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Ex Post Monitoring and Loan Repayment Performance in Rural Vietnam

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Abstract

Loan monitoring is a fundamental element of credit control. The importance of loan monitoring is to reduce loan defaults and to increase loan repayment performance. The ex-post monitoring can also increase the loan quality and thus a concern to many creditors in the market economy. This study identifies the role of ex-post monitoring on loan repayment performance in the context of rural Vietnam. Employing primary data from rural areas of Vietnam, this study investigates the impacts of ex-post monitoring on loan repayment performance of individual borrowers in terms of on-time loan repayment and the rate of loan repayment. Descriptions of borrower demographics, loan information, and ex-post monitoring show the initial picture of borrowers and loans in Vietnam's rural areas. Quantitative estimations that use the Probit and the Tobit model confirm the argument that better ex-post monitoring would result in better loan repayment performance in both on-time repayment and repayment rate. Thus, some policy suggestions have been made to improve the monitoring system in each financial institution. The study also indicates that some other factors too affect loan repayment performance such as borrower's characteristics (education, agricultural working area, and income) as well as loan's characteristics (loan size, maturity, and loan purpose).

Keywords: Loan, Ex Post Monitoring, Disbursement, Creditor, Microfinance

JEL Classification Code: C21, G21, O16, P25

1. Introduction

The importance of the financial sector in contributing to the development not only of the financial system but also of the economy has been widely discussed. It indicates the macro and micro role of the financial sector in economic development (Kumar et al., 2018). As a part of the financial sector, commercial banks play an important role in supplying capital as well as other financial services to the economy. In developing countries, credit is one of the most important businesses of commercial banks. Earnings from providing

credit to businesses account for the largest part of commercial banks' income/revenue among others. The creation of credit or deposits is one of the most important functions of commercial banks. Like other corporations, banks aim at earning profits. For this purpose, they accept cash-in-demand deposits and advance loans on credit to customers. However, credit can also bring risks to commercial banks, and increase non-performing loans. A nonperforming loan (NPL) is a loan in which the borrower is in default due to the fact that they have not made the scheduled payments for a specified period. NPLs are always the main concern while credit risk can affect bank stability, which in turn may impact economic growth (Chand et al., 2021; Isnurhadi et al., 2021). Financial institutions use credit risk analysis models to determine the probability of default of a potential borrower. The models provide information on the level of a borrower's credit risk at any particular time. If the lender fails to detect the credit risk in advance, it exposes them to the risk of default and loss of funds. Lenders rely on the validation provided by credit risk analysis models to make key lending decisions on whether or not to extend credit to the borrower and the credit to be charged (Hundie et al., 2004).

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In the competitive market, loan quality is crucial to the existence of commercial banks. Thus, banks have to effectively control non-performing loans. Banks, being highly leveraged entities, have much less room to maneuver any fall in operating margins (i.e., the surplus of interest income over interest expenses—also known as net interest margin), something rising non-performing loans result in. As such, it is important that actual non-performing loan levels are monitored and controlled regularly and closely—both by the banks themselves and the regulators. Moreover, since banks make less income on the remaining portion of good loans the cost of the bad loans is passed on partly by charging higher interest on the good loans. Therefore, good borrowers have to pay higher levels of interest; this impacts the probability of on-time loan repayment and the rate of loan repayment. In developing economies, financial institutions face poor loan repayment, especially in rural areas where customers' (borrowers/creditors) earnings mostly come from agricultural products, whereas the price of products always fluctuates (Jung, 2018). The importance of an effective loan monitoring system has been mentioned in the literature. In the context of providing credit to the rural and poor areas, banking principles with an effective monitoring system may help to reduce non-performing loans (Agbeko et al., 2017). To get loans, customers have to clarify their purpose of using loans, which is used by the banks to decide whether they should give loans or not. However, in many cases, customers do not use loans for the right purpose as stated, thus banks must monitor to ensure the bank's investment is protected. Perhaps the most obvious reason to monitor a portfolio is that banks want to avoid loan losses. Effective borrower monitoring is, therefore, necessary to detect which loans are likely to become stressed, and which loans might default and lead to financial loss (Widarjono et al., 2020).

The monitoring system especially ex-post monitoring may improve the effectiveness of loan usage, which may increase the loan repayment rate. In the literature, however, empirical research still gives inclusive results. This paper, therefore, empirically examines the impact of ex-post monitoring on loan repayment performance in rural Vietnam. Using primary data of individual customers of commercial banks in rural Vietnam, the paper includes a two-part analysis. The first part is descriptive statistics of the data collected. Ex-post monitoring activities and the loan repayment performance are the two main constructs (variables) in this part while taking into account customers' and loan characteristics. The second part of the analysis focuses on quantitative estimations of the impact of ex-post monitoring on loan repayment performance. This part investigates the effects of ex-post monitoring on two sub-constructs (variables): the probability of repaying the loan

and the rate of repayment. These two sub-constructs/variables will show the relation between the ex-post monitoring and repayment performance. This study will contribute to the literature on the role and impact of ex-post monitoring on loan repayment performance in rural Vietnam, which is not a popular topic for research in Vietnam. Policymakers and financial institution managers can employ the findings of this paper to introduce appropriate policies concerning ex-post monitoring in controlling the loan repayment performance in rural areas.

The next section will introduce the literature review of the study. Then, it is followed by the methodology employed, which is shown in the third section. Section 4 is for empirical results of the study while the last section concludes the paper.

2. Literature Review

Ex-post loan monitoring involves a procedure of reporting and disclosure that indicates a minimum standard of communication between customers and financial institutions. Regular submission of financial reports, borrowing-based certificates, and receipt of buying things (of the borrowers), or even regularly visiting (by bank staff) borrowers can be included in the monitoring procedure. In some cases, banks can impose some restrictions on borrowers as to what they can do or what they cannot do with loans, collateral, and business.

The results of studies on monitoring and loan repayment performance remain inconclusive. Nawai and Shariff, (2012) found that the number of times that financial institution employees visit the borrower's business in a month has a negative impact on loan repayment performance. On the other hand, Agbeko et al. (2017) found that monitoring does improve repayment rates, irrespective of the borrowers' educational level, business experience, or gender. Even though the use of monitoring variables varies, most studies agree that loan monitoring will improve the loan repayment performance (Okorie, 1986; Wongnaa & Awunyo-Vitor, 2013; Dorfleitner & Oswald, 2016; Agbeko et al., 2017). Some authors used the number of supervisory visits of institutional finance employees after loan disbursement as the monitoring variable (Okorie, 1986; Wongnaa & Awunyo-Vitor, 2013; Nawai & Shariff, 2012). In Vietnam, there are not many studies that focus on the role of ex-post loan monitoring on loan repayment performance. This would be the gap in the literature. The study forms two hypotheses relating to ex-post monitoring and loan repayment:

H1: Higher number of creditor visits to monitor borrower business will associate with a higher probability of on-time loan repayment.

H2: Higher number of creditor visits to monitor borrower business will associate with a higher rate of on-time loan repayment.

Most of the monitoring literature focuses on other determinants of loan repayment rather than ex-post monitoring. Generally, determinants of loan repayment in microfinance are classified into factor groups such as demographic factors of debtors, loan characteristics, and factors of financial institutions. First, in demographic determinants, age and gender are frequently used. While age has a statistically insignificant impact on loan repayment performance according to the studies of Nawai and Shariff (2012) and Shahriar et al. (2020) Other researchers have found a negative or positive impact of debtor age (Godquin, 2004; Georganakos & Fuerth, 2014; Dorfleitner et al., 2017). There are even some studies that found that there is no gender effect on loan repayment performance (Nawai & Shariff, 2012; Wongnaa & Awunyo-Vitor, 2013; Georganakos & Fuerth, 2014; Dorfleitner et al., 2017). Most studies found that female debtors have a higher tendency to pay debts on time (D’Espallier et al., 2011; Dorfleitner & Oswald, 2016; Chen et al., 2018; Shahriar et al., 2020). Other demographic determinants that are included in previous studies are the education of household head/firm head (Sharma & Zeller, 1997; Al-Azzam et al., 2012; Nawai & Shariff, 2012; Georganakos & Fuerth, 2014; Chen et al., 2018; Shahriar et al., 2020), marital status, employment status, income, siblings, religious, children, household size, distance to lender offices, credit score and risk-facing capacity (DeYoung et al., 2008; Al-Azzam et al., 2012; Wongnaa & Awunyo-Vitor, 2013; Georganakos & Fuerth, 2014; Carrizosa & Ryan, 2017; Bilau & St-Pierre, 2018; Shahriar et al., 2020). In general, research hypotheses relating to demographic variables will be:

H3: Female borrowers will have a higher probability and higher rate of on-time loan repayment.

H4: Younger borrowers will have a higher probability and higher rate of on-time loan repayment.

H5: Borrowers with higher education will have a higher probability and higher rate of on-time loan repayment.

H6: Borrowers who are single will have a lower probability and lower rate of on-time loan repayment.

H7: Borrowers who are working in the agricultural industry will have a higher probability and higher rate of on-time loan repayment.

H8: Higher-income borrowers will have a higher probability and higher rate of on-time loan repayment.

H9: Borrowers who are living in North Vietnam will have a higher probability and higher rate of on-time loan repayment, compared to those who live in the South.

H10: Borrowers who are living in Center Vietnam will have a higher probability and higher rate of on-time loan repayment, compared to those who live in the South.

Second, relating to loan characteristics, most studies focus on loan size, loan length, loan type, loan purposes, and government loan guarantee (Chand et al., 2020). In the case of loan repayment, loan size has a negative impact on repayment management (Godquin, 2004; Al-Azzam et al., 2012; Nawai & Shariff, 2012; Dorfleitner & Oswald, 2016). It indicates that the size of the loan may reduce the probability of on-time repayment. Duration of loan is also considered a determinant of loan repayment performance. A longer loan may create more risk to the financial institution, which is compensated by the bank by charging a higher rate of interest. As a result, the loan repayment performance reduces as the duration of the loan increases (DeYoung et al., 2008; Dorfleitner & Oswald, 2016). In addition, loan types differently affect loan repayment performance. Debtors who give collateral to banks seem to have a higher probability to repay loans on time (Okorie, 1986; Antwi et al., 2012; Georganakos & Fuerth, 2014). Another loan characteristic that can affect loan repayment is the purpose of loans. Different purposes can generate diverse impacts on loan repayment performance. Dorfleitner et al. (2017) found that farmers who get agricultural microloans for irrigation purposes have higher loan repayment performance than those who take loans for the purpose of agricultural production. The policy relating to loans such as a government loan guarantee which ensures creditors receive on-time repayment (apply to high-risk loans) reduces the loan repayment performance (DeYoung et al., 2008). Some hypotheses for loan characteristics will be:

H11: Larger loans will have a lower probability and a lower rate of on-time loan repayment.

H12: Loans with a larger duration will have a lower probability and a lower rate of on-time loan repayment.

H13: Collateral loans will have a higher probability and higher rate of on-time loan repayment.

H14: Loans for agricultural purposes will have a lower probability and lower rate of on-time loan repayment.

3. Data and Methodology

All individual loan data used in this study has been collected from the Vietnam Bank for Agriculture and Rural Development (Agribank), which is the last state-owned bank in Vietnam and which covers the largest market share in rural Vietnam (GSO, 2020). Based on the profiles documented at Agribank on December, 31st 2019, a sample of 720 observations has been randomly selected for

analysis. Customers are from 2015 and by the end of 2019, they have not closed (that is loan is still is outstanding) their loans. The data set contains demographic information of borrowers as well as loan files. All details of borrowers such as age, gender, marital status, children, job, etc. are clearly and carefully documented. Loan information is also detailed in credit contracts. Regional variables are identified based on the classification of the General Statistics Office (GSO, 2020).

Loan repayment performance is considered by two measures. The first measure is loan default before maturity. It means that if borrowers repay loans on time, this variable receives the value of 1; otherwise, this variable will be zero. The second measure is the percentage of actual repayment to total required repayment within the period. This is a continuous variable and ranges from zero to 1.

For analytical purposes, independent variables relating to borrower demographics, loan characteristics, and creditor information will be used. The description of the variables used is shown in Table 1.

To estimate the impacts of ex-post monitoring on loan repayment performance, the study will use two estimation methods in accordance with two dependent variables. When the dependent variables are in their range, OLS may generate biased and inconsistent estimates. So, for binary default indicator (LDI) which receives zero or 1, the Probit model is employed. A Probit or Logit model is properly employed for the binary dependent variable (Godquin, 2004; DeYoung et al., 2008; Georgarakos & Fuerth, 2014; Agbeko et al., 2017; Chen et al., 2018). The Tobit model will be used for the rate of loan repayment which is a continuous variable (Brehanu & Fufa, 2008). First, the Probit model is specified as follows:

The probability that the customer repays the loan on time: $p_i = P(\text{LDI} = 1)$.

The probability that the customer does not repay the loan on time: $1 - P_i = P(\text{LDI} = 0)$.

$$P(\text{LDI} = 1) = p_i = \frac{1}{1 + e^{\beta_i x_i}}$$

Table 1: Variable Description

Variables	Description	Expected Sign
Borrower Demographics		
Male	Dummy variable, 1 if the borrower is male	–
Age	Borrower age at the time the loan is signed, natural logarithm	–
High education	Dummy variable, 1 if the borrower has graduate or higher at the time the loan was granted	+
Single	Dummy variable, 1 if the borrower is single	–
Agriculture	Dummy variable, 1 if the borrower works in the agricultural industry	+
Income	Borrower income per month, natural logarithm	+
North	Dummy variable, 1 if the borrower lives in the North of Vietnam	+
Center	Dummy variable, 1 if the borrower lives in the Center of Vietnam	+
Loan Characteristics		
Loan size	Loan size, natural logarithm	–
Maturity	Loan Length in months, natural logarithm	–
Loan type	Dummy variable, 1 if the loans have collateral, otherwise	+
Loan purpose	Dummy variable, 1 if the loans are used for agricultural purposes	+
Creditor Information		
Ex post monitor	The number of times per year that the creditor visits and monitors the borrower business	+
Loan Repayment Performance		
LDI	Binary default indicator: 1 if loans are on-time repaid, and otherwise	
RLR	Rate of loan repayment, percentage of actual repayment to total required repayment until the time data collected	

$$P(\text{LDI} = 0) = 1 - p_i = \frac{e^{\beta_i x_i}}{1 + e^{\beta_i x_i}}$$

Where β_i 's and x_i are the coefficients and independent variables, respectively.

The odds ratio is expressed as follows:

$$\text{odds} = \frac{p_i}{1 - p_i}$$

The Probit model is formed by taking the natural logarithm of the odds ratio

$$\ln \left[\frac{P(\text{LDI} = 1)}{P(\text{LDI} = 0)} \right] = \beta_i x_i = y = f(x_i)$$

Where x_i : Male, Age, High education, Single, Agriculture, Income, North, Center, Loan size, Maturity, Loan type, Loan purpose, Ex post monitoring.

The interpretation of coefficients is as follows: β_i 's measure the change in probability of a customer's on-time repayment resulting from a change in the i^{th} independent variable.

Second, the Tobit model is specified as follows. The rate of loan repayment (RLR), which is the proportion of actual repayment to total required repayment ranges between 0 and 1. It is given as: $y_i^* = \beta'x_i + \varepsilon_i$, where y_i^* is not observed and ranges from $(-\infty; 0)$ to $(1; +\infty)$. If y_i is an observed variable, which is RLR and is censored in $[0;1]$ then (the lower value $\text{LV} = 0$ and the upper-value $\text{UV} = 1$). We have,

$$\begin{aligned} y_i &= 0 \text{ if } y_i^* \leq \text{LV} \\ y_i &= y_i^* \text{ if } \text{LV} \leq y_i^* \leq \text{UV} \\ y_i &= 1 \text{ if } y_i^* \geq \text{UV} \end{aligned}$$

The expected value of y_i^* , is expressed as follows:

$$E(y_i^* / x) = \beta'x$$

Where $\beta_i = \frac{\partial E(y_i^* / x_i)}{\partial x_i}$ measures the change in the proportion of loan repayment as a result of one unit change in the i^{th} explanatory variable.

Because $y \in [0;1]$, the conditional expected value of y is given by:

$$\begin{aligned} E(y_i / x_i, L < y^* < U) &= \beta_i x_i \\ &+ \sigma \frac{\theta\left(\frac{L - \beta_i x_i}{\sigma}\right) - \theta\left(\frac{U - \beta_i x_i}{\sigma}\right)}{\theta\left(\frac{U - \beta_i x_i}{\sigma}\right) - \theta\left(\frac{L - \beta_i x_i}{\sigma}\right)} \end{aligned}$$

Where θ follows a standard normal distribution and β_i 's express the direction of intensity change of loan repayment resulting from the change in explanatory variable i^{th} .

4. Empirical Results

4.1. Descriptive Statistics

The study shows that most debtors are male. Male borrowers account for around 64% of total customers in the data set (Table 2). This is familiar to those local areas in developing economies where the male is often the head of the family. There are only 24% of borrowers who are graduates or higher. This rate is relatively low compared to those in urban areas of Vietnam (GSO, 2020). Most borrowers are not single (76%) while most of them are working in the agricultural industry. In the data set, the majority of observations come from the North and South which account for 37% and 38%, respectively. Loans that are given against collateral account for 64%. These loans are mostly used for agricultural purposes (87%) while other purposes like consumption or asset purchase are less important. The number of times that creditors visit and monitor the borrower's business is rather low. The average 'number of times of visit' is only 1.59 for the overall survey. The standard deviation of monitoring is quite high compared to the average number. This may indicate that there is a large gap between visits (between some observations). The number of on-time paid loans and the rate of loan repayment are quite similar. These numbers are over 80% showing that a large number of borrowers repay loans on time.

The ex-post monitoring varies from one to six times per year. The detailed 'number of visits' is shown in Table 3.

The description indicates that in most cases, creditors do not monitor the loans after disbursement. There are 38.9% of cases that show 'no visit' and 23.6% show '1 visit' during the loan lifetime. 7.5%, 12.4%, and 6.3% of the cases show '2 visits', '3 visits', and '4 visits' per year, respectively. Frequent visits account for less proportion. 9.7% and 1.7% of borrowers receive 5 and 6 visits per year, respectively. This is because loan sizes are relatively small and a huge number of customers need to be served. The low number of employees can contribute to the small number of ex-post disbursement visits in rural areas of Vietnam.

4.2. Estimation Results

The estimation results have been computed in three steps to check the robustness. First, the estimations consist only of constant and ex-post monitoring variables (estimations (1) and (4)). Then, borrowers' characteristics have been added to the models (estimations (2) and (5)). Last, a full set of independent variables are employed (estimations (3) and (6)).

Table 2: Description of Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Male	720	0	1	0.64	0.42
Age	720	3.22	4.09	3.56	1.03
High education	720	0	1	0.21	0.47
Single	720	0	1	0.24	0.39
Agriculture	720	0	1	0.62	0.54
Income	720	1.61	3.92	2.30	0.76
North	720	0	1	0.37	0.48
Center	720	0	1	0.25	0.43
Loan size	720	2.30	7.58	3.21	2.84
Maturity	720	0.69	4.29	3.43	1.09
Loan type	720	0	1	0.64	0.50
Loan purpose	720	0	1	0.87	0.45
Ex post monitor	720	0	6	1.59	2.16
LDI	720	0	1	0.81	0.42
RLR	720	0	1.00	0.85	0.23

Table 3: Ex post monitoring

Number of Ex Post Monitoring	Frequency	Percentage (%)
0	280	38.9
1	170	23.6
2	54	7.5
3	89	12.4
4	45	6.3
5	70	9.7
6	12	1.7
Total	720	100

The results indicate that the robust results are sufficiently confirmed (Table 4).

First, the 1st and 2nd hypotheses are strongly supported. The results confirm the argument that monitoring would improve the loan repayment performance. Ex-post monitoring positively affects both the probability of on-time loan repayment and loan repayment rate. This result is in accordance with previous studies (Okorie, 1986; Wongnaa & Awunyo-Vitor, 2013; Dorfleitner & Oswald, 2016; Agbeko et al., 2017). The more frequently the creditor visits, the higher the probability that borrowers can pay. Visiting and monitoring can help creditors to minimize the risk of

non-payable loans by checks and revision of customer business. Frequent monitoring may also remind borrowers of their duty in repaying debt as well as adequate usage of loans.

Second, the results show that controlled variables have a less significant impact on loan repayment. Most borrowers' demographic variables have no impact on loan repayment performance. It means that there is no significant evidence to confirm those hypotheses relating to borrowers' demographics. The 3rd hypothesis cannot be confirmed since male and female borrowers share the same probability of on-time loan repayment. The findings of gender effects are similar to the results of Nawai and Shariff (2012), Wongnaa and Awunyo-Vitor (2013), Georganakos and Fuerth (2014), and Dorfleitner et al. (2017). Two other hypotheses, the 4th and 6th are rejected. Age and marital status are found to have no impact on loan repayment and this is supported by Nawai and Shariff (2012), Wongnaa and Awunyo-Vitor (2013), Georganakos, and Fuerth (2014), Dorfleitner et al. (2017), and Shahriar et al. (2020). Higher education seems to reduce loan default while this variable has no significant impact on the rate of loan repayment. This result partly confirms the 5th hypothesis. The 7th and 8th hypotheses cannot be fully rejected. Borrower income and occupation have an impact on the rate of loan repayment but not on the probability of on-time loan repayment. This indicates that higher-income debtors tend to have a higher rate of loan repayment since their income can cover not only due but also advance repayment. Higher income results in a lower

Table 4: Estimates of Probit and Tobit Models

Variables	Probit Model Dependent Variable: LDI			Tobit Model Dependent Variable: RLR		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.246	0.353	0.475	0.076	-0.121	0.142
Ex post monitoring	0.509***	0.754**	0.678	0.312**	0.201*	0.107**
Borrower's Characteristics						
Male		0.345	-0.415		-0.221	-0.010
Age		0.564	0.419		0.078	0.104
High education		0.602***	0.741		0.128	0.048
Single		-0.349	0.125		0.345	0.111
Agriculture		-0.344	-0.451		0.332***	0.058**
Income		0.672	0.787		-0.265***	-0.211***
North		-0.532	0.214		-0.019	0.045
Center		-0.324	0.084		0.256	0.147
Loan Characteristics						
Loan size			-0.780			-0.102***
Maturity			-0.081			-0.017***
Loan type			0.820			-0.002
Loan purpose			0.870			-0.450

Note: ***, **, and * indicate significant at 1%, 5%, and 10% level of significance based-on *t*-statistics.

rate of loan repayment. This result is different from previous studies (Nawai & Shariff, 2012; Wongnaa & Awunyo-Vitor, 2013; Georgarakos & Fuerth, 2014; Dorfleitner et al., 2017). This is explainable that high-income borrowers tend to have bigger credit, which requires regular repayment. Whenever the borrowers cannot repay one or more debts, the rate of loan repayment would increase sharply. Borrowers who work in the agricultural industry have a higher rate of loan repayment. This is because these debtors have experienced unstable income from agricultural production in Vietnam. Whenever these debtors receive the income they prefer to close their loan to ensure their creditability. The location of debtors seems to have little effect on the probability of on-time loan repayment and has no impact on the rate of on-time loan repayment. The 10th hypothesis is rejected while the 11th hypothesis is partly accepted. The two largest rice delta in Vietnam is located in the North and the South of Vietnam. Debtors located in these two regions may share the same characteristics for repayment of their loans and thus they behave indifferently. The Center of Vietnam, on other hand, faces more extreme weather as well as mountainous terrain, which negatively affect agricultural production. Unfavorable conditions may force debtors to repay their debts on time.

Loan size and loan maturity have a negative impact on the rate of loan repayment while these variables have no impact on the probability of on-time repayment. So, the 12th and 13th hypotheses are partly accepted. This indicates that the bigger the loan, the loan can increase the risk of loan repayment or reduce the rate of loan repayment. These findings are similar to those of Godquin (2004), Nawai and Shariff (2012), and Dorfleitner and Oswald (2016). Relating to loan characteristics, loan type and loan purpose are significantly uncorrelated to the probability of on-time loan repayment and rate of loan repayment. The 14th hypothesis is rejected. This is not in accordance with the study of Antwi et al. (2012) and Georgarakos & Fuerth (2014). In addition, the first part of the 15th hypothesis is accepted. It means that loan purpose has a significant impact on loan repayment performance. If the borrowers use loans for agricultural cultivation, the borrowers have a higher probability to repay their loans on time (DeYoung et al., 2008).

5. Conclusion

The impacts of ex-post monitoring on loan repayment performance are investigated through the data description

(descriptive statistics) and econometric model. The data set is extracted from customer files across rural Vietnam and in total, there are 720 observations in the North, the Center, and the South included in the sample. The data focus on borrowers' characteristics, loan information, ex-post monitoring of financial institutions, and loan repayment performance. Data description shows the relevant characteristics of customers/borrowers and loans. It also indicates the number of times creditors use the monitoring system to check the customers' usage of loans. In addition, the Probit and the Tobit models are used to estimate the impact of ex-post monitoring on the probability of on-time loan repayment and the loan repayment rate, respectively. The results indicate that monitoring can help financial institutions in rural Vietnam limit their outstanding/delinquent loans. When creditors pay more attention to the ex-post monitoring, the borrowers would increase their loan repayment performance. Higher ex-post monitoring will increase the probability of on-time loan repayment as well as the rate of loan repayment. This may imply that to strengthen the monitoring ability, financial institutions should construct an early alarm system, which can alert customers to use their loans properly. Regular and unexpected visits for monitoring borrowers/debtors should be applied for early discovery of unhealthy loans. Higher responsibility should be imposed on employees (creditors/bank employees) who have duties to monitor loans. This would lower the possibility of outstanding loans. Some other determinants of loan repayment performance such as borrower education, income, loan size, maturity, loan type, and loan purpose are found in the study and this finding would be beneficial to banks and financial institutions providing credit.

The limitation of this study is that the sample size is relatively small compared to the whole population. The sample does not cover all financial institutions in rural areas of Vietnam. However, including big sample size (by covering almost all financial institutions in rural areas) may result in many insignificant variables, and the research model can miss some important determinants of loan repayment performance in rural Vietnam. Future research can focus on a smaller scope of borrowers but concentrate on smaller geographic areas as well as a specific group of customers. In addition, borrower types can be classified in more detail rather than two groups as mentioned in this paper.

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