap in the characteristics of the treated and control units to find adequate matches (or a common support). When these two assumptions are satisfied, the treatment assignment is said to be strongly ignorable (Rosenbaum and Rubin, 1983)

The primary purpose of the propensity score is that it serves as a balancing score. Consequently, the idea behind balancing tests is to check whether the propensity score is an adequate balancing score. In other words, it checks if at each value of the propensity score, X has the same distribution for the treatment and control group. More formally, this becomes;

$$D \perp X | p(X)$$

where X is a set of covariates that are chosen to fulfill the CIA⁷. After conditioning on $p(X)$, additional conditioning on X should not provide new information on D . The propensity scores themselves serve only as devices to balance that observed distribution of covariates across the treated and control groups. The success of propensity score estimation is therefore assessed by the resultant balance rather than by the fit of the models used to create the estimated propensity scores (Heinrich et al., 2010).

A household's decision about whether to take credit is expected to be affected by institutional (bank) factors, product (loan) features and household/client socio-economic characteristics (Okurut, 2006). Among the institutional factors are the location of the financial service providers and the conditions they set, which are expected to influence the probability of attracting rural borrowers (Dallimore and Mgimeti, 2003). Product features may include issues of credit rationing such as the interest rates in operation and collateral requirements (Kochar, 1997).

The socio-economic characteristics of the household are important because they influence the household's willingness (including the purpose of borrowing) and capacity (including the potential repayment performance) to borrow. As suggested by Bell et al. (1997) and Vaessen (2001), the

⁶ This is because $P(X_i|D=0)=1-P(X_i|D=1)$

⁷ It is important to distinguish the CIA from the balancing property of propensity scores. One does not imply the other. For example, it is possible to obtain balance for examples of data where the CIA is valid or where it does not hold. The simplest case is when X is a univariate variable, when it is clear that the CIA does not hold and where it is very easy to obtain balance. Similarly, even if the CIA is fulfilled, the balancing property might not hold because $p(X)$ could be an inadequate balancing score, perhaps because the functional form of X is not presented correctly when estimating $p(X)$. For further information see Smith and Todd (2005).

following household characteristics are included in the model: age of the household head, gender, educational level and marriage status. We also include ethnicity, family size and having a community job in the village. This last is used as a proxy for social capital. In addition, Kochar (1997) uses income and expenditure levels of the household as factors affecting household's access to credit. To avoid endogeneity problems, we include the area of land use, its ownership status and the asset value in buildings instead. Furthermore, location as a major indicator of access to banking is captured in dummies for provinces (Dallimore and Mgitmeti, 2003). Location (including distance to the bank) is important because it may influence the probability of access to credit, and it may also influence the outcome indicators. Differences in the provincial organization of health and educational systems may influence the availability of services and the amount spent on it. Finally, we assume that distance to the bank also reflects distance to a commercial centre (since we assume that bank offices are located in these centers). Hence, this distance also reflects the distance to markets and services.

The variables are defined as follows. First, access to credit by households is defined as the households who have applied for and received credit from formal financial institutions. General household characteristics include age, gender, educational level, household size, involvement in farm activities and land endowment. Age refers to the average age of the head of the household. It is assumed that households with an older head of the household have control over more resources, are more experienced, have a better reputation, and more responsibility. Households with young household heads often consume more than save. However, it is difficult for them to get credit because they are considered to be lacking in experience and their reputation is less good (Moll, 2000). Education level is defined as the number of schooling years received by the household head. Better-educated farming households are expected to depend more on self-finance and on formal credit sources, because they may be better able to exploit investment opportunities and to better understand loan regulations and the borrowing procedures of the formal sector. Hence, households with higher education levels would prefer to get credit from the formal sector instead of from informal sources, which are usually more expensive (Nguyen, 2001). Family size is defined as the total number person in one household who have the same condition and share the same meal. Dependency ratios are calculated by ratio of the number of elderly (age above 60 years) and children (16 years or below) in a household over the number of total members of the farm household. On the demand side, the household with high ratio of dependency means high demand for consumption credit because they have greater demand for living and schooling expenditures. Because formal lenders do not lend for consumption purposes, these households have to borrow from informal sources (Duong and Izumida, 2002).

The variable of total land combines the size of cropland, garden land, house building land and other land. Land can be used as collateral for formal credit. Lenders regard households possessing a large area of land as safe clients because they may generate more output and return, so that their repayment capacity is also higher.

The impact of credit is measured on the total asset value, income, total expenditure, and expenditure on food, education and health care. Total asset value includes values of livestock, buildings, television, irrigation pump, motorbikes, bicycles, boats and other durables. This variable is measured in millions of dongs (Duong and Izumida, 2002). There is a difference by type of expenditures. First, expenditure on farming is defined as the expenses for farming inputs such as seeds, fertilizers, pesticides, young animals, hired labour and hired machines. Second, non-farm expenditure is defined as expenses for non-farming activities of household members such as family labour, migrations and other household business not related to farming. Last, off-farm expenditure refers to the expense of households in off-farm activities such as household business in agricultural activities and other farming services. Expenditure on education is defined as total school fees of household members who are under 18 years of age. Health care expenditure is defined as the total cost for all household members to receive basic treatment from the health services, such as health insurances fees and basic health care services. Total income is defined as total income from farming, non-farming and off-farm activities of the households.

3.2 Propensity Score Matching Method

The average treatment effects (ATT) are defined as the average treatment effect for the sub-population with a given value of the pre-treatment variables. It is estimated by taking the difference between the treatment and control averages in the sub-population that are matched through the propensity scores. The ATT are then estimated by weighting these sub-population estimates. The ATT effect is thus (Becker and Ichino, 2002):

$$ATT = E\{Y_{1i} - Y_{0i} | D_i = 1\} \quad (4)$$

$$ATT = E[E\{Y_{1i} - Y_{0i} | D_i = 1, p(X_i)\}] \quad (5)$$

$$ATT = E[E\{Y_{1i} | D_i = 1, p(X_i)\} - E\{Y_{0i} | D_i = 0, p(X_i)\} | D_i = 1] \quad (6)$$

where ATT is the average treatment on the treated; Y_{1i} and Y_{0i} are the potential outcomes in the two counterfactual situations of the borrowers and non-borrowers respectively; $p(X_i) | D_i = 1$ is the propensity score of the treated households, given its characteristics X_i . Several matching techniques can be used (Caliendo and Kopeinig, 2005). This paper uses a Stratification matching and a Kernel matching approach.

3.2.1 Stratification matching approach(SM)

The stratification procedure is based on the same approach used for estimating the propensity scores such that, within each interval, treated and control units have on average the same propensity score (Dehejia and Wahba, 1999). It is advisable to use the same blocks within which the balancing property is examined. Within each interval, the difference between the average outcomes of the treated and the control observation is computed as follows (Dehejia and Wahba, 1999).

$$T_q^S = \frac{\sum_{i \in I(q)} Y_i^T}{N_q^T} - \frac{\sum_{j \in I(q)} Y_j^C}{N_q^C} \quad (7)$$

where: $I(q)$ is the set of units in block q that is automatically chosen in the propensity score estimation; Y_i^T and Y_i^C are the outcomes of the treated and control units respectively; N_q^T , N_q^C are the numbers of treated and control units in block q respectively. The total number of blocks is Q .

Finally, the ATT is obtained as an average of the ATT of each block with the weight of each block given by the corresponding fraction of treated units (Dehejia and Wahba, 1999).

$$T^S = \frac{\sum_{q=1}^Q T_q^S \frac{D_i}{\sum_{i \in I(q)} D_i}}{\sum_{q=1}^Q \frac{D_i}{\sum_{i \in I(q)} D_i}} \quad (8)$$

3.2.2 Kernel matching (KM) approach

In the Kernel matching method, all treated cases are matched with a weighted average of all controls using weights that are inversely proportional to the distance between the propensity scores of treated and controls. The ATT is then calculated as follows (Heckman et al., 1997).

$$ATT = \frac{1}{N_1} \sum_{i \in I_1} Y_i - \frac{\sum_{j \in I_0} Y_j \frac{K(\frac{P(x_j) - P(x_i)}{h})}{\sum_{j \in I_0} K(\frac{P(x_j) - P(x_i)}{h})}}{\sum_{j \in I_0} \frac{K(\frac{P(x_j) - P(x_i)}{h})}{\sum_{j \in I_0} K(\frac{P(x_j) - P(x_i)}{h})}} \quad (9)$$

where Y_i and Y_j are the outcomes of treated and non-treated households respectively; $K(\cdot)$ is the Kernel function; h is the estimated bandwidth; I_1 is the sample of the treated cases and I_0 is the sample of non-treated controls; $P(\cdot)$ are the probabilities of treated and non-treated cases.

Apart from the two methods used in this paper, other propensity score matching methods are available (Heckman et al., 1997). But these have a number disadvantages and therefore were not considered for this study. The Nearest neighbor matching approach (NNM) method should be used very carefully as it may violate the common support assumption (Cochran and Rubin, 1973). This approach will provide an estimate even when there are no sufficient comparable units.

Radius Matching (RM) is more suitable but the estimated results are relatively imprecise compared to the SM and KM approaches because only one control is matched with each participant. Instead, the SM method matches the average of several individuals. However, equal weights are given to an individual at the limit of the stratum and to an individual close to the observed unit, since the average is only arithmetic (Chemin, 2008). The KM method overcomes this problem by giving each individual a weight decreasing in distance compared to the intentional unit. As all individuals in the control group are used, the KM method is also likely to relax the common support assumption (Chemin, 2008).

It is meaningful to conduct checks on the robustness of the estimations. The robustness checks of standard errors of propensity score matching are obtained by using a bootstrap method. These robustness checks help to increase the reliability of the results by demonstrating that the estimations do not depend too much on the particular methodology chosen.

4. Empirical results

4.1 Household characteristics

In this section, an overview is given of the households' characteristics before turning to the estimation results.

Tables 2 and 3 compare the household characteristics of borrowers and non-borrowers. Heads of borrower households were relatively older and had lower educational levels than non-borrower households. No differences in family sizes and dependency ratio were found between the two groups. Land endowments and average income also seemed not to differ. Total landholding is considered to be an important determinant of access to credit (Vu, 2001; Zeller et al., 2001; Okurut, 2006). It is hypothesized that households with more land are more likely to have an interest in expanding production and hence a higher probability of borrowing. Land can also be used as collateral for the loan. In the survey, the average land area under control by individual borrowers and non-borrowers was about 11 and 15 ha, respectively while that of group-based-borrowers was about 6.5 ha, and the difference was statistically significant at 1 percent level. Most households in the survey held a 'red certificate' and thus had property rights on the land.

Individual borrowers registered a higher value of assets such as building value and other fixed assets and they spent more on education and health care. On the other hand, group-based borrowers were found to be on average poorer than individual borrowers. Non-borrowers spent on average more on food.

Table 2: Household characteristics (continuous variables)

	Non-borrowers	Individual Borrowers	Group based Borrowers	F-stat
N	106	106	113	
Age of household (years)	44.57 (11.92)	47.64 (11.64)	46.61 (10.49)	1.99
Education level (years)	9.86 (3.82)	10.10 (3.36)	8.70 (3.16)	4.90 ^{***}
Family size (person)	4.94 (1.70)	4.90 (1.46)	4.89 (1.61)	0.03
Dependency ratio (%)	0.28 (0.21)	0.27 (0.22)	0.31 (0.22)	1.45
Total land size (ha)	11.66 (13.01)	15.49 (10.18)	6.38 (8.17)	20.10 ^{***}
Yearly income (1,000 dongs)	77188 (88908)	101034 (72950)	71911 (72972)	4.13 ^{***}
Income per person (1,000 dongs)	15845 (15280)	22531 (21145)	15985 (17693)	4.68 ^{***}
Value of assets (1,000 dongs)	470523 (539095)	615507 (499161)	354495 (655350)	5.64 ^{***}
Food consumption (1,000 dongs)	17906 (9373)	16684 (9030)	14283 (6763)	5.30 ^{***}
Food consumption per person (1,000 dongs)	3862 (1979)	3676 (2348)	3139 (1662)	3.89 ^{***}
Food consumption/Income (%)	0.48 (0.48)	0.22(0.17)	0.27 (0.14)	22.00 ^{***}
Education expenditure (1,000 dongs)	3802 (6967)	6081 (6772)	4939 (5044)	3.47 ^{**}
Education/Total expenditure (%)	10.55	9.02	11.67	0.96
Education expenditure per person (1, 000 dongs)	781 (1306)	1339 (1670)	1050 (1061)	4.46 ^{***}
Healthcare expenditure (1,000 dongs)	805 (1829)	2865 (2067)	2657 (2814)	26.59 ^{***}
Health/total expenditure (%)	1.03	1.40	2.50	1.88 ^{**}
Healthcare expenditure per person (1,000 dongs)	190 (263)	623 (459)	606 (722)	20.39 ^{***}
Distance to market center (m)	1394 (603)	833 (368)	577 (507)	75.64 ^{***}

Notes: *: significant at 10%; **: Significant at 5%; ***: Significant at 1%.

Table 3: Household characteristics (categorical variables)

	Non-Borrowers	Individual	Group	X ² -Stat
N	106	106	113	
Gender (% male)	67	71	52	9.13***
Married (% yes)	90	96	99	10.39***
Red book certificate (%)	91	98	82	15.57***
Vietnamese (% yes)	61	43	51	6.75**
Village work (% yes)	17	17	19	0.34
Religion (% at least one religion)	62	69	62	1.59
Can Tho (%)	37	27	35	2.72
Soc Trang (%)	34	36	31	0.60
Tra Vinh (%)	28	37	35	1.83

Notes: **: Significant at 5%; ***: Significant at 1%.

There were relatively more female borrowers among the group-based borrowers. Among the borrowers, 43 percent of individual borrowers and 51 percent of group-based borrowers were of Vietnamese origin, compared to 61 percent among non-borrowers. It was furthermore hypothesized that if the household head has any social and/or political positions in the village, he or she will have a high probability of access to formal credit and is therefore less likely to borrow from the informal sector. However, this could not be confirmed by the chi-square analysis. Individual borrowers were relatively more involved in village work. Over 60 percent of the respondents in each group adhered to at least one religion. As noted above, individual borrowers were found to be more prevalent in Soc Trang while most group borrowers and non-borrowers were in Can Tho.

Table 4 presents the expenditure levels of households on food and services. Households in Can Tho and Soc Trang have higher expenditure levels on food and education than households in Tra Vinh province. However, these last households spent much more on health services than households in the other provinces.

Table 4: Household expenditure on education and health services by province

	Can Tho	Soc Trang	Tra Vinh	F-stat
Education expenditure (1,000 dongs)	8119 (11286) [67.60%]	6536 (7436) [74.31%]	4348 (6102) [54.63%]	3.10**
Education to total expenses (%)	12.13	9.81	9.33	1.14
Education per person (1,000 dongs)	1635 (2198)	1460 (1774)	892 (1280)	4.46***
Healthcare expenditure (1,000 dongs)	556 (831) [57.41%]	1414 (2991) [65.14%]	2124 (4337) [51.86%]	3.98***
Healthcare to total expense (%)	0.61	1.39	3.00	4.82***
Healthcare per person (1,000 dongs)	106 (152)	324 (673)	485 (1138)	3.80***

Notes: Percentage of households who have spent on education and health services in brackets.

*: significant at 10%; **: Significant at 5%; ***: Significant at 1%.

4.2 Loan characteristics

Table 5 compares the loan characteristics of individual and group-based borrowers in the survey. The average loan size of group-based borrowers was approximately 11 million dongs (527 US\$) while that of individual borrowers was about 19 million dongs (909 US\$). The average yearly interest rates charged on individual loans were higher than those charged on group-based loans. The results indicate that the average loan duration for microcredit is long, which may be due to the fact that many of these loans are used for agricultural production so that a certain duration is necessary to cover at least a growing season in order to increase repayment rates. The loan duration appears to be around 12 months for rice crops, 24 months for livestock systems and around 6 months for vegetable production. In fact, the average loan duration for group based borrowers in the survey was longer than for individual borrowers. Figure 3 compares the size of loans to household income and asset levels. The majority of the households (about 60%) took a loan that constituted less than 20% of their income.

Table 5: Characteristics of formal loans received by rural households

Items	Unit	Mean	Individual borrowers	Group-based borrowers	T-Statistic
Average loan size	1000 dongs	14356 (12702)	18970 (15880)	10150 (6530)	-5.42***
Interest rates	%/year	10.82 (2.80)	12.02 (2.92)	9.73 (2.18)	-6.57***
Loan maturity	Month	19.91 (14.51)	16.16 (10.90)	23.33 (16.47)	3.74***

Notes: ***: Significant at 1%.

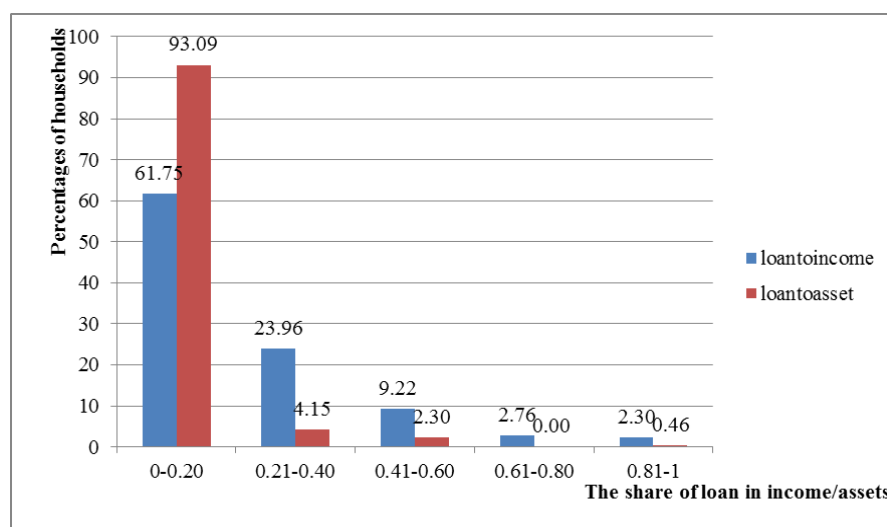
Figure 3: The share of loans to households' income and asset values

Table 6 compares the characteristics of loans provided by VBARD and VBSP in the survey. The average loan size provided by VBARD was higher than that provided by VBSP: 18 and 10 million dong respectively. The average yearly interest rates charged by VBARD were higher than those charged by VBSP. The results also indicate that the average duration of VBSP loans was longer than that of VBARD: about 24 and 15 months respectively.

Table 6: Characteristics of formal loans provided by formal institutions

Items	Unit	Mean	VBARD	VBSP	T-Statistic
Average loan size	1000 dongs	13852 (692)	18000 (1171)	10198 (597)	-6.14***
Interest rates	%/year	10.63 (0.21)	12.02 (0.33)	9.42 (0.22)	-6.74***
Loan maturity	Month	20.27 (1.11)	15.61 (1.22)	24.33 (1.72)	4.03***

Notes: ***: Significant at 1%.

4.3 Determinants of access to credit

Table 7 gives the factors that affect the probability of access to formal credit for rural households in the Mekong Delta. As noted above, these factors include household characteristics, assets levels, institution characteristics and location effects. As the table shows, distance to a market center (higher likelihood when closer), marital status and location of households were found to be determinants of access to credit for the pooled sample. These findings can be explained as

follows. Firstly, distance from their dwelling place to a market centre may affect a household's credit accessibility. Greater proximity may afford significantly more information on financial markets. The more financial information the household receives, the faster it can decide to borrow. We believe that marital status is important for both demand and approval of credit. Married household heads may need to generate an income to support the family, which is probably higher than one-person households. From a lender point of view, married credit takers may be better as asset levels (hence collateral) would be higher and the level of income is also probably higher. Furthermore, they are less likely to move. Households from the Tra Vinh province are more likely to borrow. As noted earlier, households from Soc Trang and Tra Vinh provinces have a high concentration of minority ethnic groups and are therefore more targeted by the poverty alleviation programs of the Vietnamese government. The results concur with the findings of Okurut (2006) and Ha (1999).

There are some differences between group-based and individual borrowers. Group-based borrowers are poorer than individual borrowers. The likelihood of borrowing in a group system was lower for large landowners, non-married households, households living further from the bank, and households not located in the Tra Vinh province. As group-based systems do not require collateral, they will probably attract households with limited land endowments who are excluded from private lending schemes. The influence of marital status, distance to the bank and location in Soc Trang or Can Tho is explained above. Individual borrowers were more likely to be of married households, living closer to a market center, and households with fewer children. Separate models have been estimated for the propensity scores of the subsamples of households with non-zero education costs and non-zero health care expenditure. The results of these models are available upon request.

Table 7: Estimation model of propensity scores

	(1)	(2)	(3)
Gender (male=1)	-0.143 (-0.720)	-0.062 (-0.270)	-0.320 (-1.270)
Marital status (yes=1)	1.166*** (3.150)	0.824** (1.990)	1.932*** (3.260)
Children to family size (ratio)	-0.798 (-1.590)	-1.207** (-2.040)	-0.254 (-0.400)
Elderly to family size (ratio)	1.133 (1.370)	1.341 (1.470)	0.595 (0.490)
Education level (years)	-0.015 (-0.560)	0.028 (0.920)	-0.051 (-1.550)
Farming experience (years)	-0.004 (-0.380)	-0.001 (-0.000)	0.002 (0.130)
Village work (yes=1)	0.022 (0.090)	-0.099 (-0.350)	0.353 (1.120)
Farmer (yes=1)	-0.059 (-0.300)	0.157 (0.680)	-0.204 (-0.84)
Total land (1000m2)	-0.007 (-0.890)	0.005 (0.540)	-0.0366*** (-2.96)
Distance to market center (m)	-0.002** (-8.720)	-0.002*** (-6.510)	-0.002*** (-7.850)
Soctrang province (yes=1)	0.208 (0.940)	0.333 (1.280)	0.324 (1.080)
Travinh province (yes=1)	0.394* (1.800)	0.424 (1.600)	0.521* (1.860)
Constants	1.255* (2.210)	0.392 (0.600)	0.596 (0.690)
<i>N</i>	324	211	221
Prob	0.000	0.000	0.000

Notes: (1): Pooled sample; (2) Individual-non borrowers; (3): Group-non borrowers
t statistics in parentheses

*: Significant at 10%; **: Significant at 5%; ***: Significant at 1%.

The data available for matching methods are critical in order to justify the assumption that, once all relevant observed characteristics are controlled for, comparison units have, on average, the same outcomes that treated units would have had in the absence of the intervention. Thus, to obtain impact estimates that are generalizable to the population of interest, it is important to consider the balancing tests of data availability. Tables 8a, 8b, and 8c show the balancing properties of the three models, namely pooled sample, individual vs non borrowers, and group vs non borrowers, for the total sample and the education/health care subsamples. The balancing properties are mainly satisfied for the pooled sample by 6 blocks and for group-non borrowers and for individual non-borrowers by 5 blocks. This confirms that the pool of comparison units have a sufficient number of observations with characteristics corresponding to those of the treated units for all given models.

>>>>> Insert table 8a,b&c about here

Table 8a: Balancing tests

Inferior of block of pcores	Pooled sample			Individual – non borrowers			Group-non borrowers		
	0	1	Total	0	1	Total	0	1	Total
<0.1	18	6	24	20	4	24	31	7	38
0.2	20	11	31	24	9	33	18	6	24
0.4	20	15	35	24	21	45	20	11	31
0.6	30	54	84	13	34	47	13	21	34
0.8	5	40	45	4	38	42	2	71	73
0.9	3	93	96	-	-	-	-	-	-
Total	96	219	315	85	106	191	84	116	200

Table 8b: Balancing tests for households with education costs only

Inferior of block of pcores	Pooled samples			Individual – non borrowers			Group-non borrowers		
	0	1	Total	0	1	Total	0	1	Total
<0.1	10	3	13	14	3	17	18	3	21
0.2	11	8	19	16	5	21	16	5	21
0.4	20	7	27	15	10	25	7	5	12
0.6	12	33	45	6	27	33	3	9	12
0.8	5	22	27	3	3	6	2	58	60
0.9	1	77	78	1	22	23	-	-	-
Total	59	150	209	55	70	125	46	80	126

Table 8c: Balancing tests for households with healthcare costs only

Inferior of block of p-scores	Pooled samples			Individual – non borrowers			Group-non borrowers		
	0	1	Total	0	1	Total	0	1	Total
<0.1	3	2	5	11	3	14	12	4	16
0.2	13	7	20	15	5	20	11	3	14
0.4	14	6	20	10	13	23	9	4	13
0.6	12	29	41	5	2	7	6	11	17
0.8	7	91	98	5	17	22	1	50	51
0.9	-	-	-	2	22	24	-	-	-
Total	49	135	184	48	62	110	39	72	111

4.4 Differential impact of access to credit on rural household poverty

The ATT calculated using the stratification and kernel matching alternatives are given in tables 9 and 10. The findings indicate that there is a tendency for borrowers to improve their living standard in the long-run, mainly through increased expenditure on education and health care. In table 10, borrowers seem to have spent more on education and health care. The results show a limited impact of credit on our short run indicators. Only for group based borrowers does credit seem to improve their income and to increase their farm expenditure. This is also not surprising as group based borrowers were less endowed than private borrowers.

It is somewhat surprising that expenditure on food in table 9 is significantly lower for borrowers than for non-borrowers. This may imply that borrowers tend to spend less on food and more on other goods, or alternatively, that their levels of home farm production are higher as a result of higher investments, which increases the subsistence food available to the household. This may also suggest that access to credit used in a productive way contributes to smooth consumption.

It needs to be remembered that the propensity score method attempts to reduce selection bias. The difference in income can therefore be attributed to access to credit, given that other factors are controlled for by the propensity scores. Unobservable factors such as entrepreneurship and attitudes towards work or risk may of course play a role, and we have not been able to control for such factors.

The robustness checks confirm the reliability of results. The impacts found on education expenses, healthcare expenses, total income and farming expenses and food consumption do not appear to depend critically on the algorithm used, since both the value of the coefficients and its significance are very similar using different alternatives.

>>>>> Insert table 9 and 10 about here

Table 9: ATT for income, assets, food consumption and livelihood expenditure

(1,000 dong)

	Pooled model		Individual-Non borrowers		Group -Non borrowers	
	Stratification	Kernel	Stratification	Kernel	Stratification	Kernel
Total income (1000 dong)	-9066 (30880) [28878]	1544 (-) [12586]	-8349 (21157) [21775]	4222 (-) [17488]	39224*** (9617) [12381]	40794*** (-) [11230]
Asset total (1000 dong)	-151000 (259000) [234000]	-72800 (-) [14800]	-214000 (228000) [256000]	-136000 (-) [187000]	45119 (196000) [147000]	151000 (-) [130000]
Food expenses (1000 dong)	-2678** (1408) [1512]	-1947 (-) [1394]	-2738 (2014) [2049]	-1832 (-) [1670]	213 (3374) [2781]	1023 (-) [3018]
Food per person (1000 dong)	-175 (262) [241]	-109 (-) [314]	-216 (349) [360]	-104 (-) [420]	243 (678) [566]	474 (-) [544]
Farming expenses (1000 dong)	-7437 (11819) [10169]	-3842 (-) [6067]	-6945 (8900) [8767]	-2650 (-) [6892]	9714*** (2992) [3321]	10875*** (-) [4578]
Nonfarm expenses (1000 dong)	2395 (2254) [2208]	1844 (-) [4617]	-7385 (9169) [10110]	-5080 (-) [6312]	4465 (3511) [3642]	4406 (-) [3158]
Off-farm expense (1000 dong)	1144 (3134) [3084]	523 (-) [6862]	-1762 (3755) [3934]	-1453 (-) [5072]	3428 (3330) [4742]	4010 (-) [7181]
<i>n</i>	315	315	191	191	200	200

Notes: Standard errors in parentheses, bootstrapped clustered errors in the brackets.

*: Significant at 10%; **: Significant at 5%; ***: Significant at 1%.

Table 10: ATT for subsample of households with real education and health costs**(1,000 dong)**

	Pooled model		Individual-Non borrowers		Group -Non borrowers	
	Stratification	Kernel	Stratification	Kernel	Stratification	Kernel
Education costs (1000 dong)	2684 ^{***} (-) [1384]	2109 ^{**} (-) [1456]	2231 ^{***} (-) [1493]	848 [*] (-) [2836]	3497 ^{***} (824) [1480]	3403 ^{***} (-) [1264]
Education per person (1000 dong)	631 ^{***} (-) [283]	502 ^{**} (-) [293]	700 ^{***} (-) [319]	490 ^{***} (-) [468]	522 ^{***} (179) [267]	569 ^{***} (-) [253]
Health costs (1000 dong)	1087 ^{***} (292) [325]	1078 ^{***} (-) [371]	590 ^{***} (455) [501]	599 [*] (-) [613]	1572 ^{***} (284) [1183]	1497 ^{***} (-) [440]
Health per person (1000 dong)	236 ^{***} (73) [79]	263 ^{***} (-) [73]	470 ^{***} (102) [114]	479 [*] (-) [308]	640 ^{***} (-) [197]	631 ^{***} (-) [141]
n	209	209	125	125	111	111

Notes: The ATT of indicators are calculated by sub-sample models regarding to households only with real expenses on education and health.

Standard errors in parentheses, bootstrapped clustered errors in the brackets.

*: Significant at 10%; **: Significant at 5%; ***: Significant at 1%.

5. Conclusions and implications

This paper investigates the impact of access to formal credit on household likelihood indicators in the Mekong Delta in Vietnam. A comparison is made between borrowers, both individual and group-based, and non-borrowers for a sample of rural households using a propensity score matching approach. From the descriptive, it is clear that individual borrowers are among the richer households in the area; in particular, they are better endowed in land and assets, while group-based borrowers are poorer. These latter tend to have lower education levels and less land compared to the control group. Overall, proximity to the market center, marital status and the province where the households live seemed to be important determinants of access to credit.

The findings on the treatment effect suggest that group based borrowers are better off in terms of income and farm expenditures. Expenditures on health care and education, considered to be long-term livelihood investments, are higher for borrowers than for non-borrowers. This would imply that access to credit has a particularly beneficial effect on improving the living standards of children in the household. And, in turn this improvement may improve the overall household

welfare and wellbeing. These findings confirm the findings of Diagne and Zeller (2001), Navajas et al. (2000), and Dunn (1999).

Comparison of the credit provision vehicles is also interesting. In one case, group-based borrowers seem to increase farming expense levels and households income. This result is consistent with Cuong et al. (2007), Duong and Izumida (2002), Chen and Snodgrass (2001), and Robinson (2001). In the other case, individual borrowers did not report higher income, asset or investment levels, but they seemed to make a clear choice for improved levels of wellbeing.

While we would assume that the demand for credit by the poorest households is largely for emergency credit to support consumption and to reduce vulnerability to various risks, the results suggest that the households in our study invest in areas that will be productive in the future. Furthermore, the results suggest that rural households do not increase spending on food. The borrowers tend to spend less on food than the control group. We are still puzzled by this result. One possible explanation is that credit is invested in agricultural production which increases the production of food to meet household subsistence needs, but this is not confirmed by the data as shown by the non-significant effect of credit on farm expenditure. Alternatively, all else being equal, it is possible that rural households also cut down on food in a short term strategy to save to repay their debts. Another possible explanation is that if the loan granted is not enough for the intended investment, the households reduce food consumption in order to make up for the shortfall.

Three more issues deserve our attention: the lack of access of poor households to individual credit, the importance of remoteness in access to credit and the lack of evidence of credit used to increase income and investment in income generating activities. Individual loans seem not be accessible to poorer households with limited collateral. Poor rural households are required to borrow in groups which themselves act as collateral for the lending institutions i.e. group pressure to repay replaces formal collateral (Armendariz and Morduch, 2005). Furthermore, remote rural

households seem not to be adequately served by the formal banking institutions. Finally, little evidence is found that credit consistently increases income and expenditure in any of farming, nonfarm or off-farm activities in the short term. While this may be due to unobservable factors which we could not control for in the analysis, the lack of short-term response to credit suggests that credit alone is not sufficient to improve the living conditions of the rural households. Many clients of formal credit programs face a lack of skills and training, and limited access to markets and technology. As a result, when these households have access to credit to invest in human capital or start-up new businesses or firms, the sustainability of these businesses becomes a topic of consideration. It is very important for the financial institutions to facilitate or directly involve themselves in “credit plus” services that may contain skill development/training, marketing facilities and business development services to their customers to help them to sustain the economic activities supported by their financial schemes. However, the planning and evaluation of such services are issues for future research. An important related issue would be to investigate whether individual or group lending systems would be most appropriate for organizing these services.

REFERENCES

- Agribank (2008). Foundation and Development of Agribank. Available at <http://www.agribank.com.vn/Agribank/eIntro/Introduction.aspx?CatID=23>. Accessed on March 16th, 2010.
- Ang, M. H. (2004). Empowering the poor through microcredit. *International Journal of Entrepreneurship and Innovation Management*, 4(5): 485-494.
- Ardington, C., D. Lam and J. Levinsohn (2004). Savings, Insurance and Debt over the Post-Apartheid Period: a review of recent research. CSSR Working Paper No. 65, University of Cape Town.
- Armendariz, B. A. and J. Morduch (2005). *The economics of microfinance*. London MIT press.
- Becker, S. O. and A. Ichino (2002). Estimation of average treatment effects based on propensity scores. *The Stata Journal* 2(4): 358-377.
- Bell, C., T. N. Srinivasan and C. Udry (1997). Rationing, Spill over and interlinking in Credit Markets: The Case of Rural Punjab. *Oxford Economic Papers* 49(4): 557-585.
- Binswanger, H. P. and S. R. Khandker (1995). The impact of formal finance on the rural economy of India. *Journal of Development Studies* 32(2): 234-262.
- Caliendo, M. and S. Kopeinig (2005). Some practical Guidance for the Implementation Propensity Score Matching. Discussion paper No.1588 of Forschungsinstitut zur Zukunft der Arbeit Institute for the Study of Labor, Bonn Germany, May 2005.
- Chemin, M. (2008). The benefits and costs of microfinance: Evidence from Bangladesh. *Journal of Development Studies* 44(4): 463-482.
- Chen, M. A. and D. Snodgrass (2001). Managing resources, activities, and risk in urban India: the impact of SEWA Bank. Washington D.C.: AIMS, September 2001.

- Chowdhury, M. J. A. (2008). Poverty and Microfinance: An investigation into the role of Microcredit in Reducing the Poverty Level of Borrowing Households in Bangladesh and The Philippines. *The Whitehead Journal of Diplomacy and International Relations*. No 19 Summer/Fall 2008. .
- Cochran, W. G. and D. B. Rubin (1973). Controlling Bias in Observational Studies: A Review. *The Indian Journal of Statistic* 35(4): 417-446.
- Coleman, B. E. (1999). The impact of group lending in Northeast Thailand. *Journal of Development Economics* 60(1): 105-141.
- Cuong, N. V., P. M. Thu and P. M. Nguyet (2007). Poverty Targeting and Impact of a Governmental Micro Credit Program in Vietnam. *Poverty and Economic Policy Research Network Working paper No. PMMA – 2007 – 2009*.
- Dallimore, A. and M. Mgiteti (2003). Democratic Banking in the New South Africa: Challenging Contemporary Banking Practices at Grass Roots. Unpublished Report, Durban: Development Research Africa, February, 2003.
- Dang, N. H. and V. T. Danh (2008). An Overview of The Development of The Agricultural Economy in The Mekong Delta. In: *Economic Development of the Mekong Delta in Vietnam*. M. V. Nam and R. Lensink (eds), University of Groningen, Centre for Development Studies (CDS), pp.31-50.
- Dehejia, R. and S. Wahba (1999). Causal Effects in Non-experimental Studies: Reevaluating the Evaluation of Training Programs. *Journal of the American Statistical Association* 98(448): 1053-1062.
- Diagne, A. and M. Zeller (2001) Access to credit and its impact on Welfare in Malawi. Research report 116, International Food Policy Research Institute, Washington D.C.
- Dunn, E. (1999). Microfinance Clients in Lima, Peru: Baseline Report for AIMS Core Impact Assessment. University of Missouri-Columbia. <http://www.mip.org>.
- Duong, P. B. and Y. Izumida (2002). Rural development finance in Vietnam: A microeconomic analysis of household surveys. *World Development* 30(2): 319-335.
- GSO (2010). General Statistics Office: Statistical Yearbook of Vietnam 2008 (in Vietnamese). Statistical Publishing House, Hanoi.
- GSO (2009). General Statistics Office Statistical Yearbook of Vietnam 2008 (in Vietnamese). . Statistical Publishing House, Hanoi.
- Ha, N. T. T. (1999). An analysis of informal versus formal microfinance for the poor in Vietnam. The Vietnamese – Netherlands Master's program in development economics, Class 6 (1999-2001).
- Heckman, J. J., H. Ichimura, J. Smith and P. Todd (1997). Characterization of Selection Bias Using Experimental Data. *Econometrica*. 66(5): 1017-1098.
- Heckman, J. J., H. Ichimura and P. Todd (1998). Matching as an econometric evaluation estimator. *Review of Economic Studies* 65(2): 261-294.
- Heidhues, F. (1995). Rural Finance Markets: An Important Tool to Fight Poverty. *Quarterly Journal of International Agriculture* 34(2): 105-108.
- Heinrich, C., A. Maffioli and G. Vazquez (2010). A primer for Applying Propensity Score Matching. Impact Evaluation Guidelines Technical Notes. No.IDB-TN-161. August 2010.
- Hossain, M. and C. B. Diaz (1997). Reaching the Poor with Effective Microcredit: Evaluation of a Grameen Bank Replication in the Philippines. *Philippine Sociological Review* 45(1-4): 89-121.
- Hulme, D. and P. Mosley (1996). Finance against Poverty: Effective Institutions for Lending to small Farmers and Micro-enterprises in Developing Countries. London: Routledge.
- Islam, T. (2007). Microcredit and poverty alleviation, Aldershot, England. Burlington, U.S.A., Ashgate Publishing.
- Izumida, Y. (2003). Programmed Lending for Social Policies: Challenges for Vietnam Bank for Social Policies. Working Paper Series No.03-F-02. Department of Agricultural and Resource Economics, The University of Tokyo, Japan.
- Kaboski, J. and R. Townsend (2002). Policies and impact: an analysis of village-level microfinance institutions. mimeo, University of Chicago.
- Khandker, S. R. (2001). Does Micro-Finance Really Benefit the Poor? Evidence from Bangladesh. Paper delivered at Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction. help by the Asian Development Bank. Manila.
- Khandker, S. R. (2005). Micro finance and Poverty: Evidence using Panel data from Bangladesh. *World Bank Economic Review* 19(2): 263-286.
- Kochar, A. (1997). An Empirical Investigation of Rationing Constraints in Rural Credit Markets in India. *Journal of Development Economics* 53(2): 339-371.
- Llanto, G. M. (2000). Vietnam. The Role of Central Bank in Microfinance in Asia and the Pacific: Countries Study. A. Seki, Asia Development Bank, 2: 331-356.
- MDPA (2004). Mekong Delta Poverty Analysis Mekong Poverty Report,. <http://www.ausaid.gov.au/publications/pdf/mekong_poverty_report_04.pdf>.

- Moll, H. A. J. (2000). Banks in Rural Financial Markets Wageningen: Wageningen University Press.
- Momen, M. D. N. and M. M. Begum (2006). Impact of Microcredit Program for Women Development in Bangladesh: A Case Study of BRAC. *Asian Journal of Information Technology*, 5(11): 1269-1283.
- Montel, M. C., R. Talon, J. L. Berdague and M. Cantonnet (1993). Effects Of Starter Cultures On The Bioschemical Characteristics Of French Dry Sausages. *Meat Science* 35(2): 229-240.
- Morduch, J. (1999). The microfinance promise. *Journal of Economic Literature* 37(4): 1569-1614.
- Morduch, J. and B. Haley (2002) Analysis of the Effects of Microfinance on Poverty Reduction.
- Moser, S. C. (2005). Impact assessment and policy response to sea level rise in three US states: An exploration of human dimension uncertainties. *Global Environmental Change* 15(353-369).
- Mourji, F. (2000). Impact study of the Zakoura microcredit program. Microfinance Gateway. Retrieved from <http://www.microfinancegateway.org/p/site/m//template.rc/1.9.25435>.
- Navajas, S., M. Schreiner, R. L. Meyer, C. Gonzalez-Vega and J. Rodriguez-Meza (2000). Microcredit and the poorest of the poor: Theory and evidence from Bolivia. *World Development* 28(2): 333-346.
- Ngan, N. V. (2003). Determinants of access to formal and informal credits in Chau Thanh A district, Can Tho provinces.
- Nguyen, M. H. (2001). Effect of Farmer's Education on Household's Access to Formal Credit: A Case of Vietnam Rural.
- Nguyen, T. M. H. and T. Kawaguchi (2002). Overview of Rice Production in the Mekong Delta – Vietnam. *Journal Faculty Agriculture Kyushu University* 47(1): 221-231.
- Okurut, F. N. (2006). Access to credit by the poor in South Africa: Evidence from Household Survey Data 1995 and 2000. Stellenbosch economic working papers: 13/2006.
- Pitt, M. M., S. R. Khandker, O. H. Chowdhury and D. L. Millimet (2003). Credit programs for the poor and the health status of children in rural Bangladesh. *International Economic Review* 44(1): 87-118.
- Putzeys, R. (2002). Microfinance in Vietnam: Three Case Studies. Rural Project Development, Hanoi 2002.
- Quach, M. H., A. W. Mullineux and V. Murinde (2003). Microcredit and Household Poverty Reduction in Rural Vietnam. Paper presented at the DSA Conference in Glasgow, 10-12th September 2003 and at the ESRC conference in Manchester 31st, October, 2003.
- Ravallion, M. and D. V. D. Walle (2008). Land and Poverty in Reforming East Asia: Lessons from Vietnam's agrarian reforms. Finance and Development, International Monetary Fund 45.
- Robinson, M. (2001). The Micro-finance Revolution: Sustainable Finance for the Poor. Washington D.C. World Bank.
- Rosenbaum, P. R. and D. B. Rubin (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika* 70: 41-50.
- Smith, J. A. and P. E. Todd (2005). Does matching overcome LaLonde's critique of nonexperimental estimators? *Journal of Econometrics* 125(1-2): 305-353.
- Swain, R. B., N. V. Sanh and V. V. Tuan (2008). Microfinance and poverty reduction in the Mekong Delta in Vietnam. *African and Asian Studies* 7(2-3): 191-215.
- Vaessen, J. (2001). Accessibility of Rural Credit in Northern Nicaragua: The Importance of Networks of Information and Recommendation. *Savings and Development* 25(1): 5-31.
- VPA (2002) Vietnam Poverty Analysis Prepared for the Australian Agency for International Development by the Centre for International Economics, Canberra and Sydney. Access by website: <http://siteresources.worldbank.org/INTVIETNAM/Resources/Vietnam-Poverty-Analysis.pdf>.
- VPER (2004). Vietnam Public Expenditure Review and Integrated Fiduciary Assessment draft version, October 5. World Bank.
- Vu, T. T. H. (2001). Determinants of Rural Households' Borrowing from the Formal Financial Sector: A study of the rural credit market in Red river delta region.
- WB (2009). World Bank Development Report 2009. Spatial Disparities and Development Policy. <http://siteresources.worldbank.org/INTWDR2009/Resources/Outline.pdf>.
- WHO (2001). World Health Organization: country website for Vietnam. Access at <http://www3.who.int/whosis/country>.
- Zaman, H. (1999). Assessing the Poverty and Vulnerability Impact of Micro-credit in Bangladesh: A case study of BRAC. Policy Research Working Paper No.2145, Washington DC: The World Bank.
- Zeller, M., M. Sharma, C. Henry and C. Lapenu (2001). An Operational Tool for Evaluating Poverty Outreach of Development Policies and Projects. Food Consumption and Nutrition Division, International Food Policy Research Institute, Washington, DC, USA, Discussion Paper (www.ifpri.org/fcnd). 111, 45.