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from formal credit market?**

**--The case of Vietnam--**

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# **What factors determine whether SMEs obtain credit from formal credit market? The case of Vietnam**

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## **Abstract**

This paper aims to find the answers to the question: “Which factors are important in determining whether SMEs access the formal credit market, and what determines SMEs’ satisfaction levels after applying for formal credit?”. By using a survey of Vietnamese SMEs conducted from 2005 to 2013, this study provides a wider view and presents new evidence regarding determinants of access to formal credit before and after the global crisis in 2008. The study outlines the process, from applying for a formal loan to being satisfied with that loan. Three empirical models have been devised based on the decision processes: the application stage, the approval stage, and the satisfaction stage. The empirical results show that banking relationships and the business environment were important factors when applying for formal credit as well as in credit obtainment. However, positive measures of firms’ performance, such as high return on assets scores and sales growth, did not have a significant influence on whether firms obtained credit. Furthermore, Vietnamese formal financial institutions were found to depend too much on collateral assets in assessing whether to supply credit.

**Keywords:** SMEs, formal credit, credit constraint, Vietnam

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## **1. Introduction**

This paper aims to find out what determines Vietnamese small and medium enterprises' (VSMEs) access to formal credit and obtainment of loans from formal credit channels. These purposes are motivated by three main factors. First, accounting for 98% of total enterprises in Vietnam, 35% of total investment and contributing 40% of GDP (GSO, 2015), VSMEs have convincingly demonstrated their ability and benefit to the economy. However, VSMEs have been coping with many constraints, with lack of capital being the main problem hampering growth. Second, even though many lack credit, the percentage of VSMEs that have applied for formal credit is limited to about 30%, and only half of these feel satisfied with the amount they received, according to recent SME surveys (Cao, 2015). Third, if these determinants are found empirically, this would shed some light on potential policies that could support SMEs, especially in terms of broadening their access to formal credit.

The major studies investigating VSMEs' access to credit from formal institutions are Rand (2007), Vo et al (2011), Le (2012), Nguyen and Luu (2013) and Cao (2015). Nguyen and Luu (2013) looked solely into SMEs' applications for loans without investigating whether firms obtained loans or not. Rand (2007) examined firms' credit obtainment by observing two groups of SMEs: those that needed funds but did not apply for credit, and those that did apply but were not satisfied with the result of their application. As a result, Rand's study did not specifically examine whether firms had their application for credit accepted obtained the amount they applied for. In a different approach, Vo et al (2011) employed data from ten financial institutions in Hanoi, noting that some firms perceived that they received only part of the credit they applied for, while others procured their desired credit amount in full. Le (2012) also examined firms that had obtained credit based on those firms' liability information, and did not investigate the determinants of whether firms apply for credit. Cao's study (2015) did fully investigate the influential factors in all stages of the process from application to credit obtainment based on 2009 and 2011 VSME surveys. However, due to the limitations of using cross-section data, Cao's study could not show the full picture of SMEs financing in Vietnam in the context of global change.

The present study attempts to overcome aforementioned shortcomings of previous studies and offers some notable contributions. Firstly, by employing the panel data (both of unbalanced data and balanced data) calculated from the most updated

VSMEs' surveys, the study provides an insight into recent changes, especially before and after global crisis, in the credit approval process for Vietnamese firms. The process, from applying for a formal loan, to being satisfied with a formal loan, is outlined. Secondly, using firms' subjective perception of lack of credit, the relations between financial institutions and the firms, the provincial competitiveness index as explanatory variables of accessing formal credit; we were able to achieve new findings. Notably, unlike previous studies, this study uses evidence from firms to explain the determinants of being satisfied with formal credit. Thirdly, in terms of analytical techniques, a panel data sample selection model was used to analyze firms' satisfaction after applying for formal credit. Neither panel data nor the sample selection models have been used in previous studies.

The paper's empirical analysis reveals that banking relationships and the business environment were important factors when applying for formal credit as well as in credit obtainment. However, Vietnamese financial institutions were found to depend too much on collateral assets in assessing whether to supply credit, and place little importance on data that demonstrates firms' performance, such as high return on assets scores and sales growth. The empirical results obtained in this study should shed light on relevant policies. The role of regional business environment was proven. The results show that, in order to help SMEs access formal credit, policy makers should focus not only on increasing financial institutions' credit supply but also on improving the business environment for SMEs. Furthermore, financial institutions should pay more attention to SMEs' performance and business plans, and reduce their dependence on tangible assets when supplying credit. Conversely, as the results show, firms should apply more for the reason that, although they may be not fully funded, their probability of being totally rejected is very low.

The rest of this paper is organized as follows. Section 2 explains the method we used in our statistical analysis and provides an overview of datasets after reviewing previous research into SME financing. Section 3 will present the results of our empirical investigation and discuss the results of this investigation. Section 4, the conclusion, will summarize the findings of this study and, based on these findings, recommend potential policy reform aimed at improving SMEs' access to credit.

## **2. Analysis of accessing to formal credit channel in Vietnam**

### **2.1 Literature review on SMEs finance**

In theoretical view, many studies have been conducted to explain the accessing formal credit of SMEs. On the one hand, the 'relationship lending theory' states that if a close, long-term relationships between lender (financial institution) and borrower (firms) is developed, necessary information is more easily provided to lender, and this will encourage the lender to make more credit available to the firm and allow the firm to borrow at a lower cost (Petersen and Rajan, 1994). On the other hand, 'transaction lending theory' argues that lenders should judge whether to offer a firm credit based on the firm's financial statements and collateral to resolve the problem of information asymmetry (Berger and Udell, 2006).

In empirical view, a firm's trustworthiness, its relationship with its bank are often cited as the factors that determine firms' obtain credit from financial institutions. For example, characteristics like being large-scale, having audited accounts and being in a good financial statement make a firm seem more trustworthy, and thus make it more likely to have credit applications approved (Beck, 2007; Barth, Lin and Yost, 2011). Moreover, past studies have proved that state-owned firms dealing with state-owned banks (Li et al, 2008), as well as firms that have done business with a bank for a long period of time (Uchida et al, 2011) and made prompt repayment to past loans (Cole, 1998; Rand et al, 2009) obtain credit more easily.

Regarding access to formal credit for SMEs in Vietnam, many studies have been conducted and many conclusions have been drawn. These studies were mostly based on surveys of SMEs, such as SMEs surveys conducted by the Central Institute for Economic Management (CIEM) (Rand, 2007; Nguyen and Luu, 2013; Cao, 2015), a survey of SMEs conducted in 2010 by ERIA Research Project (Vo et al., 2011), and an SMEs survey in 2005 conducted by the World Bank (Le, 2012). Looking for evidence of SMEs accessing bank credit, Rand (2009) showed that only 39% of SMEs have access to bank credit. Home province and a firm's characteristics, financial characteristics, types of favored collateral, and a firm's credit worthiness were the determinants of SMEs' access to bank finance (Le, 2012). Based on the number of firms that had credit requests rejected, Vo et al. (2011) concluded that the number of years firms have been in operation, the number of credit institutions they have approached for credit and the net worth of owners were significant influences on the

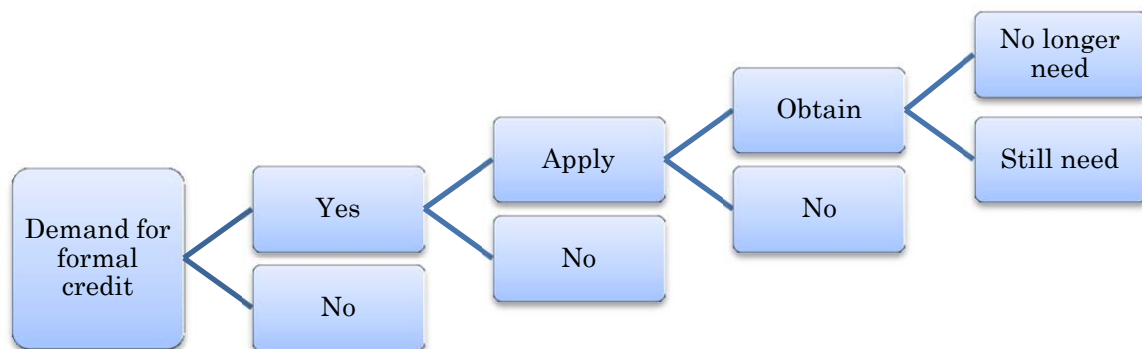
probability of firms being rejected. Besides, Cao (2015) concluded that the business environment plays an important role in encouraging firms to apply for formal credit, but collateral assets is a determinant of firms' credit obtainment.

The present study will expand on the work of these prior studies, incorporating the insightful techniques they employed while attempting to account for their limitations. Specifically, this study use an updated version of the panel datasets used in the past studies to provide an insight into recent changes in the credit approval process for Vietnamese firms before and after crisis. Furthermore, we will investigate the impact of other factors not considered in prior research, including firm owners' political ties (a highly scrutinized issue in transitional economies), firms' future new project conduct activities (which demonstrates how firms plan to use external funds) and firms' lack of credit (which indicates why firms decide to apply for external funds).

## 2.2 Framework of analysis of accessing to formal credit in Vietnam

### 2.2.1 The framework

In order to analyze firms' behavior in applying for formal credit and obtaining credit, we describe the process of applying for credit with the following chart.



**Chart 1: The decision process in applying for and obtaining formal credit**

Source: Authors described.

As can be seen from the above chart, there are three stages that firms that have demand for formal credit may process through: applying, obtaining and being satisfied. In order to analyze in detail SMEs' applications for formal credit, obtainment of formal credit, and satisfaction with that credit, this study proposes three empirical models. The

first model investigates the determinants of whether or not firms apply for formal credit. The second model investigates the determinants of whether firms obtain formal credit. The third model investigates the determinants of whether firms are satisfied with their loan. In the first model, the logit model, the traditional model of analyzing SMEs access to bank loans will be employed. The dependent variable of this model is dichotomous in nature and takes the value of 0 if the firm did not apply for bank loan and takes 1 if the firm did apply for bank loan. In the second model, the sample selection probit model will be used to assess the influence of explanatory variables, which relate to firms' characteristics, credit worthiness and business environment, on the probability of SMEs obtaining formal credit. In the third investigation, the sample selection probit model will be used to find which factors determine whether firms are completely satisfied after obtaining loans from formal financial institutions.

We will divide the explanatory variables into three groups: variables expressing firms' lack of credit, variables associated with the 'relationship lending theory', and variables associated with the 'transaction theory'. The explanatory variables will be described in detail in the next section, which presents the empirical models that will be used in this investigation.

## 2.2.2 Empirical models

### **Model 1: Estimation equation for probability of applying for formal credit**

$$\begin{aligned} \text{Prob}(APPLY_{i,t} = 1) &= \Lambda(\beta_0 + \beta'_1 \text{lackcredit}_{i,t-1} + \beta'_2 \text{bank\_relation}_{i,t} \\ &+ \beta'_3 \text{political}_{i,t} + \beta'_4 \text{financialstatement}_{i,t-1} + \beta'_5 \text{collateral}_{i,t} \\ &+ \beta'_6 \text{firm\_characteristics}_{i,t} + \beta'_7 \text{owner\_characteristics}_{i,t} \\ &+ \beta'_8 \text{business\_environment}_{i,t}) \end{aligned}$$

### **Model 2: Estimation equation for probability of obtaining credit**

$$\begin{aligned} \text{Prob}(OBTAIN_{i,t} = 1) &= \alpha_0 + \alpha'_1 \text{bank\_relation}_{i,t} + \alpha'_2 \text{political}_{i,t} + \alpha'_3 \text{financialstatement}_{i,t-1} \\ &+ \alpha'_4 \text{collateral}_{i,t} + \alpha'_5 \text{firm\_characteristics}_{i,t} \\ &+ \alpha'_6 \text{owner\_characteristics}_{i,t} + \alpha'_7 \text{business\_environment}_{i,t} + u_{i,t} \end{aligned}$$

We can calculate estimation equations in model 2 when  $APPLIED_{i,t} > 0$



### Model 3: Estimation equation for probability of being still in need of credit

$$\begin{aligned} \text{Prob}(\text{Still\_need}_{i,t} = 1) &= \gamma_0 + \gamma_1' \text{bank\_relation}_{i,t} + \gamma_2' \text{political}_{i,t} + \gamma_3' \text{financialstatement}_{i,t-1} \\ &+ \gamma_4' \text{collateral}_{i,t} + \gamma_5' \text{firm\_characteristics}_{i,t} + \gamma_6' \text{owner\_characteristics}_{i,t} \\ &+ \gamma_7' \text{business\_environment}_{i,t} + v_{i,t} \end{aligned}$$

We can calculate estimation equations in model 3 when  $OBTAIN_{i,t} > 0$

In the above formulas, ' $i$ ' represents the firm in question, ' $t$ ' represents the year the surveys were conducted, and ' $\Lambda(\cdot)$ ' represents the cumulative distribution function of this logistic distribution. Dependents variables represent whether firms apply for formal credit (using a dummy variable) and whether they obtain credit (using a dummy variable). Explanatory variables and parameters in these formulas are expressed as vectors.

First, in order to investigate whether firms lacking in credit apply for formal credit or not, we will use two variables. The first one represents firms' self-evaluation of whether lack of credit was the biggest obstruction to growth in the previous period or not. The second one represents whether firms have plans to start up new projects in the near future or not. In terms of variables associated with the relationship lending approach, we have chosen to use a variable representing whether firms have previously made a deposit and received loans from a certain bank as a proxy for firms' banking relationships. Also, we will investigate whether firm owners' social position, or more precisely, their political ties, has any impact on their firm's access to credit or not. In terms of variables associated with the transaction lending approach, we use proxies for firms' collateral strength, including total assets and possession of land use rights (land possession). We also use firms' financial statement variables (ROA, sales growth, and outstanding debt ratio) taken with a one period lag. We assume that ROA and sales growth indicate firms' profitability and performance, while the outstanding debt ratio implies how much credit they need. Moreover, as the business environment is thought to have a positive effect on a firm's probability of applying, to represent the business environment we will use provincial competitiveness index scores and a dummy variable describing whether the data used was collected before or after the 2008 global crisis happened, giving data collected after 2008 the value of 1. Also, we will add firms' attributes and owners' attributes as control variables.

### 2.2.3 Data description

The main dataset used in this paper is from a survey of Vietnamese Small and Medium-scaled Enterprises conducted in 2005, 2007, 2009, 2011 and 2013. This survey was undertaken by the Central Institute for Economic Management (CIEM) of the Ministry of Planning and Investment (MPI), the Institute of Labor Science and Social Affairs (ILSSA) of the Ministry of Labor, Invalids and Social Affairs (MOLISA), the Economic Department of Copenhagen University, the United Nations University (UNU-WIDER), and the Embassy of Denmark in Vietnam with the purpose of examining the Vietnamese business environment<sup>1</sup>. Each of these was a comprehensive survey of approximately 2,500 manufacturing SMEs in 10 provinces (Hanoi, Hai Phong, Ho Chi Minh, Ha Tay, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong and Long An).

In order to eliminate unsuitable firms in the sample, we have excluded firms that had stopped business for one year, firms controlled by the State (such as state owned firms and local state enterprises), joint venture firms with foreign capital, and firms primarily using special official bank loans such as loans from the Social Policy Bank, Development Assistant Fund and the Targeted Program. We have also excluded firms that use interest-free loans from family, relatives, and friends as their major loans. After cleaning the data, we obtained the panel set presented in Table 1.

Table 1: Panel structure of the sampled SMEs (Obs: 4410)

Frequency	Cumulative frequency (%)	2005	2007	2009	2011	2013
675	15.31	1	1	1	1	1
523	27.17	1				
425	36.80					1
361	44.99	1	1			
303	51.86				1	1
298	58.62	1	1			
292	65.24	1	1	1	1	
228	70.41			1	1	1
169	74.24				1	
1136	100	Other patterns				
4410	100					

Source: Sample data extracted from the SME surveys

As shown in Table 1, only about 15% of total firms were investigated in all five surveys.

<sup>1</sup>The author would like to thank Professor John Rand, Doctor Neda Trifkovic from Copenhagen University for supplying raw datasets. All mistakes in cleaning data are the author's responsibility.

Considering the limitations imposed by the size of the samples, we decided to use the firms surveyed on all five occasions as balanced panel data, and also use the whole sample as unbalanced panel data to test robustness and as well as to compare the estimation results.

Table 2, 3, 3.1, 3.2 and 3.3 show an overall picture of firms' access to formal credit and the reasons why some firms did not access credit, why others were still in need of a loan after applying and why others still did not need additional credit after applying. The statistical results revealed that the percentage of firms that did not apply for formal credit increased especially after the global crisis. This percentage climbed from 65.2% in the year 2005 to 65.5% in the year 2009, and jumped to 76.2% in the year 2013. Looking into the reason why firms did not apply for formal credit, we found that more than 70% of them had no demand for formal credit, and nearly 30% of them were discouraged from applying<sup>2</sup>. Notably, more than half of firms that did not apply for formal credit did borrow from an informal credit channel with high interest. In detail, about 41% of those that had no demand for formal credit borrowed informal credit, and 74% of those that were discouraged from applying for formal credit did access informal credit. Furthermore, the trend of using both formal and informal external credit decreased over time after the global financial crisis. This implies that VSMEs prefer to use internal credit more than external when the credit market is going down and lending conditions are growing stricter.

Regarding to obtainment after applying, we found that once firms applied for formal credit, the probability of receiving loan from formal financial institution was extremely

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<sup>2</sup>In the interview conducted for the survey, the question: "Has your firm applied for bank loans or other formal credit since the last survey?" was asked first. If the answer was "no", the interviewer moved to the next question: "Why has your firm not applied for formal loans since the last survey?" The possible answers to this question were: "Because (1) my firm had inadequate collateral, (2) my firm doesn't want to incur debt, (3) the process was too difficult, (4) my firm didn't need one, (5) interest rates were too high, (6) my firm was already heavily indebted, (7) (other reason)". If the respondent gave the answer "(2) my firm doesn't want to incur debt", or "(4) my firm didn't need one", their firm is assumed to have no demand, and those respondents that selected any of the remaining reasons are assumed to own firms that do have demand for credit.

high (more than 90%), and only 20% of those that applied for formal credit faced problems in applying. However, the percentage of firms those were still in need of a loan after obtainment accounted for more than 60% on average.

Table 2: SMEs access to formal credit from 2005 to 2013

Applied	2005	2007	2009	2011	2013	Total
No	1,613	1,562	1,525	1,666	1,592	7,958
(%)	<i>65.17</i>	<i>67.94</i>	<i>65.54</i>	<i>73.68</i>	<i>76.21</i>	<i>69.50</i>
Yes	862	737	802	595	497	3,493
(%)	<i>34.83</i>	<i>32.06</i>	<i>34.46</i>	<i>26.32</i>	<i>23.79</i>	<i>30.50</i>
Problems in getting loan	163	156	179	166	118	782
(%)	<i>18.91</i>	<i>21.17</i>	<i>22.32</i>	<i>27.90</i>	<i>23.74</i>	<i>22.39</i>
Obtained at least once time	814	708	786	557	465	3,330
(%)	<i>94.43</i>	<i>96.07</i>	<i>98.00</i>	<i>93.61</i>	<i>93.56</i>	<i>95.33</i>
Still in need after applying	557	437	502	322	278	2,096
(%)	<i>64.62</i>	<i>59.29</i>	<i>62.59</i>	<i>54.12</i>	<i>55.94</i>	<i>60.01</i>
Total	2475	2299	2327	2261	2089	11451

Table 3: Why SMEs did not apply for formal loan

Reasons	2005	2007	2009	2011	2013	Total
(1) Had no demand for formal credit	1160	1173	1126	1225	1100	5784
(%)	<i>71.92</i>	<i>75.10</i>	<i>74.92</i>	<i>74.70</i>	<i>70.20</i>	<i>73.35</i>
didn't want to incur debt	239	297	176	250	264	1,226
didn't need one	921	876	950	975	836	4,558
borrowed informal credit (1)	129	510	602	618	542	2,401
(%)	<i>11.12</i>	<i>43.48</i>	<i>53.46</i>	<i>50.45</i>	<i>49.27</i>	<i>41.51</i>
(2) Had demand but was discouraged	453	389	377	415	467	2101
(%)	<i>28.08</i>	<i>24.90</i>	<i>25.08</i>	<i>25.30</i>	<i>29.80</i>	<i>26.65</i>
inadequate collateral	135	104	79	46	39	403
process too difficult	214	138	148	120	148	768
high interest	81	97	102	210	206	696
already heavily in debt	17	29	20	15	22	103
other	6	21	28	24	52	131
borrowed informal credit (2)	239	292	328	332	356	1,547
(%)	<i>52.76</i>	<i>75.06</i>	<i>87.00</i>	<i>80.00</i>	<i>76.23</i>	<i>73.63</i>
Total (1) + (2)	1,613	1,562	1,503	1,640	1,567	7,885
Borrowed informal credit	368	802	930	950	898	3,948
(%)	<i>22.81</i>	<i>51.34</i>	<i>61.88</i>	<i>57.93</i>	<i>57.31</i>	<i>50.07</i>

Table 3.1: Still in need of a loan after applying

	2005	2007	2009	2011	2013	Total
No	305	1,565	300	273	227	2,670
	<i>(%)</i>	<i>35.34</i>	<i>68.07</i>	<i>37.36</i>	<i>45.81</i>	<i>52.66</i>
Yes	558	734	503	323	282	2,400
	<i>(%)</i>	<i>64.66</i>	<i>31.93</i>	<i>62.64</i>	<i>54.19</i>	<i>47.34</i>
Total	863	2,299	803	596	509	5,070

Table 3.2: Reason why SMEs was still in need

Reason	2005	2007	2,009	2011	2013	Total
To pay debt	13	16	28	17	22	96
Recurrent spending	39	109	83	66	71	368
Investment	502	564	380	232	177	1,855
Other	5	45	12	8	13	83
Total	559	734	503	323	283	2,402

Table 3.3: Why SMEs did not need more

Reason	2007	2009	2011	2013	Total
Had enough own funds	426	86	74	56	642
Did not need to invest	496	96	87	90	769
Other	643	118	112	76	949
Total	1,565	300	273	222	2,360

Source: Authors calculation from the surveys

The second data set used in this study is 2005 to 2013 data from the Provincial Competitiveness Index (PCI) developed by Vietnamese Chamber of Commerce and Industry (VCCI) and the U.S. Agency for International Development-supported Vietnam Competitiveness Initiative (USAID/VNCI). This data includes assessments of entry costs, access to land, transparency and access to information, time costs of regulatory compliance, informal charges, and the proactivity of provincial leadership, business support services, labor training, and legal institutions. The final index is counted out of 100 with 5 ranks: very good, good, fair, low and very low. The reason for using this data set stems from the assumption that a good business environment with more positive government interventions, more transparent information, and less informal costs would help SMEs access formal credit more easily.

Table 4: PCI of 10 provinces from 2005 – 2013

	2005	2007	2009	2011	2013
Ha noi	60.3	56.73	58.18	58.28	57.67
Ho Chi Minh	59.6	64.83	63.22	61.93	61.19
Hai phong	59.4	53.19	57.57	57.07	59.76
Ha tay	38.8	56.73	58.18	58.28	57.67
Long an	58.5	58.82	64.44	67.12	59.36
Phutho	54.42	55.64	53.3	60.31	53.91
Quang Nam	59.7	62.92	61.08	63.4	58.76
Nghe An	59.6	49.76	52.56	55.46	55.83
KhanhHoa	54.1	52.42	58.66	59.11	57.49
Lam Dong <sup>3</sup>	52.25	49.85	52.93	51.75	57.22

Source: Authors calculated from PCI data (<http://pcivietnam.org>)

In order to analyze the behavior of firms applying for bank loans and obtaining bank loans, we used items related to firms' characteristics, owners' characteristics, assets, liabilities, credit, networks and economic constraints. Figure for total assets will be taken in logarithmic form, and revenue and outstanding debt figures will be taken as proportional rates of total assets with one period lagged. Furthermore, some independent variables such as 'credit constraints' and 'new projects in near future' will be created based on the answers of firms in questionnaires.

The definitions of these variables and the expected sign, as well as statistical descriptions, are shown in Table 5.

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<sup>3</sup>The PCI of Lam Dong in 2005 was extracted from the PCI of Lam Dong in 2006 for the reason that in 2005, Lam Dong was not surveyed. Ha Tay was merged into Hanoi in 2008, thus the PCI of Ha Tay after 2008 is the same as the PCI of Hanoi

Table 5: Variables' definition and summary of statistics

<i>Variable name</i>	<i>Definition</i>	Obs	Mean	Std. Dev.	Min	Max
Applied	Dummy variable: applied via formal credit channel (1) or not (0)	11,451	0.305	0.460	0.000	1.000
Obtained	Dummy variable: Obtain formal credit after applying (1) or not (1)	3,493	0.953	0.211	0.000	1.000
Still need	Dummy variable: Still in need of formal credit after obtaining (1) or not (2)	3,493	0.600	0.490	0.000	1.000
credit constraint (in 1 period lagged)	Category variable: lack of credit is the biggest (3), the second biggest (2), or the third biggest (1) constraint to growth	6,623	1.232	1.379	0.000	3.000
New project	Dummy variable: plan to start up new projects/product line in near future (1) or not (0)	11,451	0.265	0.441	0.000	1.000
Bank relation	Dummy variable: used to have deposit and borrow (1) or not (0)	11,451	0.038	0.191	0.000	1.000
political	Dummy variable: the owner is a member of the communist party / hold social position/ used to work for state enterprises (1) or not (0)	11,451	0.030	0.170	0.000	1.000
total asset (in 1 period lagged)	Sum of total physical assets and total financial assets in logarithmic form	6,623	0.261	0.745	-16.021	33.515
land possion	Dummy variable: the firm's owner has a Certificate Land Use Right (1) or not (0)	11,451	0.497	0.500	0.000	1.000
audit (in 1 period lagged)	Dummy variable: firm's accounting books are audited (1) or not (0)	6,623	0.212	0.409	0.000	1.000
sales growth (in 1 period lagged)	Proportion of revenue in present year over the previous year	6,607	32.383	2412.196	0.072	196002.0
ROA (in 1 period lagged)	Net profits/total assets	6,623	0.261	0.745	-16.021	33.515
Out standing debt rate (in 1 period lagged)	Outstanding debt/ total assets	6,623	0.099	0.301	0.000	12.500
PCI	Regional provincial competitiveness index	11,451	0.380	0.485	0.000	1.000
crisis	Dummy variable: before (0) and after (1) global crisis in 2008	11,451	0.495	0.500	0.000	1.000
Firm size	Total number of full-time employees end-year (Micro: 1-9, Small: 10-49, Medium: 50-300)	11,451	1.405	0.617	1.000	3.000
firmage	The number of years the firm had been in operation at the time of the survey	11,420	13.714	10.228	2.000	77.000
managerial experience	Dummy variable: the owner has managerial experience (1) or not (0)	11,439	0	0.190	0.000	1.000
owner age	The age of firm's owner	11,451	57.792	5.142	0.000	67.120

### 3. Empirical results

#### 3.1 Estimation results with unbalanced data

The analytical technique we employed, panel data, allowed us in principle to use three empirical models to perform probability estimations: the pooling model, the random effect model and the fixed effect model. However, it is thought to be difficult to use nonlinear estimation models such as the logit regression model or the order probit model to test the significance of the fixed effect model (Yamamoto, 2015). Therefore, we adopted the estimation results of the pooling model and the random effect model. The estimation results are summarized in Table 6 for Unbalanced dataset and 7 for Balanced dataset, respectively.

Table 6: Estimation results with unbalanced data

	MODEL 1: APPLIED OR NOT		MODEL 2: OBTAINED OR NOT		MODEL 3: STILL NEED FORMAL				
	Pooling Model	Random-effect Model	Pooling Model (Probit model with sample selection)	Random-effect Model (Simple probit model with condition)	Pooling Model (Probit model with sample selection)	Random-effect Model (Simple probit model with condition)			
	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)			
1. credit constraint (in 1 period lagged)	0.318* [0.187]	0.536** [0.241]							
2. credit constraint (in 1 period lagged)	0.340** [0.140]	0.475*** [0.181]							
3. credit constraint (in 1 period lagged)	0.454*** [0.090]	0.534*** [0.115]							
New project	0.006 [0.084]	0.015 [0.107]	-0.351** [0.150]	-0.442*** [0.124]	0.454*** [0.069]	0.445*** [0.066]			
Bank relation	2.905*** [0.326]	3.276*** [0.363]	1.419*** [0.454]	1.098*** [0.357]	-0.047 [0.097]	-0.018 [0.084]			
political	0.852*** [0.278]	1.057*** [0.350]	-0.144 [0.273]	-0.215 [0.275]	0.175 [0.160]	0.189 [0.168]			
total asset (in 1 period lagged)	0.117*** [0.033]	0.129*** [0.043]	0.107** [0.048]	0.080* [0.045]	0.046* [0.027]	0.054** [0.027]			
land possion	0.209** [0.088]	0.207* [0.114]	0.219* [0.115]	0.218* [0.122]	-0.171** [0.070]	-0.162** [0.071]			
audit (in 1 period lagged)	0.255** [0.115]	0.331** [0.147]	0.083 [0.143]	0.067 [0.150]	-0.009 [0.083]	-0.009 [0.086]			
sales growth (in 1 period lagged)	-0.02 [0.016]	-0.022 [0.016]	-0.048** [0.023]	-0.049** [0.024]	0.03 [0.029]	0.029 [0.029]			
ROA (in 1 period lagged)	-0.127 [0.099]	-0.141 [0.118]	-0.013 [0.102]	-0.003 [0.108]	0.274** [0.108]	0.293*** [0.113]			
Out standing debt rate (in 1 period laggs)	0.766*** [0.205]	0.544** [0.219]	0.598** [0.300]	0.435 [0.274]	0.022 [0.077]	0.031 [0.079]			
PCI	0.018* [0.010]	0.027** [0.014]	-0.015 [0.014]	-0.009 [0.014]	-0.026*** [0.008]	-0.027*** [0.008]			
crisis	-0.619*** [0.093]	-0.828*** [0.121]	-0.493*** [0.120]	-0.464*** [0.138]	-0.09 [0.094]	-0.126* [0.074]			
Small	0.323*** [0.108]	0.505*** [0.144]	0.045 [0.154]	-0.021 [0.147]	0.005 [0.083]	0.013 [0.087]			
Medium	0.914*** [0.191]	1.336*** [0.255]	0.460* [0.261]	0.334 [0.247]	0.101 [0.124]	0.121 [0.128]			
firmage	-0.002 [0.005]	-0.003 [0.006]	-0.01 [0.006]	-0.008 [0.006]	-0.005 [0.004]	-0.006 [0.004]			
managerial experience	0.016 [0.240]	-0.105 [0.311]	0.058 [0.322]	0.019 [0.335]	-0.026 [0.164]	-0.05 [0.173]			
owner age	-0.013*** [0.004]	-0.016*** [0.006]	-0.007 [0.006]	-0.005 [0.006]	-0.007** [0.003]	-0.008** [0.003]			
Constant	-1.384** [0.623]	-1.850** [0.841]	1.919** [0.901]	2.246** [0.896]	1.543*** [0.483]	1.586*** [0.500]			
		Insig2u	Constant	athrho	Insig2u	Constant	athrho	Insig2u	Constant
No. of Obs.	3137		0.497** [0.206]	0.354	-4.403 [18.258]	-0.446		1.033 [1.033]	-2.548*** [0.792]
			3137	6593	1910	1910		1825	1825
	LR chi2(19) = 575.37 Prob > chi2 = 0.0000	Wald chi2(19) = 252.68 Prob > chi2 = 0.0000	Wald chi2(16) = 59.36 Prob > chi2 = 0.0000	Wald chi2(16) = 32.70 Prob > chi2 = 0.0081	Wald chi2(16) = 116.64 Prob > chi2 = 0.0000	Wald chi2(16) = 111.85 Prob > chi2 = 0.0000			

*The impact of variables related to firms' lack of credit*

As seen in the results, we found that firms that consider lack of credit to be the biggest constraint to growth have a 1% higher probability of applying for formal credit in the pooling model, and a 5% higher probability in the random-effect model than firms that do not consider this to be their greatest constraint. This implies the importance of the role of formal credit channels in supplying credit for firms, although the percentage of firms that applied for formal credit was quite low on average as described in Table 3. However, the variable representing whether firms planned to start up new projects or a new product line in the near future did not have a statistically significant impact on the probability of firms applying for formal credit. And surprisingly, this factor reduces the



probability of obtaining credit of firm. Therefore, it makes the firm still being in need after applying.

*The impact of variables associated with relationship banking*

We found that firms that had a score of 1 for the relationship banking proxy (that is, those that had deposited in and borrowed from the financial institution that they intended to apply for credit at) were about three times more likely to apply for formal credit than firms that scored 0 for the proxy. Moreover, this proxy was statistically significant in our investigation of firms' probability of obtaining credit even though the significant impact merely appears in model 2. This reveals that the relationship banking theory, to some extent, can be applied to explain VSMEs' level of access to formal credit. On the other hand, results regarding the influence of the political ties of firm owners showed that, if firm owners had strong political ties, i.e. are a member of the communist party, hold a socialist position, or used to work for a state enterprise, their probability of applying increased significantly. However, this political position did not significantly increase firms' probability of receiving a loan from their bank.

*The impact of variables associated with transaction lending*

In the first model, we found that firms' collateral strength, i.e. large total assets and owners with land use rights, did encourage firms to apply for formal credit, as these variables had statistical significance scores of 5% and 1%. From the empirical results of Model 2, we again found that these variables encouraged financial institutions to supply credit to firms. But against our expectations, large total assets did not have a high significance score in Model 3, which implies that large total assets does not help firms in obtaining the credit amount they requested in full. Or, in the another thinking, the larger firm is, the higher credit they demand, therefore, it is hard for them to be satisfied by the loan received. However, holding land use rights still had a positive relationship with firms obtaining their requested credit amount as initially expected. Furthermore, the proxies for firms' profitability (high return on assets score and fast growth) had no impact on whether firms applied for credit, or on whether financial institutions supplied credit. Having high ROA and sales growth actually had significant negative impact on firms' probability of receiving a loan after applying. And being audited, a proxy for firms' transparency had a positive impact only in encouraging firms to apply for formal credit. Conversely, having a high outstanding debt ratio had a

positive influence on firms' probability of applying for and obtaining credit. These empirical results can be explained by the fact that Vietnamese financial institutions seem to rely much on firms' tangible assets and neglect firms' financial statement. If firms can use their retained profit to reinvest, then they do not need to obtain external credit; but, if profitable firms can obtain credit from financial institutions, they can conduct more investment activities and use the extra funds to innovate.

*The impact of the business environment variables*

We hypothesized that, in Models 1 and 3, the business environment variable would have a positive effect on a firm's probability of applying for and obtaining a sufficient level of credit, and our results conformed to that hypothesis. A good business environment helped firms apply for formal credit and increased the level of credit they obtained. In addition, the 2008 global crisis largely reduced firms' probability of applying for credit as well as obtaining credit. This result is reasonable because after the crisis, financial institutions have been more careful in supplying credit, especially to SMEs.

*The impact of firm owners' attributes and firms' attributes*

Regarding firm owners' attributes and firms' attributes, we found that larger scale firms had a higher probability of applying for and obtaining credit in comparison with the micro size of firm. This result is associated with firms' creditworthiness. However, the probability of firms applying for credit decreased as the age of the owner increased. This means that older owners seem to prefer to not access credit from external sources.

### 3.2 Estimation results with balanced data

Our empirical findings presented in Table 6 are based on the pooling model with a cross-section dataset and the random-effect model with an unbalanced dataset. There was not a big difference between these results. As the next step to achieving robust empirical results using the estimation models, we implemented exactly the same data construction and empirical strategies using the balanced dataset and found that our results were qualitatively unchanged (Table 7). Comparing the results, we found that the notable difference is lies on the fewer significance on some important variables such as PCI, bank relation. This can be explained that due to the decreased-number of

samples. However, even though the difference does exist, we found no opposite results in comparison with the previous results.

Table 7: Estimation results with balanced data

	MODEL 1: APPLIED OR NOT		MODEL 2: OBTAINED OR NOT		MODEL 3: STILL NEED FORMAL				
	Pooling Model	Random-effect Model	Pooling Model (Probit model with sample selection)	Random-effect Model (Simple probit model with condition)	Pooling Model (Probit model with sample selection)	Random-effect Model (Simple probit model with condition)			
	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)	Coefficient / (S.E.)			
1. credit constraint (in 1 period lagged)	0.23 [0.320]	0.374 [0.393]							
2. credit constraint (in 1 period lagged)	0.328 [0.228]	0.446 [0.283]							
3. credit constraint (in 1 period lagged)	0.421*** [0.146]	0.442** [0.180]							
New project	-0.107 [0.136]	-0.114 [0.167]	-0.700*** [0.195]	-0.657*** [0.198]	0.317*** [0.098]	0.427*** [0.108]			
Bank relation	2.737*** [0.524]	2.997*** [0.577]	0.408 [0.655]	0.658* [0.398]	0.094 [0.134]	0.042 [0.143]			
political	1.030** [0.429]	1.060** [0.531]	-0.334 [0.421]	-0.291 [0.418]	0.283 [0.258]	0.432 [0.294]			
total asset (in 1 period lagged)	0.165*** [0.056]	0.166** [0.070]	0.057 [0.114]	0.09 [0.071]	-0.004 [0.040]	-0.015 [0.043]			
land possession	0.377*** [0.145]	0.364** [0.183]	-0.164 [0.198]	-0.142 [0.203]	-0.018 [0.107]	0.004 [0.118]			
audit (in 1 period lagged)	0.14 [0.196]	0.207 [0.241]	-0.101 [0.243]	-0.107 [0.249]	0.18 [0.132]	0.175 [0.143]			
sales growth (in 1 period lagged)	-0.036 [0.078]	-0.007 [0.081]	0.176 [0.317]	0.181 [0.332]	0.022 [0.035]	0.021 [0.035]			
ROA (in 1 period lagged)	-0.282 [0.230]	-0.316 [0.273]	0.042 [0.287]	0.007 [0.278]	0.709*** [0.216]	0.820*** [0.254]			
Out standing debt rate (in 1 period lagged)	1.864*** [0.444]	1.757*** [0.504]	0.134 [0.706]	0.375 [0.467]	0.157 [0.211]	0.099 [0.226]			
PCI	0.040** [0.016]	0.050** [0.021]	0.008 [0.019]	0.005 [0.019]	-0.017 [0.012]	-0.018 [0.013]			
crisis	-0.880*** [0.152]	-1.067*** [0.185]	-0.433 [0.303]	-0.502** [0.209]	-0.086 [0.111]	-0.014 [0.120]			
Small	0.188 [0.184]	0.33 [0.237]	-0.208 [0.260]	-0.162 [0.252]	0.208 [0.130]	0.279* [0.144]			
Medium	0.897*** [0.322]	1.313*** [0.417]	-0.159 [0.449]	-0.034 [0.379]	0.315* [0.190]	0.370* [0.208]			
firmage	0.003 [0.007]	0.003 [0.010]	-0.009 [0.011]	-0.01 [0.011]	0.001 [0.006]	0.003 [0.007]			
managerial experience	0.328 [0.436]	0.226 [0.546]	4.617 [1948.249]	0 [.]	-0.33 [0.280]	-0.461 [0.298]			
owner age	-0.021*** [0.007]	-0.024*** [0.009]	0.012 [0.014]	0.008 [0.010]	-0.009* [0.005]	-0.010* [0.006]			
Constant	-2.524** [0.997]	-2.995** [1.309]	1.359 [1.332]	1.076 [1.285]	0.928 [0.745]	1.049 [0.803]			
		Insig2u	Constant	athrho	Insig2u	Constant	athrho	Insig2u	Constant
			0.333	-0.384		-10.617		12.729	-2.172***
			[0.301]			[190.063]		[26.578]	[0.776]
No. of Obs.	1223	1223	2694	2694	715	715	738	738	709
	LR chi2(19) = 256.26	Wald chi2(19) = 122.90	Wald chi2(16) = 20.83	Wald chi2(15) = 21.02	Wald chi2(16) = 47.76	Wald chi2(16) = 48.30			
	Prob > chi2 = 0.0000	Prob > chi2 = 0.0000	Prob > chi2 = 0.1850	Prob > chi2 = 0.1362	Prob > chi2 = 0.0001	Prob > chi2 = 0.0000			

In comparison with the results of previous studies, several interesting findings have been drawn. In terms of applying for formal credit, a positive association between total asset and probability of applying for a loan was found, which is consistent with Nguyen and Luu's (2013), Rand's (2007). Also, like prior work, the role of land possession is proved to significantly affect the probability of applying. Moreover, good business environment, lack of credit, and banking relationship significantly encourage firm to apply for a formal loan, are new finding of the present study which has not been

studied in previous research.

In terms of obtaining formal credit, we reach the same conclusion as Vo et al.'s (2011) about the role of tangible assets and total assets; Uchida (2011) about the importance of banking relationship. However, our analysis in two steps clearly shows that land possession is the key factor that determines firm's satisfaction after applying, not banking relationship. On the other hand, we did not find the importance of firm's performance as the best way to explain credit obtainment, as previous studies had.

#### **4. Conclusion**

In this study, following the process SMEs go through to obtain credit, we investigated the factors that determine whether VSMEs apply for credit from formal financial institutions and obtain that credit, as well as the factors that determine the level SMEs obtain the credit. The analytical models we employed were the logit, probit with sample selection models by using panel data achieved from VSMEs surveys conducted from 2005 to 2013.

The results of our probability calculations made the following points about VSME financing clear. First, the fact that firms that lack credit tend to apply for formal credit proves the important role of formal credit channels in supplying credit. Second, regarding the factors associated with relationship banking, we found that firm owners' political ties had a positive relationship with their firm's probability of applying for formal credit, but the relationship between political ties and credit obtainment was unclear; while the history of transacting with the applying financial institutions does work. Third, regarding the factors associated with transaction lending, we found that firms' financial achievement have almost no influence on whether they apply for or successfully obtain credit; while possessing land use rights is an important part of credit procurement, and land possession did have as significant an impact on the probability of firms obtaining credit as we had initially predicted. Fourth, we observed that local governments' efforts to improve the business environment for private local firms had a small but positive influence on those firms' ability to access credit. Last, as a result of the global financial crisis, firms' applying for formal credit as well as financial institutions' supplying credit has been badly affected.

Our analysis has highlighted that loans to SMEs in Vietnam make a significant

contribution to growth in the enterprises that receive them. However, the fact that there are firms that require credit but do not seek it from formal institutions surely indicates that there is a large barrier between financial institutions and SMEs. We suggest that implementing the following strategies and policies may help to bring down this barrier. Firstly, financial institutions must lend funds more proactively and improve their transmission of information and advertising to SMEs. Financial institutions should pay more attention to SMEs' performance and business plans in order to meet not only the firm's financial requirements but also the country's development orientation. For example, with the purpose of promoting green industry, an assistance fund should be offered to firms manufacturing environment-friendly products; with the purpose of promoting supporting industries, producing components, spare parts, etc., SMEs should be granted non-refundable assistance, or the like. Moreover, in order to reduce the dependence on tangible assets in supplying credit, policy makers should look into experience from other developing countries and take advantage of SMEs' international development assistance fund. Next, firms that need funds should be encouraged to approach financial institutions without hesitation. They must be made aware that if they try to apply, they are highly likely to obtain at least a part of their desired funds. Finally, by improving the local business environment, regional governments can indirectly make it easier for firms to access financing, so governments should continue to implement policies aimed at achieving that goal.

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