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Adverse Selection versus Moral Hazard in Financial Contracting: Evidence from collateralized and non-collateralized loans*

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Abstract

We test the existence of adverse selection and moral hazard in financial contracting by examining the choice of borrowers between collateralized and non-collateralized loans. Using comprehensive loan-level data from all loans underwritten by a large public bank in Japan, we examine the borrowers' behavior before and after the introduction of non-collateralized loans that expand the choice set for borrowers. We find an increase in credit risk for firms that switch to non-collateralized loans after the introduction, which is consistent with moral hazard. In contrast, we find mixed and unclear evidence for the existence of adverse selection.

Keywords: Information asymmetry, Collateral, Adverse selection, Moral hazard, Government financial institutions

JEL classification: G21; G28; H81

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1. Introduction

Information asymmetry between lenders and borrowers plays an integral role in the field of finance as one of the fundamental causes of financial frictions. Lenders do not know the creditworthiness of borrowers (hidden information) and/or cannot detect inefficient behavior of borrowers after lending (hidden action). For fear of lending to borrowers with poor creditworthiness or those that take inefficient behavior, lenders are unwilling to provide their own funds, which creates severe financial frictions. This is the problem of adverse selection (in the case of hidden information), or of moral hazard (in the case of hidden action).

Among the many strands of the literature on financial frictions in the loan market, the studies on the role of collateral provide a solid theoretical basis for the relationship between different types of information asymmetry and lending outcomes. On the one hand, the so-called ex ante theory focuses on an ex-ante information gap between borrowers and lenders (hidden information or adverse selection), and demonstrates that collateral serves as a device to sort out good and bad borrowers that are observationally equivalent (e.g., Bester 1985). On the other hand, the so-called ex post theory focuses on ex-post incentive frictions (hidden action or moral hazard), and demonstrates that lenders use collateral to provide borrowers with incentives for more efficient behavior (e.g., Boot, Thakor, and Udell 1991).

Despite a clear-cut theoretical distinction between adverse selection and moral hazard, identifying each one is empirically difficult, because both predict the same relationship between the use of collateral and borrowers' ex-post performance. On the one hand, the ex ante theory predicts better performance by collateralized borrowers because firms with high creditworthiness self-select loans with collateral. On the other hand, the ex post theory predicts the same relationship because the provision of collateral by borrowers provides them with an incentive to behave more efficiently. There are many empirical studies that report a positive correlation between the use of collateral and

borrowers' performance (see Steijvers and Voordeckers 2009 for a survey), but an empirical identification of adverse selection and moral hazard remains an open issue. This identification is important not only from an academic but also from a practical viewpoint, because it provides an important insight into to what extent banks should focus on ex-ante screening and/or ex-post monitoring of borrowers to mitigate different types of asymmetric information.

Against this background, this paper directly addresses this issue of identifying adverse selection and moral hazard. We focus on a unique institutional change in a public (government-affiliated) bank in Japan, the Small and Medium Enterprise Unit of the Japan Finance Corporation (hereafter the JFC-SME) in August 2008. To respond to a policy initiative, this bank introduced non-collateralized loans to small- and medium-sized enterprises (hereafter SMEs) at the time when most of the other financial institutions in the country, either private or public, provided collateralized loans only. Due to this introduction, SME borrowers obtain a choice between non-collateralized and collateralized loans.

The focus on this public bank provides us with an ideal setting to test theoretical predictions on the profit maximization behavior of borrowers that are offered two types of loan contracts. First, we can focus on borrowers' profit maximization, because the JFC-SME, as it is a public bank, designs and offers loan contracts that make itself break even. We can thus focus on the situation where the lender's participation constraint binds. Second, borrowers make a choice from two break-even contracts. Given factors such as a firm's credit rating, the loan's amount and maturity, this bank offers a borrower two options, a collateralized loan with a low interest rate and a non-collateralized loan with a high interest rate, where the margin in their interest rates (ranging between 30 and 90 basis points) is set as risk premium. Third, we can also compare borrowers with two such options and those with only one, because (1) some borrowers do not have sufficient amount of assets and cannot choose collateralized loans, and (2) no borrowers can obtain non-collateralized loans before August 2008. Comparisons of these one-option borrowers with those who have two enable us to take unique and

novel strategies to empirically identify the ex-ante (adverse selection) and the ex-post (moral hazard) theories of collateral.

Our identification strategies are threefold. First, we start with a test for the existence of information asymmetry in general with no identification between adverse selection and moral hazard. In this analysis, we follow the method proposed by Chiappori and Salanié (2000) that test the existence of informational asymmetry in the automobile insurance market. We use a bivariate probit model to examine whether the use of collateral and the ex-post performance of the borrowers are correlated after controlling for observable borrower characteristics. This test is essentially equivalent to the conventional regression methods used in the literature on collateral to examine the effect of the use/non-use of collateral on ex post performance of borrowers.

Second, we test the ex-post theory of collateral by following a method that is similar to the one adopted in Aarbu (2015) in his analysis on home insurance. We compare the effect of the use of collateralized versus non-collateralized loans on the borrowers' performance after controlling for the borrowers' time-invariant fixed effects. This comparison enables us to control for the ex-ante creditworthiness of the borrowers (hidden information) that is privately known to the borrowers and is unobservable to the lenders. We can thus isolate the effect of the use or non-use of collateral on the ex-post performance of borrowers through hidden actions.

Third, we test the ex-ante theory of collateral by comparing borrowers that choose the same type of loans. More specifically, we compare (i) borrowers that choose one type of loans (either collateralized or non-collateralized) despite that they could have chosen the other type, and (ii) borrowers that choose the same type of loans because it is the only type of loans available to them. The idea behind this comparison is that incentives provided by a contract are the same among the borrowers that choose the same type of loans, and so any difference in the ex-post performance stems from the difference in unobservable ex-ante characteristics of the borrowers as the ex-ante theory

predicts. In this third test, we make two comparisons: (1) collateralized borrowers before and after the introduction of the non-collateralized loans, and (2) non-collateralized borrowers that have a sufficient amount of assets and could have chosen collateralized loans, and those that do not have such assets.

By way of preview, we obtain the following findings. First, from the first test we find strong statistical correlations between the use of collateralized or non-collateralized loans and firms' ex-post performances, which suggests the existence of asymmetric information. Second, from the second test, we find that after controlling for the time-invariant heterogeneity in firms (hidden information), an increase in credit risk is more sizable and sales growth is marginally larger for non-collateralized borrowers than for collateralized borrowers. These findings support the existence of moral hazard.

Third, from the first version of our third test, we find mixed results: Borrowers that self-select collateralized loans after August 2008 (when non-collateralized loans are also available) tend to have lower credit risk but lower sales growth and profitability than borrowers that choose collateralized loans before August 2008 as the only option available for them. Although the former result is consistent with adverse selection, the latter is not. Fourth, we find from the second version of our third test that the credit risk is higher for borrowers that self-select non-collateralized loans despite that they have a sufficient amount of assets to pledge as collateral than for borrowers that choose non-collateralized loans because they have insufficient amount of assets to pledge. This finding is inconsistent with the theory of adverse selection. On balance, our findings on adverse selection is mixed and unclear.

Our study is closely related to a strand of the literature of empirical contracts that test different hypotheses based on contract theory (see Chiappori and Salanié 2001 for a survey). Many studies empirically find evidence for the presence of information asymmetry in markets for automobile insurance (Chiappori and Salanié 2000; Abbring, Pinquet, and Chiappori 2003; Saito 2006), health insurance (Chiappori, Durand, and Geoffard 1998; Cardon and Hendel 2001), home insurance (Aarbu 2015), and annuities (Finkelstein and Poterba 2004). However, identification of adverse selection and

moral hazard is one of the key issues in this literature. Some studies test adverse selection and moral hazard in demand for medical care by taking advantage of a natural experiment (Chiappori, Durand, and Geoffard 1998), in claims for car insurance by focusing on a state-dependent contract (Abbring, Pinquet, and Chiappori 2003), and in the consumer loan market (auto loans) by taking advantage of a unique instrument (Adams, Einav, and Levin 2009). We refer to these studies when designing our three empirical strategies explained above.

To the best of our knowledge, there is scarcity of research that identifies adverse selection and moral hazard in corporate loan markets. A rare exception is Berger, Frame, and Ioannidou (2011) who use detailed loan-level data in the credit registry in Bolivia. These authors focus on information that is recorded in the registry but not disclosed to lenders, regard the information as being private and unobservable to the lenders, and examine the effect of the information on the use of collateral as a test of adverse selection. In the present paper, we also test adverse selection by following a different approach, and we test moral hazard as well.

The remaining part of this paper proceeds as follows. Section 2 explains the background of this study by providing institutional details on the JFC-SME and the newly introduced non-collateralized loans. We describe our data in Section 3. Section 4 explains our empirical strategies to implement the three tests, and Section 5 reports the results. Section 6 concludes the paper.

2. Institutional background

In this section, we provide institutional background behind our analysis. We first provide information on public banks in Japan and the bank that we specifically focus in this paper. We then explain the non-collateralized loans that this bank introduced. We finally explain how the public bank makes lending decisions and thereby how our data provide with an ideal setting for testing adverse selection and moral hazard.

2.1. Small and Medium Enterprises Unit of the Japan Finance Corporation

Public banks, or banks that are affiliated with the government, play important roles in many countries to meet policy objectives such as financing for economic development, for the poor, or for SMEs, because private banks cannot provide sufficient funds for these purposes. In Japan, there are many public banks that provide business loans and loan guarantees, and/or securitize loans underwritten by private banks, for policy purposes. Almost all of these institutions are 100% owned by the central government and specialize in areas such as financing foreign infrastructure projects, financing regional development, and loans to SMEs.[1] These banks do not take deposits, and raise funds through bonds with and without explicit government guarantees.

Providing loans to SMEs is the most important among the areas that the public banks in Japan are involved, and there are two such banks: the Japan Finance Corporation (hereafter JFC) and the Shoko Chukin Bank. The former has two business units that specialize in financing SMEs: the Small and Medium Enterprises Unit (hereafter JFC-SME) and the Micro Business and Individual Unit (hereafter JFC-MBI). These units extend loans to SMEs of different sizes: the JFC-SME to relatively larger SMEs, and the JFC-MBI to smaller SMEs and sole proprietorships.[2]

The JFC-SME and the JFC-MBI used to be independent banks, and were respectively the Japan Finance Corporation for Small and Medium Enterprise (hereafter JASME) and the National Life Finance Corporation (hereafter NLFC). The two banks merged in October 2008 to form the JFC, but their business operations and missions remained separated in respective units and the units are independent of each other. The data from the JFC-SME and its predecessor JASME are available to

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[1] See Uchida and Udell (2014) for more information on the government-affiliated financial institutions in Japan.

[2] The other (third) unit of the JFC is the Agriculture, Forestry, Fisheries and Food Business Unit.

us. For brevity, below we use the term JFC-SME to indicate either the JFC-SME or the JASME.

The JFC-SME operates nationwide, and has 63 branches in 47 prefectures in Japan. Although this number is significantly smaller than that of private banks, the JFC-SME provides a sizable amount of loans to SMEs. The amount of its outstanding loans is JPY 6.0 trillion at the end of year 2015, which correspond to about 2.3 percent of the total JPY 258.4 trillion of SME loans outstanding in Japan.[3]

The loans by the JFC-SME are "program-based," where borrowers apply for different loan programs that target specific types of SMEs for different policy-purposes. Safety-net Loans, Loans for Enhancing Corporate Vitality, and New Business Development Loans are examples of such programs that the JFC-SME actually provides. Each program has its own eligibility requirements depending on, for example, industry that borrowers belong to, firm age, and purposes for the funds to borrow.

2.2. Introduction of Non-Collateralized Loans

Our analysis below takes advantage of an institutional change in the JFC-SME to introduce non-collateralized loans. Although the JFC-SME has provided only collateralized loans, it introduces two new types of loans in 2005 to provide non-collateralized loans in response to political pressure to provide more funds to SMEs.[4] These loans are either non-collateralized or partially collateralized, but with upper limits of JPY 50 or 80 million.[5] A far more substantial institutional change occurs in

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3 See Table 13 in the 2016 White Paper on Small and Medium Enterprises in Japan, the Small and Medium Enterprise Agency of the Government of Japan.

4 To promote easier access to bank loans, the Financial Services Agency of the Government of Japan, the regulatory agency that supervises financial institutions in Japan, announced "the Action Program that Enhances the Functions of Relationship Banking" in March 2003. One of the measures that was implemented based on this program was to encourage banks to increase the amount of loans that rely less on collateral or personal guarantees.

5 The non-collateralized loans do not require collateral, have an upper-limit of JPY 50 million and are provided to financially healthy firms that agree to include covenants in their borrowing contract. The

August 2008, when the JFC-SME lifts the upper limits of the non-collateralized loans. This lift enables borrowers to borrow sufficient amounts of funds either through non-collateralized and through collateralized loans. Within our sample period, there are no further essential changes, even after the JASME becomes the JFC-SME in October 2008

Figure 1 shows the numbers (Panel (1)) and the amounts (Panel (2)) of loans of different types extended by the JFC-SME. We find that few borrowers use the two new types of loans introduced in 2005, i.e., non-collateralized and partially collateralized loans with upper limits. This is presumably because the limits are too restrictive. Even in fiscal year 2007, the amounts of these loans (respectively JPY 61.7 billion and JPY 132.3 billion) are substantially smaller than the total amount of collateralized loans (JPY 754.6 billion).

The black bars in the figure show the use of non-collateralized loans with no upper limits introduced in 2008. We find a sizable increase in their amount. Although this increase is partially attributable to the emerging loan demand driven by the financial crisis after the fall of 2008, the new loans are used extensively even within 2008 when the crisis has not yet had a significant impact on the Japanese economy. Further, the share and the amount of non-collateralized loans keep increasing even several years after the crisis. Compared with collateralized loans, the total amount of non-collateralized loans increase from less than half in 2009 to almost comparable in 2011. This substantial increase also implies that the upper limits for the two previous types of loans are too restrictive for many firms. Thus, in the analysis below, we focus on the lifting of the upper limits for non-collateralized loans in August 2008 as an effective exogenous policy shock.

2.3. Lending decisions and borrowers' choice

partially collateralized loans are covered by collateral of no less than 25 percent of the total loan amount, and have an upper limit of JPY 80 million.

The focus on the JFC-SME and the use of its data provide us with an ideal setting to test the theories of moral hazard and adverse selection. To explain this, this subsection describes how the JFC-SME underwrites these collateralized and non-collateralized loans and determines their terms of lending.[6]

When receiving loan applications from firms that satisfy the eligibility requirements for a loan program, the JFC-SME first screens the applicants based on information from different sources such as financial statements, on-site monitoring, and interviews with borrowers, and assigns an internal credit rating. It rejects loan applications by firms with very low credit ratings, e.g., firms that do not earn profits for many years and are considered by the JFC-SME to go bankrupt in the near future. For firms with better credit ratings, the JFC-SME offers loans with details of the terms of lending, and the borrower decides whether to accept them.

The terms of lending by the JFC-SME are predetermined based on its internal rule. The terms differ by program and depend solely on the credit rating of the borrower. The JFC-SME strictly applies the rule, and does not change the terms depending on other factors. Ceteris paribus, the interest rates that the JFC-SME sets differ between collateralized and non-collateralized loans by a margin added to the latter as risk premiums (or higher interest rates). The margins are calculated to compensate possible additional losses due to the absence of collateral, based on information such as past default rates and collection rates.

Based on these practices, our focus on the JFC-SME and its data provide us with a unique ground on which we can test theoretical predictions on the profit maximization behavior of borrowers that are offered two types of loan contracts. First, we can focus on borrowers' profit maximization. Because it is a public bank that does not seek profits, the contracts that the JFC-SME offers are designed for the

6 This description is based on several interviews with loan officers from the JFC-SME.

bank to break even. Thus, the lender's participation constraint binds, and it is the borrower that chooses the contracts to maximize its profits.[7]

Second, we can focus on a simple choice by borrowers facing two options: a non-collateralized loan with a high interest rate and a collateralized loan with a low interest rate. We can directly focus on this dichotomous choice because our complete information allows us to control for factors such as a firm's credit rating, the loan's amount and maturity. The choice between a high-interest rate loan without collateral and a low-interest rate loan with collateral is a typical set up in the baseline theoretical model of adverse selection or moral hazard, and through the focus on this dichotomous choice, we can directly test predictions from such simple models.

Furthermore, we can also take advantage of the existence of some borrowers in our data set that have only one option to choose. First, collateralized loans are not an option for those borrowers who do not have sufficient amount of assets to pledge as collateral, e.g., real estate properties. Second, non-collateralized loans are not an option for any borrowers before their introduction in 2008. Requiring collateral is a common practice in Japan, as often called as the collateral principle (*yuu-tanpo gensoku* in Japanese) (see IMES 1995, p.21), especially for loans to small- and medium-sized firms. Although the JFC-SME introduced non-collateralized loans because it is a public bank and needed to respond to political pressure, there were only a very limited number of banks, either private or public, that provide non-collateralized loans at such a large scale.[8]

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[7] Some bankers from the JFC-SME told us that they sometimes advise borrowers perceived as less creditworthy to choose a collateralized loan, but do not force them to do so if the borrowers insist on receiving a non-collateralized one.

[8] The NLFC (the predecessor of the JFC-MBI) has provided non-collateralized loans for many years but these loans are for smaller firms, mostly startups and microbusinesses. A relatively large number of private banks introduced small business credit scoring (SBCS) without collateral in response to a government policy initiative to promote loans that do not depend on collateral ("the Action Program that Enhances the

The presence of such borrowers with limited options is rather advantageous for our analysis. In our data set, there are borrowers that are forced to choose collateralized or non-collateralized loans due to the above two reasons, as well as borrowers that choose the same type of loans although they could have chosen the other type. As detailed in Section 4, comparisons of these borrowers enable us to take unique approaches to identify adverse selection and moral hazard.

3. Empirical Approach

We propose and implement three tests in this paper: a test for the presence of asymmetric information; a test for the ex-post theory of collateral to examine the existence of moral hazard; and a test for the ex-ante theory of collateral to examine the existence of adverse selection. In each of these tests, we examine the relationship between the provision of collateral and the ex-post performance of borrowers in different econometric settings.

3.1. Test 1: Test for Asymmetric Information

Our first test is the test of the existence of asymmetric information. In this test, we follow the approach of the conditional correlation test proposed by Chiappori and Salanié (2000), who study the existence of asymmetric information in the French car insurance market. In this test, we examine whether the choice of collateralized loans is associated with ex post borrower performance as both the ex post and the ex ante theories of collateral suggest. This is a test that cannot identify moral hazard and adverse selection, and so is a test for asymmetric information in general.

Functions of Relationship Banking" in March 2003). However, SBCSs are for working capital of small amount and were not alternatives to ordinary business loans like the ones that the JASME provides. Also these banks decreased the volume of SBCS in the late 2000s due to huge loan losses (see Uchida and Udell 2014, Sec. 36.3.2.2).

More specifically, we estimate the following bivariate probit model.[9]

$$y_{it} = 1_y(X_{it}\beta + \varepsilon_{it}) \quad (1\text{-}1)$$

$$z_{it+k} = 1_z(X_{it}\gamma + \eta_{it}), \quad (1\text{-}2)$$

where y_{it} represents a dummy variable to indicate that firm *i*'s loan in year *t* is non-collateralized (*y*=1) or collateralized (*y*=0); z_{it+k} represents a dummy variable for firm *i*'s ex-post performance in year *t*+*k* with *k* that takes the values of 1, 2, or 3; $1_x(\cdot)$ is a function that determines the probability that a dummy variable x takes the value of one; and the vector X_{it} represents firm *i*'s attributes in year *t*.[10] After estimating the two equations and obtaining the error terms, we test the null hypothesis of no correlation between the error terms, or $\mathrm{corr}(\varepsilon_{it}, \eta_{it}) = 0$. If the null hypothesis is rejected, we infer that there is asymmetric information in the loan market.[11] Note that X_{it} should contain all the relevant information that the lender uses when it extends loans. In our context, we should include the information on the lender's internal credit ratings and other characteristics of borrowers that the JFC-SME uses for their loan screening.

As for the variables for ex post firm performance, z_{it+k}, we use two types of variables: those that measure a firm's credit risk, and those that measure financial performance. If moral hazard takes the form of inefficient managerial effort or asset substitution (a choice of risky project), or if adverse selection works, we should observe higher ex post risk and poorer ex post financial performance for

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9 Note that Chiappori and Salanie (2000) propose and estimate not only the bivariate parametric model but also non-parametric models for the conditional correlations. We do not implement such non-parametric tests in this paper, but their results are qualitatively the same as the test based on the bivariate model.

10 When we use continuous variables for firm performance, z_{it+k}, we use a linear equation instead of the probit model equation,

11 Theoretically, a one-sided test is more preferable, but we simply follow the convention in the field of insurance to conduct a two-sided test. However, we will check the direction of the correlation as well.

borrowers of non-collateralized loans. However, it is theoretically possible in a setting of moral hazard that the risky project is more profitable than a safer one, and the asset substitution may result in higher risky but better financial performance.

3.2. Test 2: Test for Moral Hazard

Our second test examines the presence of moral hazard. To identify moral hazard and adverse selection, we need a test that goes beyond the above conditional correlation test for asymmetric information that only examines a simple correlation between the provision of collateral and the firms' ex-post performance. Our test to detect moral hazard is based on an idea that the effect of adverse selection stems from the differences in unobservable characteristics among borrowers. If we can control for such differences, the remaining differences in ex post performance that depends on the use/non-use of collateral stem sorely from moral hazard. Our second test tries to eliminate the effect of adverse selection by controlling for firm fixed effects. This approach is reasonable to the extent that the firms' unobservable characteristics are time-invariant. This approach is similar to the one adopted in Aarbu (2015) that examines moral hazard in the home insurance market, and to the one in labor economics that examines the causes of long-term unemployment.[12]

More specifically, in our test for moral hazard, we first formulate the following two equations:

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[12] The issue of distinguishing moral hazard and adverse selection is in parallel with the issue in labor economics of distinguishing state dependence and heterogeneity as a cause for long-term unemployment (see Abbring et al. 2003). One explanation for long-term unemployment based on state dependence is that the past unemployment experience of workers has a direct negative impact on the probability of their future employment. The other explanation based on heterogeneity is that workers are different because of unobserved characteristics that affect their future probability of employment. The literature on unemployment has tried to distinguish between the two by assuming that the unobservable heterogeneity is not affected by labor market conditions and controlling for it with panel data estimations. Their approach is similar to ours in that both control for time-invariant unobservable characteristics to examine moral hazard, which is one form of state-dependent behavior.

$$z_{it+k} = \alpha_i + X_{it}\beta + \xi y_{it} + \epsilon_{it} \quad (2\text{-}1)$$

$$z_{it'+k} = \alpha_i + X_{it'}\beta + \xi y_{it'} + \epsilon_{it'}, \quad (2\text{-}2)$$

These are the equations that determine ex-post performance (z_i) of firm i depending on its attributes (X_i) and the type of loan (y_i), before (t) and after (t') the JFC-SME introduced the non-collateralized loans in August 2008. In these equations, α_i indicates a time-invariant firm fixed effect. Taking the difference between the two equations leads to the following equation to estimate.

$$\Delta z_{it+k} = \Delta X_{it}\beta + \xi \Delta y_{it} + \Delta \epsilon_{it} \quad (2\text{-}3)$$

The most important coefficient in this equation is ξ. To the extent that the effect of adverse selection is eliminated by controlling for the firm fixed effect (α_i), the remaining effect of the use of non-collateralized loans (Δy_{it}) on ex post performance (Δz_{it+k}) captures the effect of moral hazard. When we use credit risk variables for the dependent variable z_{it+k}, we expect that ξ is positive due to insufficient managerial effort or a choice of riskier project by the borrower of the non-collateralized loan. When we use performance variables for z_{it+k}, the expected sign of ξ is indeterminate depending on whether risky projects are more profitable.

3.3. Test 3: Test for Adverse Selection

Our third test is to detect the existence of adverse selection. To separate the effect of adverse selection from the confounding effect caused by moral hazard, we need to control for differences in ex-post incentives that collateralized and non-collateralized loans respectively provide with borrowers. In this vein, we make a *within-contract comparison*, i.e., a comparison within firms that are provided

with the same incentives for their ex-post behavior, i.e., those that choose the same type of loan contracts (either collateralized or non-collateralized loans). More specifically, we compare firm performance between a group of borrowers that choose collateralized (or non-collateralized) loans despite that they could have chosen the other type of loans, and a group of borrowers that choose the same type of loans because they had no other choice but to choose the relevant type.

This test is based on an idea that among borrowers that choose the same type of loans, the composition of good and bad borrowers may differ when there is another option to choose and when there is not. In the former case, the ex-ante theory of collateral predicts that good and bad borrowers respectively choose collateralized and non-collateralized loans (separating equilibrium). In the latter case, however, both good and bad borrowers have to choose the same type of loans that are available. Thus, if we compare ex post performance among the borrowers that choose collateralized (non-collateralized) loans, the performance is better (worse) when there is another option than when there is not. Note that an important underlying assumption for this prediction is the assumption of *ceteris paribus*, i.e., irrespective of whether there is another option or not, the distribution of good and bad borrowers is the same.

We conduct two version of this within-firm comparison. In the first version, we directly take advantage of the institutional change to introduce non-collateralized loans in August 2008 as an expansion of the choice set for borrowers. More specifically, we compare the average ex post performance of collateralized borrowers before and after the introduction. Before the introduction, borrowers had no choice but to use collateralized loans, but after the introduction, the other option, i.e., non-collateralized loans, was also available to the borrowers. Thus, average performance of collateralized borrowers should be better after the introduction.

To test this prediction, we estimate the following equation:

$$z_{it+k} = X_{it}\beta + \delta POST_t + \epsilon_{it}, \quad (3\text{-}1)$$

where *POST* is a time dummy to capture the difference in the choice set. It takes the value of unity if a firm receives a collateralized loan after August 2008, and zero if before. The vector of firm attributes X_{it} that includes year dummies is added on the right hand side to control for any differences in ex ante firm characteristics before and after August 2008, and for the difference in the distribution of good and bad borrowers. The coefficient of our interest is δ. We expect that it represents a negative effect on firm performance, because after the expansion of the choice set, borrowers with lower creditworthiness should choose non-collateralized loans.

The second version of our within-contract comparison focuses on borrowers of non-collateralized loans. Although we have such borrowers in our data set only after August 2008, we can distinguish two groups of borrowers among them (those with and without another option to choose) based on information on borrowers' collateral margin, which is defined as the ratio of the amount of collateralizable assets (net of the amount already pledged as collateral to other debtors) to the amount of total loans outstanding. Borrowers whose margins are equal to or larger than unity are those that could have chosen a collateralized loan, or those that had two options. They are likely to be borrowers that chose non-collateralized loans because they are risky. However, borrowers whose collateral margins are less than unity are those that had no other choice but the non-collateralized loans. They are borrowers that had to choose non-collateralized loans, even if they are creditworthy. We can thus conjecture that the borrowers with a large collateral margin are on average less creditworthy than those without.

The equation to test this prediction is:

$$z_{it+k} = X_{it}\beta + \mu MARGIN_i + \epsilon_{it}, \quad (3\text{-}2)$$

where *MARGIN* represents the dummy that takes the value of unity if the collateral margin is not smaller than the unity, and zero otherwise. If the ex-ante theory of collateral holds, the coefficient μ takes a positive value as a result of the self-selection by riskier borrowers of non-collateralized loans. To control for any differences in ex post performance stemming from ex ante difference in firm characteristics, we include a vector of firm attributes X_{it} as a set of control variables.

4. Data

4.1. Data and Sample

The data set used for our analysis is compiled from several firm-level and loan-level sources provided by the JFC-SME. The information that we can use include balance sheets and firm characteristics such as the number of employees, location, and industry; borrowers' internal credit rating; and the terms of loan contracts such as the amount of loans, interest rates, and maturities.

We implement estimations at the loan-level rather than at the firm-level to avoid a loss of information by aggregating loan-level data at the firm-level. As a matter of fact, a number of firms obtain two or more loans within a year from the JFE-SME. However, this division comes at a cost of treating observations of the same firm as being different.

Firms in our sample are relatively large-sized SMEs in Japan, because they are the targets of the JFC-SME. There is segmentation of the target SME loan markets within the JFC: medium to large SMEs for the JFC-SME and micro SMEs and sole proprietorships for the JFC-MBI. Also, compared with the universe of firms in Japan, the industry composition of JFC-SME borrowers skews toward manufacturing, because the original purpose of the JFC-SME is to provide loans for fixed capital investment.[13]

[13] However, the JFC-SME underwrites many loans for working capital.

To implement the three tests that we proposed in Section 3, we need different data sets. Test 1 for asymmetric information compares borrowers of collateralized and non-collateralized loans. For this comparison, we use a sample of all firms that receive collateralized or non-collateralized loans after the introduction of the non-collateralized ones. The sample period is from August 2008 to 2014. For test 2 where we control for firm fixed effects, we need to concentrate on borrowers that receive collateralized loans at least two different time periods, one before and one after the introduction in August 2008. The corresponding sample periods are respectively from 1995 to July 2008 and from August 2008 to 2014. For the two versions of Test 3, we use two different data sets. The first covers the borrowers that receive collateralized loans before and after the introduction. Its sample period spans from 2003 to 2014. The second covers the borrowers that receive non-collateralized loans after their introduction. Due to the availability of data for the collateral margin, the window for this data set is from 2011 to 2014.

4.2. Variables

In this part, we explain the variables that we use in our tests. The definitions of these variables are summarized in Table 1. Because we use different samples depending on the tests to perform, the summary statistics for each sample are reported in the next section where we report the corresponding test results.

The most important variable in our analysis is an indicator for non-collateralized loans, NONCOLL, which takes the value of one if the relevant loan is a non-collateralized loan and zero if it is a collateralized one. There are two other important variables that bring us advantages to our analysis. The variable POST is a dummy variable to indicate that the loan is underwritten after August 2008, i.e., after the introduction of non-collateralized loans. The variable MARGIN measures the collateral margin, which is defined as the ratio of the amount of collateralizable assets (net of the value

already pledged as collateral to other debtors) to the amount of loans. The collateralizable assets are mostly real estate properties (land and buildings) and machinery.

We use six variables to measure ex post performance of the borrowers. Four of these variables measure firms' credit risk, and are created using the JFC-SME's internal credit rating that is based on hard and soft information that the JFC-SME collects. The original rating, which we label CREDIT, ranges from 1 (most creditworthy) to 12 (least creditworthy and bankrupt). A rating that is equal to or larger than 9 indicates that the JFC-SME regards the firm as being in financial distress and the loans are non-performing. Applying the standards that private banks also apply, the JFC-SME classify these non-performing firms into three categories: firms in possible bankruptcies (ratings of 9 or 10), in virtual bankruptcies (rating of 11), and in actual bankruptcies (rating of 12). To indicate these firms, we use three dummy variables: Possible BANKRUPTCY, Virtual BANKRUPTCY, BANKRUPTCY.

In addition to these variables to measure ex post credit risk, we use two variables for firm performance. The variable d_lnSALES is the difference in the natural logarithm of firms' sales, or sales growth. The variable ROA is the return on asset, defined as the ratio of business profits to total assets. For each of these six variables, we measure ex post performance at three different time points, year t+1, t+2, and t+3, with year t as the year that the borrowers obtain loans. In sum, we use 18 (= 6 times 3) different variables as z_{it+k} in equations (1), (2-3), (3-1) and (3-2).

For the variables in the vector of control variables X_{it}, we use the following variables: LEVERAGE (firms' leverage), TANGIBILITY (the ratio of tangible asset to total asset), lnAGE (the natural logarithm of firm age), LENDERS (the number of lenders), LENGTH (the duration (years) of lending relationship), INDj (industry dummies), REGIONj (regional dummies), and YEARj (year dummies). We also include in the vector X_{it} ROA and CREDIT when they are not used as a performance measure.

5. Results

5.1. Results for Test 1: Test for Asymmetric Information

5.1.1. Sample description

Table 2 reports the summary statistics for the variables for the sample constructed for Test 1, the test for asymmetric information. We have almost 177,000 observations in this sample. The average (mean) firm size as measured in logarithms are 7.029 in lnSALES and 7.076 in lnASSETS, which correspond to the sales and asset of JPY1.13 billion and JPY1.18 billion, respectively. The average age measured in logarithms is 3.859, which corresponds to 47 years. For the average firm, the leverage ratio (LEVERAGE) is 58.2%, the ratio of tangible assets is 55.3%, and ROA is 2.3%. The highest frequency for IND 3 among the industry dummies and REGION 2 among the regional dummies indicate that the number of observations is the largest for firms in the manufacturing industry, and located in the Kanto area (including Tokyo).

The most frequent internal credit rating is 2, i.e., the second best rating among the 12 grades. Regarding the ex-post credit risk of firms, the ratios of firms that fall into the categories of possible, virtual, and actual bankruptcies (respectively Possible BANKRUPTCY, Virtual BANKRUPTCY, and BANKRUPTCY) between year t and t+1 are 0.021, 0.001, and 0.001. These ratios increase when we extend the time window to t+2 and t+3.

The table also reports the statistics when we split the sample into the subsamples of collateralized (almost 99,000 observations) and non-collateralized borrowers (almost 77,000 observations), together with the results for the differences in means of the variables between the two samples. We can see substantial differences between these samples. In terms of size and age, collateralized firms are smaller and older than non-collateralized ones. In terms of leverage, tangibility, and credit risk, collateralized firms are less leveraged, more endowed with tangible assets, and more creditworthy. Collateralized firms are more concentrated in manufacturing (IND3), and are less geographically concentrated in the

Kanto area (REGION2).

When comparing ex post performance as a univariate analysis, we find that in terms of ex-post credit risk, the collateralized firms tend to be less risky than non-collateralized ones, regardless of what variables to use and of what time period to take. These findings suggest that firms obtaining collateralized loans are less risky than those obtaining non-collateralized ones. Although this finding is consistent with the presence of asymmetric information, we need to conduct multivariate analysis to obtain more reliable results.

5.1.2. Multivariate Results

Table 3 shows the results for the conditional correlation test that we explained in Section 3.1. The correlation coefficients for each of the 18 estimations (6 dependent variables for 3 time periods) are reported together with the results for the test of no correlation.

As for the results on credit risk, in each of the estimations using the four credit risk variables for the three different time windows, the conditional correlation coefficients are positive and are statistically different from zero. They are also substantially larger in size. These findings strongly support the existence of asymmetric information.

Turning to the results on financial performance, the results for sales growth (d_lnSALES) indicate that the conditional correlation coefficient is positive and statistically significant when we take the window from t to t+2 or t+3. These findings again suggest that the existence of asymmetric information becomes evident a few years after lending. As for the other financial performance variable, ROA, the correlation coefficient is marginally significant three years after the loan provision.

Overall, we find that not only the firms' credit risk but also their performance is significantly correlated with the use of non-collateralized loans. These findings are consistent with the presence of asymmetric information in the loan market.

5.2. Results for Test 2: Test for Moral Hazard

5.2.1. Sample Description

Table 4 shows the summary statistics for the sample for Test 2, the test for moral hazard. Firms in this sample are those that receive loans both before and after the introduction of non-collateralized loans in August 2008. We report the summary statistics for two sub-samples: Panel (a) is for about 22,000 firms that obtain collateralized loans both before and after August 2008; Panel (b) is for about 10,000 firms that obtain a collateralized loan before August 2008 but obtain a non-collateralized loan after August 2008. In the right-most column in each panel, we report the difference in means for the variables at the two time periods: when the firms obtain loans before August 2008; and after. Note that the difference in these differences between the two panels correspond to ξ in equation (2-3).

The characteristics of firms before and after August 2008 are qualitatively similar between the two panels. In both panels, the frequency for the two bankruptcy dummies (Possible BANKRUPTCY and Virtual BANKRUPTCY) to take the value of unity is higher after August 2008 than before. Because the magnitude of these differences appears more sizable in Panel (a) than in Panel (b), we can conjecture that firms that switches to non-collateralized loans perform worse than those that do not, which is consistent with the presence of moral hazard. However, we do not control for ex ante firm characteristics in this univariate comparison. To do so, we need to perform multivariate analysis.

5.2.2. Multivariate Results

By controlling for differences in ex ante firm characteristics, we estimate equation (2-3) using the sample shown in Table 4. The results are shown in Table 5. In order to report the results using the six variables for ex post performance, the table has six panels from (a) to (f). The most important explanatory variable is ΔNONCOLL, which takes the value of unity if the loan that the firm borrows

after August 2008 is a non-collateralized one, and zero if it is a collateralized one. Because the sample firms in this analysis cover all the firms that borrowed collateralized loans before August 2008, ΔNONCOLL is an indicator for a change in loan types.

In this table, we first find that in terms of credit risk measured by possible bankruptcy (Columns (2) and (3) in Panel (a)) and credit ratings (Column (3) in Panel (d)), ΔNONCOLL has statistically significant and positive coefficients. These findings respectively indicates that firms that change from collateralized to non-collateralized loans are more likely to fall into the category of possible bankruptcy, or to be downgraded in their credit scores. Since we control for time-invariant fixed effects, these findings are consistent with the moral hazard behavior among non-collateralized borrowers.

Second, as for the other dependent variables on credit risk (Virtual BANKRUPTCY in Panel (b) and BANKRUPTCY (Panel (c)), ΔNONCOLL has positive but statistically insignificant coefficients. These findings are not consistent with the moral hazard hypothesis. However, we should take into account the fact that firms that fall into virtual or actual bankruptcy are minority. The upper rows of Panels (a) and (b) in Table 4 show that the shares of virtual bankruptcies and those of actual bankruptcies respectively range from 0.4 to 1.2% and from 0.2 to 0.5% in three years after the JFC-SME originate the loans. This low rate of bankruptcy for the JFC-SME is consistent with the low rate in recent Japan. Thus, it is reasonable to focus on the results in Panels (a) and (d) rather than those in Panels (b) and (c), and to conclude for the presence of moral hazard.

Third, turning to the results for financial performance (Panels (e) and (f)), we find that the coefficient for ΔNONCOLL is insignificant in most cases. We exceptionally find a positive coefficient that is marginally significant in Column (1) of Panel (e), which indicates that firms that switch to non-collateralized loans tend to have higher sales growth than those that do not switch. The result is consistent with our univariate finding of better financial performance for switchers.

On balance, we find evidence for moral hazard among borrowers that obtain non-collateralized

loans. The evidence from our analysis includes deteriorating credit ratings and the higher frequency of falling into the category of possible bankruptcies for the non-collateralized borrowers. However, the results are statistically insignificant when we focus on other risk measures such as incidences of falling into the categories of virtual and actual bankruptcy. The results for financial performance are also tenuous. These findings might indicate that the extent of moral hazard may not be significant enough to cause serious problems, but we should also take into account the fact that during the sample period firms in Japan are less likely to go into actual bankruptcy.

5.3. Results for Test 3: Test for Adverse Selection

5.3.1. Sample description

Our third test is to examine adverse selection. In this test, we make two comparisons: (1) comparing borrowers that receive collateralized loans before the introduction of non-collateralized loans and those after; and (2) comparing borrowers that receive non-collateralized loans and those that receive collateralized loans, both after the introduction. Tables 6 and 7 respectively report the summary statistics for the characteristics of sample firms used for comparisons (1) and (2). In each table, we also compare the statistics for the two groups of borrowers within the respective sample.

In Table 6, we find that among borrowers that obtain collateralized loans, about 114,000 firms borrow prior to August 2008 and about 99,000 borrow after August 2008. Comparing the ex ante firm characteristics depending on these two different periods of loan provision, LEVERAGE, ROA, lnSALES are higher, and TANGIBILITY is lower for the firms that borrow before 2008 than for those that borrow after. As for ex ante credit risk, the share of firms with good internal credit ratings (CREDIT1 and CREDIT2) are lower for the firms that borrow before 2008 than after. We also find that firms that borrow before 2008 are riskier in terms of ex post risk as well, because the probability of falling into bankruptcy in any form (Possible BANKRUPTCY, Virtual BANKRUPTCY, and

BANKRUTPCY) is higher, except in the case of Possible BANKRUTCY in three years after loan provision. The finding that borrowers that obtain collateralized loans before 2008 are more likely to become riskier than those that obtain the ones after 2008 is consistent with adverse selection, although this is a simple univariate result.

In Table 7, we find that among borrowers of non-collateralized loans, about 27,000 firms do not have sufficient assets to pledge as collateral (Column (a)), while about 13,000 firms do (Column (b)). At the time of loan origination, the firms in the former group have higher ROA and lower LEVERAGE, lnSALES, and TANGIBILITY than those in the latter group. The share of firms with good internal credit ratings (CREDIT1 and CREDIT2) is smaller in the former group than in the latter. As for the ex-post performance, the probability of falling into virtual bankruptcy is larger in the former group than in the latter. This simple univariate result suggests that inconsistent with adverse selection, firms that are forced to borrow non-collateralized loans become riskier than those that choose non-collateralized loans although they could have chosen collateralized ones. Below, we will examine whether the result changes when we perform multivariate analysis.

5.3.2. Multivariate Results (1): Collateralized Borrowers before and after August 2008

In this section, we report the results for the first version of Test 3 for adverse selection, i.e., the results for the estimation of equation (3-1) in Section 3.3. In Table 8, we report the results in six panels that correspond to the six performance variables we use as the dependent variables. The variable of our interest is *POST*, because its coefficient represents δ in equation (3-1).

When we use credit risk for the dependent variables (Panels (a) through (d)), the results are mixed. The coefficient is statistically significant and negative in Column (1) of Panel (a) and Column (3) of Panel (d), which is consistent with the prediction under adverse selection that borrowers that choose collateralized loans after August 2008 perform better than those that choose them before August 2008.

However, the coefficient is positive in Column (1) of Panel (c), and is statistically insignificant in the other cases.

When we use the variables for financial performance (Panels (e) and (f)), the coefficients for *POST* are negative and statistically significant in most cases. These findings do not support the prediction under adverse selection. On balance, the overall results for this test are mixed, and we find no clear evidence for the presence of adverse selection.

5.3.3. Multivariate Results (2): Non-collateralized Borrowers with and without Assets to Pledge as Collateral

This section reports the results for the second version of Test 3 for adverse selection, or the results for the estimation of equation (3-2) in Section 3.3. Table 9 shows the results. As in Table 8, the table reports the results in six panels that correspond to the six dependent variables to measure ex post firm performance. In this test, we focus on the variable *MARGIN*. Its coefficient represents μ in equation (3-2), and so under the presence of adverse selection, the variable should have a negative effect on ex post performance as a result of the self-selection by riskier borrowers of non-collateralized loans.

We first find that when we use credit risk variables on the left-hand side (Panels (a) through (d)), the coefficient for *MARGIN* is negative whenever it is statistically significant. This sign indicates that the ex-post credit risk is lower for non-collateralized firms with abundant collateralizable assets than for those without, which is inconsistent with our prior prediction under adverse selection. Although the coefficients on *MARGIN* are positive and consistent with the prediction in Panel (d), they are statistically insignificant.

Turning to the financial performance (Panels (e) and (f)), the coefficient on *MARGIN* is statistically significant only in the case of ROA (Column (1) of Panel (f)) and its sign is negative. This finding is consistent with adverse selection. However, the coefficient is statistically insignificant in

the other cases. On balance, our findings are inconsistent with adverse selection, because they suggest that borrowers that are forced to choose non-collateralized loans do not perform better than those that could have chosen collateralized ones.

6. Conclusion

In this paper, we empirically examine whether adverse selection and moral hazard matter in financial contracting by taking advantage of unique and comprehensive data from a public bank in Japan that introduced non-collateralized loans. The results indicate a positive role of collateral under the presence of asymmetric information. From our tests to identify adverse selection and moral hazard, we find results that are consistent with moral hazard. However, our findings on adverse selection are mixed and unclear.

Our empirical examination makes an important contribution to the academic literature, because from empirical viewpoints, it sheds new lights on the interaction between adverse selection or moral hazard and collateral. Our findings are also important from practical viewpoints. Based on our findings in support for moral hazard rather than adverse selection, we can draw an important implication: banks should exert more effort in ex post monitoring of borrowers than ex-ante screening.

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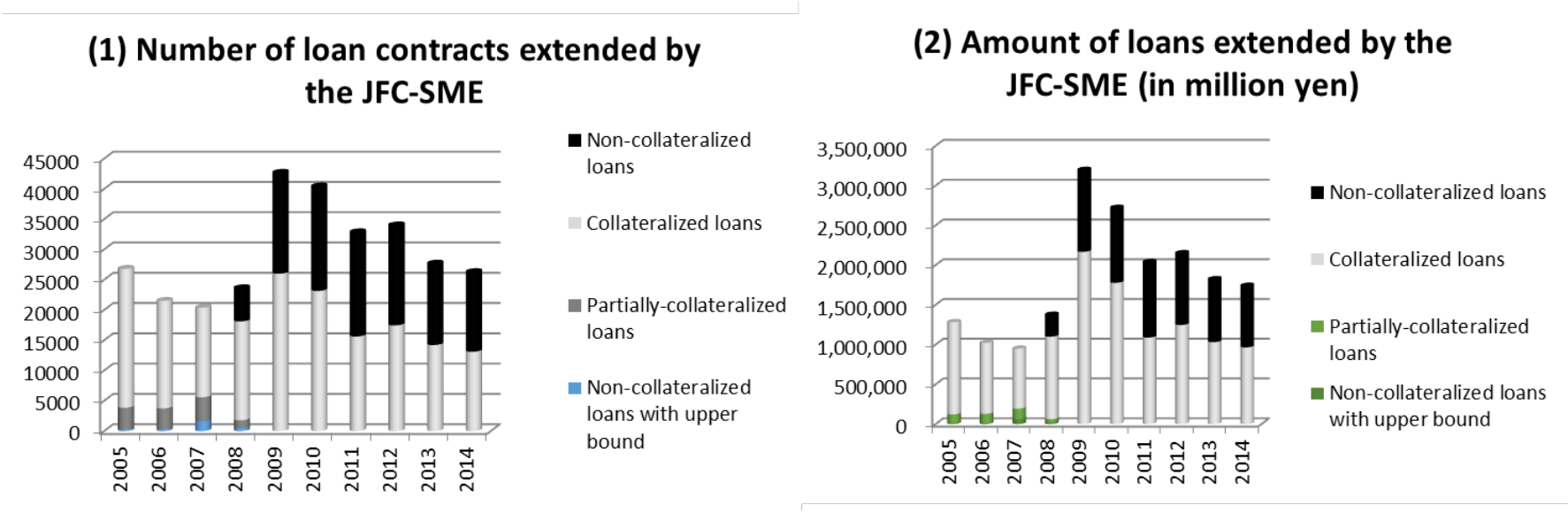
Figure

Figure 1: Amount of loans extended by JASME (-September 2008) and JFC-SME (October 2008-)



Tables

Table 1: Definitions of variables

Variable names	Definitions
NONCOLL	Dummy for the use of non-collateralized loan extended by the JFC-SME. 1 if the firm obtains the non-collateralized loan and 0 otherwise.
POST	Dummy after the institutional change on non-collateralized loans. 1 if the firm receives the loan from JFC-SME after August 2008 and 0 otherwise.
MARGIN	Dummy for the ratio of collateralizable asset amount to the amount of loan. 1 if the ratio is equal to or larger than one and 0 otherwise. JFC-SME loan officers investigate collateralizable asset amount each borrower firm may pledge. The amount of assets already pledged for collateral for other loans is deducted from the collateralizable assets.
CREDITj(t+k)	Internal credit ratings develped and reported by JFC-SME loan officers, ranging from 1 (most creditworthy) to 12 (least creditworthy and bankrupt) in year t+k.
Possible BANKRUPTCY(t+k)	Dummy for the possible bankrupt status of a firm. 1 if the firm has fallen into the category of severe financial distress that is close to bankruptcy or worse (in terms of internal ratings, CREDIT is between 9 and 12) at least once between year t and year t+k and 0 if the firm reports their credit status for all the years between t and year t+k and has never fallen into the category of severe financial distress or worse.
Virtual BANKRUPTCY(t+k)	Dummy for the virtual bankrupt status of a firm. 1 if the firm has fallen into the category of virtual bankruptcy or worse (in terms of internal ratings, CREDIT is 11 or 12) at least once between year t and year t+k and 0 if the firm reports their credit status for all the years between t and year t+k and has never fallen into the category of virtual bankrutpcy or worse.
BANKRUPTCY(t+k)	Dummy for the legal bankrupt status of a firm. 1 if the firm has fallen into the category of bankrutpcy (in terms of internal ratings, CREDIT is 12) at least once between year t and year t+k and 0 if the firm reports their credit status for all the years between t and year t+k and has never fallen into the category of bankruptcy.
d_lnSALES(t+k)	Difference in the log of sales amount between year t and t+k
ROA(t+k)	Ratio of business profit to total assets in year t+k
LEVERAGE	Ratio of sum of short- and long-term loans to total assets
TANGIBILITY	Ratio of tangible assets to total assets
lnAGE	Log of firm age
LENDERS	Number of lenders for each firm including JFC-SME
LENGTH	Duration of relationship between the firm and JFC-SME
INDj	Industry dummies: j = 1 (agriculture, fishery, and forestry), 2(construction), 3(manufacturing), 4(utilities, information technology, communications, transportation), 5(wholesale and retail), 6(finance and insurance), 7(real estate), 8(services)
REGIONj	Region dummies: j = 1(Hokkaido and Tohoku), 2(Kanto), 3(Hokuriku and Koshinetsu), 4(Tokai), 5(Kinki), 6(Chugoku), 7(Shikoku), 8(Kyushu and Okinawa)
YEARj	Year dummies: j = from 2003 to 2014

Table 2: Summary statistics for firms that obtain loans (collateralized and non-collateralized) from JFC-SME after August 2008

		(a)+(b) All loans				(a) Collateralized loans				(b) Non-collateralized loans				(a)-(b)
		N	mean	median	std	N	mean	median	std	N	mean	median	std	diff
Possible BANKRUPTCY	t+1	150,908	0.021	0	0.144	86,132	0.018	0	0.132	64,776	0.025	0	0.157	-0.008***
	t+2	123,112	0.057	0	0.231	71,330	0.047	0	0.212	51,782	0.070	0	0.254	-0.022***
	t+3	94,632	0.107	0	0.309	56,348	0.089	0	0.284	38,284	0.134	0	0.340	-0.045***
Virtual BANKRUPTCY	t+1	147,935	0.001	0	0.037	84,669	0.001	0	0.029	63,266	0.002	0	0.046	-0.001***
	t+2	116,650	0.004	0	0.066	68,154	0.003	0	0.053	48,496	0.006	0	0.080	-0.004***
	t+3	85,296	0.009	0	0.095	51,677	0.006	0	0.078	33,619	0.014	0	0.116	-0.007***
BANKRUPTCY	t+1	147,844	0.001	0	0.028	84,641	0.001	0	0.023	63,203	0.001	0	0.033	-0.001***
	t+2	116,401	0.002	0	0.047	68,061	0.001	0	0.038	48,340	0.003	0	0.057	-0.002***
	t+3	84,907	0.005	0	0.067	51,520	0.003	0	0.056	33,387	0.007	0	0.082	-0.004***
lnSALES		176,941	7.029	7.032	1.097	99,445	6.967	6.973	1.132	77,496	7.109	7.102	1.045	-0.142***
LEVERAGE		176,949	0.582	0.598	0.200	99,451	0.562	0.574	0.208	77,498	0.607	0.624	0.186	-0.045***
ROA		176,949	0.023	0.02	0.044	99,451	0.021	0.019	0.044	77,498	0.025	0.022	0.044	-0.005***
lnASSETS		176,949	7.076	7.071	0.981	99,451	7.072	7.062	0.992	77,498	7.081	7.078	0.966	-0.009**
TANGIBILITY		176,949	0.553	0.555	0.197	99,451	0.576	0.577	0.192	77,498	0.523	0.526	0.201	0.053***
lnAGE		175,094	3.859	3.951	0.556	98,351	3.928	3.989	0.505	76,743	3.770	3.871	0.604	0.158***
LENDERS		149,428	5.470	6	1.083	83,987	5.387	6	1.067	65,441	5.576	6	1.094	-0.189***
LENGTH		176,949	16.831	20	5.693	99,451	17.909	20	4.852	77,498	15.448	18	6.356	2.461***
CREDIT1		176,891	0.140	0	0.347	99,414	0.171	0	0.376	77,477	0.100	0	0.300	0.071***
CREDIT2		176,891	0.290	0	0.454	99,414	0.303	0	0.460	77,477	0.274	0	0.446	0.029***
CREDIT3		176,891	0.234	0	0.423	99,414	0.217	0	0.412	77,477	0.255	0	0.436	-0.039***
CREDIT4		176,891	0.100	0	0.300	99,414	0.086	0	0.280	77,477	0.119	0	0.323	-0.033***
CREDIT5		176,891	0.068	0	0.252	99,414	0.065	0	0.246	77,477	0.073	0	0.261	-0.009***
CREDIT6		176,891	0.126	0	0.332	99,414	0.121	0	0.326	77,477	0.133	0	0.340	-0.013***
CREDIT7		176,891	0.039	0	0.194	99,414	0.037	0	0.188	77,477	0.042	0	0.201	-0.005***
CREDIT8		176,891	0.002	0	0.048	99,414	0.002	0	0.040	77,477	0.003	0	0.056	-0.002***
IND1		176,949	0.002	0	0.047	99,451	0.002	0	0.042	77,498	0.003	0	0.053	-0.001***
IND2		176,949	0.065	0	0.246	99,451	0.061	0	0.239	77,498	0.070	0	0.255	-0.009***
IND3		176,949	0.504	1	0.500	99,451	0.519	1	0.500	77,498	0.485	0	0.500	0.034***
IND4		176,949	0.085	0	0.279	99,451	0.080	0	0.271	77,498	0.091	0	0.288	-0.012***
IND5		176,949	0.205	0	0.404	99,451	0.202	0	0.401	77,498	0.209	0	0.407	-0.007***
IND6		176,949	0.000	0	0.016	99,451	0.000	0	0.008	77,498	0.000	0	0.022	-0.000***
IND7		176,949	0.034	0	0.182	99,451	0.032	0	0.175	77,498	0.037	0	0.190	-0.006***
IND8		176,949	0.047	0	0.212	99,451	0.043	0	0.202	77,498	0.053	0	0.225	-0.011***
REGION1		176,949	0.117	0	0.321	99,451	0.109	0	0.311	77,498	0.127	0	0.332	-0.018***
REGION2		176,949	0.331	0	0.471	99,451	0.324	0	0.468	77,498	0.341	0	0.474	-0.016***
REGION3		176,949	0.064	0	0.245	99,451	0.064	0	0.244	77,498	0.065	0	0.246	-0.001
REGION4		176,949	0.088	0	0.283	99,451	0.090	0	0.286	77,498	0.085	0	0.279	0.005***
REGION5		176,949	0.200	0	0.400	99,451	0.203	0	0.403	77,498	0.195	0	0.396	0.008***
REGION6		176,949	0.070	0	0.255	99,451	0.072	0	0.258	77,498	0.067	0	0.251	0.004***
REGION7		176,949	0.036	0	0.186	99,451	0.039	0	0.194	77,498	0.032	0	0.175	0.008***
REGION8		176,949	0.092	0	0.288	99,451	0.096	0	0.294	77,498	0.086	0	0.280	0.010***

Table 3: Conditional correlation between firm characteristics and use of non-collateralized loans

		Correlation coefficient	Chi2(1)	p-value	
Possible BANKRUPTCY	t+1	0.0375	9.479	0.0002	***
	t+2	0.0565	34.615	0	***
	t+3	0.0693	56.684	0	***
Virtual BANKRUPTCY	t+1	0.0922	6.372	0.0116	**
	t+2	0.0722	8.140	0.0043	***
	t+3	0.0480	4.601	0.0320	**
BANKRUPTCY	t+1	0.0946	4.111	0.0426	**
	t+2	0.0822	7.364	0.0067	***
	t+3	0.0537	3.403	0.0651	*
CREDIT	t+1	0.0196	45.414	0	***
	t+2	0.0295	84.846	0	***
	t+3	0.0341	86.000	0	***
d_lnSALES	t+1	0.0039	1.796	0.1802	
	t+2	0.0073	5.249	0.0220	**
	t+3	0.0086	5.496	0.0191	**
ROA	t+1	0.0045	2.452	0.1174	
	t+2	0.0033	1.061	0.3031	
	t+3	0.0067	3.279	0.0702	*

Note: The statistics to test conditional correlations are the Wald test statistics when we employ Possible BANKRUPTCY, Virtual BANKRUPTCY, and BANKRUPTCY for dependent variables and Breusch-Pagan test statistics of independence when we employ CREDIT, d_lnSALES, and ROA for dependent variables.

Table 4: Summary statistics for firms that obtain two loans before and after August 2008

Panel (a): Firms that obtain collateralized loans both before and after August 2008

		(a) Prior to August 2008				(b) After August 2008				(a)+(b) All loans				(a)-(b)
		N	mean	median	std.	N	mean	median	std.	N	mean	median	std.	diff
Possible BANKRUPTCY	t+1	20,188	0.017	0	0.131	20,230	0.015	0	0.123	40,418	0.016	0	0.127	0.002
	t+2	20,026	0.035	0	0.183	18,844	0.039	0	0.193	38,870	0.037	0	0.188	-0.004**
	t+3	19,807	0.051	0	0.221	16,963	0.070	0	0.256	36,770	0.060	0	0.238	-0.019***
Virtual BANKRUPTCY	t+1	19,848	0.001	0	0.024	19,940	0.001	0	0.034	39,788	0.001	0	0.029	-0.001**
	t+2	19,372	0.002	0	0.046	18,179	0.003	0	0.058	37,551	0.003	0	0.052	-0.001**
	t+3	18,861	0.004	0	0.060	15,873	0.006	0	0.080	34,734	0.005	0	0.070	-0.003***
BANKRUPTCY	t+1	19,846	0.000	0	0.021	19,927	0.001	0	0.022	39,773	0.000	0	0.022	0.000
	t+2	19,356	0.001	0	0.036	18,143	0.001	0	0.038	37,499	0.001	0	0.037	0.000
	t+3	18,834	0.002	0	0.047	15,814	0.003	0	0.053	34,648	0.002	0	0.050	-0.001
CREDIT		20,776	3.096	3	1.745	21,831	3.117	3	1.833	42,607	3.107	3	1.790	-0.021
LEVERAGE		21,410	0.534	0.542	0.231	21,260	0.536	0.545	0.255	42,670	0.535	0.543	0.243	-0.002
lnSALES		21,414	6.814	6.827	1.219	21,266	6.752	6.753	1.246	42,680	6.783	6.794	1.233	0.062***
ROA		21,042	0.032	0.025	0.092	21,142	0.018	0.017	0.062	42,184	0.025	0.021	0.079	0.014***
TANGIBILITY		21,410	0.560	0.557	0.205	21,260	0.570	0.57	0.206	42,670	0.565	0.563	0.206	-0.010***
lnAGE		21,151	3.786	3.871	0.603	21,010	3.876	3.951	0.525	42,161	3.831	3.912	0.567	-0.090***
FY		21,868	2005.561	2006	2.107	21,868	2009.208	2009	1.368	43,736	2007.385	2008	2.546	-3.647***

Panel (b): Firms that switch from collateralized to non-collateralized loans after August 2008

		(a) Prior to August 2008				(b) After August 2008				(a)+(b) All loans				(a)-(b)
		N	mean	median	std.	N	mean	median	std.	N	mean	median	std.	diff
Possible BANKRUPTCY	t+1	9,042	0.020	0	0.140	9,064	0.021	0	0.143	18,106	0.020	0	0.142	-0.001
	t+2	8,948	0.041	0	0.199	8,457	0.054	0	0.225	17,405	0.047	0	0.212	-0.012***
	t+3	8,822	0.062	0	0.241	7,594	0.097	0	0.296	16,416	0.078	0	0.268	-0.035***
Virtual BANKRUPTCY	t+1	8,870	0.001	0	0.034	8,893	0.002	0	0.045	17,763	0.002	0	0.040	-0.001
	t+2	8,604	0.003	0	0.055	8,049	0.006	0	0.075	16,653	0.004	0	0.066	-0.003***
	t+3	8,332	0.007	0	0.082	6,938	0.012	0	0.107	15,270	0.009	0	0.094	-0.005***
BANKRUPTCY	t+1	8,868	0.001	0	0.030	8,883	0.001	0	0.030	17,751	0.001	0	0.030	0.000
	t+2	8,596	0.002	0	0.046	8,024	0.003	0	0.051	16,620	0.002	0	0.048	-0.001
	t+3	8,311	0.004	0	0.065	6,895	0.005	0	0.073	15,206	0.005	0	0.069	-0.001
CREDIT		9,354	3.378	3	1.718	9,917	3.373	3	1.842	19,271	3.375	3	1.783	0.005
LEVERAGE		9,730	0.572	0.583	0.211	9,639	0.587	0.602	0.237	19,369	0.580	0.592	0.225	-0.015***
lnSALES		9,730	6.982	6.977	1.140	9,638	6.952	6.945	1.146	19,368	6.967	6.961	1.143	0.031*
ROA		9,520	0.035	0.026	0.077	9,571	0.021	0.019	0.062	19,091	0.028	0.023	0.070	0.014***
TANGIBILITY		9,730	0.533	0.535	0.201	9,639	0.537	0.538	0.202	19,369	0.535	0.537	0.202	-0.004
lnAGE		9,638	3.686	3.784	0.636	9,548	3.797	3.871	0.540	19,186	3.742	3.829	0.593	-0.111***
FY		9,927	2005.410	2006	2.185	9,927	2009.299	2009	1.419	19,854	2007.354	2008	2.679	3.889***

Table 5: Estimation results of fixed effect model to test ex-post theory of collateral

Panel (a)	Dependent variable: Possible BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
ΔNONCOLL	0.0030	0.0024		0.0079	0.0034	**	0.0124	0.0041	***
ΔLEVERAGE	0.0362	0.0139	***	0.0621	0.0217	***	0.1015	0.0273	***
ΔROA	-0.1753	0.0250	***	-0.2428	0.0375	***	-0.2710	0.0462	***
ΔlnSALES	0.0066	0.0042		0.0019	0.0065		-0.0001	0.0078	
ΔTANGIBILITY	0.0255	0.0142	*	0.0221	0.0226		-0.0046	0.0277	
lnAGE	-0.0019	0.0020		-0.0070	0.0029	**	-0.0136	0.0037	***
ΔCREDIT	0.0047	0.0010	***	0.0059	0.0015	***	0.0074	0.0019	***
ΔYEAR	-0.0019	0.0005	***	-0.0019	0.0008	**	-0.0004	0.0010	
Constant	0.0117	0.0082		0.0381	0.0118	***	0.0737	0.0150	***
NOB	24596			23053			20941		
F-value	18.08			18.43			18.08		
Prob > F	0			0			0		
R-squared	0.0109			0.0117			0.0133		
Root MSE	0.16368			0.22184			0.25659		

Panel (b)	Dependent variable: Virtual BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
ΔNONCOLL	0.0006	0.0006		0.0013	0.0009		0.0013	0.0011	
ΔLEVERAGE	0.0037	0.0018	**	0.0125	0.0046	***	0.0169	0.0072	**
ΔROA	0.0006	0.0035		0.0007	0.0078		-0.0089	0.0123	
ΔlnSALES	0.0015	0.0009	*	0.0039	0.0018	**	0.0014	0.0027	
ΔTANGIBILITY	-0.0018	0.0023		0.0120	0.0072	*	0.0056	0.0074	
lnAGE	0.0000	0.0005		-0.0013	0.0007	*	-0.0009	0.0009	
ΔCREDIT	0.0004	0.0001	***	0.0007	0.0004	*	0.0007	0.0005	
ΔYEAR	-0.0004	0.0001	***	-0.0002	0.0002		0.0003	0.0002	
Constant	0.0021	0.0019		0.0073	0.0029	**	0.0054	0.0033	*
NOB	23915			21734			19086		
F-value	2.66			3.26			1.95		
Prob > F	0.0065			0.001			0.0481		
R-squared	0.0012			0.0025			0.0019		
Root MSE	0.03655			0.05289			0.06257		

Panel (c)	Dependent variable: BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
ΔNONCOLL	0.0004	0.0004		0.0007	0.0006		0.0006	0.0008	
ΔLEVERAGE	0.0018	0.0010	*	0.0083	0.0033	**	0.0082	0.0041	**
ΔROA	0.0026	0.0016		0.0089	0.0036	**	0.0081	0.0049	
ΔlnSALES	0.0009	0.0004	**	-0.0002	0.0008		0.0006	0.0016	
ΔTANGIBILITY	0.0002	0.0015		0.0064	0.0050		0.0037	0.0050	
lnAGE	0.0002	0.0002		0.0005	0.0003		0.0007	0.0004	
ΔCREDIT	0.0002	0.0001	**	0.0000	0.0003		0.0000	0.0003	
ΔYEAR	-0.0002	0.0001	**	-0.0002	0.0001	*	-0.0001	0.0002	
Constant	0.0001	0.0009		-0.0006	0.0013		-0.0014	0.0018	
NOB	23896			21687			19015		
F-value	1.47			2.39			1.63		
Prob > F	0.163			0.0142			0.1107		
R-squared	0.0008			0.0016			0.0007		
Root MSE	0.0242			0.0346			0.04288		

Table 5: Estimation results of fixed effect model to test ex-post theory of collateral (continued)

Panel (d)	Dependent variable: CREDIT								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
ΔNONCOLL	0.0226	0.0225		0.0186	0.0262		0.0711	0.0278	***
ΔLEVERAGE	1.0198	0.1051	***	0.8751	0.1383	***	0.5776	0.1341	***
ΔROA	-4.8405	0.4023	***	-3.2967	0.3703	***	-1.2219	0.2772	***
ΔlnSALES	-0.0365	0.0454		0.2244	0.0496	***	0.0673	0.0540	
ΔTANGIBILITY	0.1684	0.1360		0.2394	0.1700		-0.1437	0.1741	
lnAGE	-0.0004	0.0206		-0.0290	0.0232		-0.0457	0.0250	*
ΔCREDIT	0.3121	0.0102	***	0.0847	0.0119	***	0.0235	0.0125	*
ΔYEAR	-0.0371	0.0050	***	0.0129	0.0061	**	0.0314	0.0070	***
Constant	0.1576	0.0843	*	0.1725	0.0941	*	0.2655	0.1014	***
NOB	24727			23268			21152		
F-value	268.27			39.06			11.57		
Prob > F	0			0			0		
R-squared	0.1508			0.0285			0.0062		
Root MSE	1.5854			1.7767			1.7992		

Panel (e)	Dependent variable: d_lnSALES								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
ΔNONCOLL	0.0073	0.0039	*	-0.0011	0.0046		0.0024	0.0048	
ΔLEVERAGE	-0.0508	0.0228	**	0.1116	0.0291	***	0.1164	0.0313	***
ΔROA	0.0235	0.0480		-0.1744	0.0522	***	-0.0901	0.0481	*
ΔlnSALES	-0.4410	0.0140	***	-0.6731	0.0177	***	-0.8180	0.0160	***
ΔTANGIBILITY	-0.2280	0.0310	***	-0.0926	0.0338	***	-0.0561	0.0366	
lnAGE	-0.0087	0.0038	**	-0.0137	0.0044	***	-0.0193	0.0045	***
ΔCREDIT	0.0033	0.0017	*	0.0016	0.0022		-0.0043	0.0023	*
ΔYEAR	0.0045	0.0009	***	-0.0174	0.0011	***	-0.0212	0.0012	***
Constant	-0.0620	0.0154	***	0.0604	0.0179	***	0.1150	0.0181	***
NOB	24814			23430			21406		
F-value	158.02			305.03			493.52		
Prob > F	0			0			0		
R-squared	0.2034			0.3354			0.4117		
Root MSE	0.27818			0.31947			0.31504		

Panel (f)	Dependent variable: ROA								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
ΔNONCOLL	-0.0613	0.0624		-0.0787	0.0785		-0.0003	0.0009	
ΔLEVERAGE	1.7153	1.6644		0.8394	0.7746		0.0677	0.0058	***
ΔROA	-0.8365	1.1476		0.4010	0.3641		-0.0435	0.0139	***
ΔlnSALES	0.2539	0.2703		-0.0521	0.0378		-0.0088	0.0018	***
ΔTANGIBILITY	3.5918	3.5683		-0.0842	0.1028		0.0059	0.0063	
lnAGE	0.0112	0.0123		-0.2216	0.2190		-0.0014	0.0009	
ΔCREDIT	-0.1367	0.1379		-0.1008	0.1028		0.0011	0.0003	***
ΔYEAR	0.0446	0.0443		0.0284	0.0316		-0.0020	0.0002	***
Constant	-0.1655	0.1548		0.8179	0.8003		0.0096	0.0036	***
NOB	24815			23305			21174		
F-value	1.62			4.75			53.3		
Prob > F	0.1125			0			0		
R-squared	0.0079			0.002			0.0418		
Root MSE	4.9117			4.6411			0.05704		

Table 6: Summary statistics for firms that obtain collateralized loans

		(a) from 2003 to 2008				(b) after 2008				(a)+(b) All loans				(a)-(b)
		N	mean	median	std.	N	mean	median	std.	N	mean	median	std.	diff
Possible BANKRUPTCY	t+1	109,567	0.021	0	0.145	86,132	0.018	0	0.132	195,699	0.020	0	0.140	0.004***
	t+2	107,760	0.051	0	0.220	71,330	0.047	0	0.212	179,090	0.050	0	0.217	0.004***
	t+3	105,677	0.079	0	0.270	56,348	0.089	0	0.284	162,025	0.083	0	0.275	-0.009***
Virtual BANKRUPTCY	t+1	107,508	0.003	0	0.052	84,669	0.001	0	0.029	192,177	0.002	0	0.044	0.002***
	t+2	103,046	0.008	0	0.087	68,154	0.003	0	0.053	171,200	0.006	0	0.076	0.005***
	t+3	98,654	0.014	0	0.117	51,677	0.006	0	0.078	150,331	0.011	0	0.106	0.008***
BANKRUPTCY	t+1	107,381	0.002	0	0.040	84,641	0.001	0	0.023	192,022	0.001	0	0.033	0.001***
	t+2	102,723	0.005	0	0.067	68,061	0.001	0	0.038	170,784	0.003	0	0.058	0.003***
	t+3	98,044	0.008	0	0.088	51,520	0.003	0	0.056	149,564	0.006	0	0.078	0.005***
LEVERAGE		111,166	0.572	0.583	0.226	99,451	0.562	0.574	0.208	210,617	0.567	0.579	0.218	0.011***
ROA		107,732	0.034	0.026	1.032	99,451	0.021	0.019	0.044	207,183	0.028	0.023	0.745	0.013***
lnSALES		111,204	7.025	7.048	1.142	99,445	6.967	6.973	1.132	210,649	6.998	7.012	1.138	0.058***
TANGIBILITY		111,166	0.558	0.559	0.196	99,451	0.576	0.577	0.192	210,617	0.567	0.567	0.194	-0.018***
lnAGE		109,750	3.808	3.871	0.554	98,351	3.928	3.989	0.505	208,101	3.865	3.932	0.535	-0.120***
CREDIT1		111,145	0.128	0	0.334	99,414	0.171	0	0.376	210,559	0.148	0	0.355	-0.043***
CREDIT2		111,145	0.232	0	0.422	99,414	0.303	0	0.460	210,559	0.265	0	0.441	-0.071***
CREDIT3		111,145	0.265	0	0.441	99,414	0.217	0	0.412	210,559	0.242	0	0.428	0.048***
CREDIT4		111,145	0.115	0	0.319	99,414	0.086	0	0.280	210,559	0.101	0	0.302	0.030***
CREDIT5		111,145	0.116	0	0.320	99,414	0.065	0	0.246	210,559	0.092	0	0.289	0.051***
CREDIT6		111,145	0.082	0	0.274	99,414	0.121	0	0.326	210,559	0.100	0	0.300	-0.039***
CREDIT7		111,145	0.052	0	0.223	99,414	0.037	0	0.188	210,559	0.045	0	0.207	0.015***
CREDIT8		111,145	0.010	0	0.101	99,414	0.002	0	0.040	210,559	0.006	0	0.078	0.009***
IND1		113,906	0.002	0	0.045	99,451	0.002	0	0.042	213,357	0.002	0	0.043	0.000
IND2		113,906	0.068	0	0.251	99,451	0.061	0	0.239	213,357	0.065	0	0.246	0.007***
IND3		113,906	0.524	1	0.499	99,451	0.519	1	0.500	213,357	0.522	1	0.500	0.005**
IND4		113,906	0.076	0	0.265	99,451	0.080	0	0.271	213,357	0.078	0	0.268	-0.004***
IND5		113,906	0.188	0	0.391	99,451	0.202	0	0.401	213,357	0.195	0	0.396	-0.014***
IND6		113,906	0.000	0	0.009	99,451	0.000	0	0.008	213,357	0.000	0	0.008	0.000
IND7		113,906	0.026	0	0.158	99,451	0.032	0	0.175	213,357	0.028	0	0.166	-0.006***
IND8		113,906	0.038	0	0.190	99,451	0.043	0	0.202	213,357	0.040	0	0.196	-0.005***

Table 7: Summary statistics for firms that obtain non-collateralized loans

		(a) without collateral margin				(b) with collateral margin				(a)+(b) All loans				(a)-(b)
		N	mean	median	Std.	N	mean	median	Std.	N	mean	median	Std.	diff
Possible BANKRUPTCY	t+1	18,909	0.027	0	0.161	9,349	0.028	0	0.166	28,258	0.027	0	0.163	-0.001
	t+2	11,814	0.077	0	0.267	5,784	0.082	0	0.275	17,598	0.079	0	0.270	-0.005
	t+3	4,602	0.229	0	0.420	2,267	0.243	0	0.429	6,869	0.234	0	0.423	-0.014
Virtual BANKRUPTCY	t+1	18,436	0.002	0	0.042	9,089	0.000	0	0.021	27,525	0.001	0	0.037	0.001***
	t+2	10,969	0.006	0	0.079	5,324	0.003	0	0.053	16,293	0.005	0	0.072	0.003***
	t+3	3,623	0.021	0	0.143	1,737	0.012	0	0.109	5,360	0.018	0	0.133	0.009**
BANKRUPTCY	t+1	18,416	0.001	0	0.027	9,087	0.000	0	0.015	27,503	0.001	0	0.023	0.000
	t+2	10,930	0.003	0	0.052	5,318	0.002	0	0.041	16,248	0.002	0	0.049	0.001
	t+3	3,579	0.009	0	0.094	1,729	0.008	0	0.086	5,308	0.008	0	0.092	0.001
LEVERAGE		26,771	0.590	0.606	0.190	12,814	0.609	0.622	0.183	39,585	0.596	0.612	0.188	-0.019***
ROA		26,771	0.032	0.026	0.044	12,814	0.025	0.021	0.039	39,585	0.030	0.024	0.042	0.007***
lnSALES		26,771	7.110	7.104	1.050	12,814	7.134	7.114	1.053	39,585	7.118	7.107	1.051	-0.024**
TANGIBILITY		26,771	0.491	0.493	0.208	12,814	0.558	0.561	0.184	39,585	0.513	0.518	0.203	-0.067***
lnAGE		26,615	3.682	3.807	0.648	12,733	3.940	4.007	0.500	39,348	3.765	3.871	0.616	-0.258***
CREDIT1		26,764	0.107	0	0.310	12,809	0.129	0	0.335	39,573	0.114	0	0.318	-0.022***
CREDIT2		26,764	0.265	0	0.441	12,809	0.283	0	0.451	39,573	0.271	0	0.444	-0.018***
CREDIT3		26,764	0.264	0	0.441	12,809	0.238	0	0.426	39,573	0.255	0	0.436	0.025***
CREDIT4		26,764	0.131	0	0.337	12,809	0.095	0	0.293	39,573	0.119	0	0.324	0.036***
CREDIT5		26,764	0.070	0	0.255	12,809	0.059	0	0.236	39,573	0.067	0	0.250	0.011***
CREDIT6		26,764	0.125	0	0.331	12,809	0.147	0	0.354	39,573	0.132	0	0.339	-0.022***
CREDIT7		26,764	0.034	0	0.182	12,809	0.044	0	0.206	39,573	0.037	0	0.190	-0.010***
CREDIT8		26,764	0.003	0	0.057	12,809	0.003	0	0.059	39,573	0.003	0	0.058	0.000
IND1		26,771	0.002	0	0.048	12,814	0.002	0	0.043	39,585	0.002	0	0.047	0.000
IND2		26,771	0.074	0	0.262	12,814	0.061	0	0.239	39,585	0.070	0	0.255	0.014***
IND3		26,771	0.431	0	0.495	12,814	0.555	1	0.497	39,585	0.471	0	0.499	-0.124***
IND4		26,771	0.099	0	0.299	12,814	0.077	0	0.266	39,585	0.092	0	0.289	0.023***
IND5		26,771	0.232	0	0.422	12,814	0.189	0	0.392	39,585	0.219	0	0.413	0.043***
IND6		26,771	0.001	0	0.029	12,814	0.000	0	0.015	39,585	0.001	0	0.026	0.001**
IND7		26,771	0.043	0	0.204	12,814	0.030	0	0.171	39,585	0.039	0	0.194	0.013***
IND8		26,771	0.062	0	0.241	12,814	0.044	0	0.206	39,585	0.056	0	0.230	0.017***

Table 8: Estimation results for collateralized borrowers to test ex ante theory of collateral

Panel (a)	Dependent variable: Possible BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
POST	-0.0051	0.0030	*	-0.0039	0.0040		0.0016	0.0051	
LEVERAGE	0.0264	0.0032	***	0.0686	0.0030	***	0.1021	0.0059	***
ROA	-0.0042	0.0009	***	-0.0045	0.0015	***	-0.0045	0.0017	***
lnSALES	-0.0040	0.0003	***	-0.0095	0.0005	***	-0.0157	0.0007	***
TANGIBILITY	-0.0066	0.0022	***	-0.0184	0.0034	***	-0.0334	0.0045	***
lnAGE	-0.0017	0.0007	**	-0.0037	0.0012	***	-0.0073	0.0015	***
CREDIT2	0.0007	0.0005		0.0037	0.0008	***	0.0074	0.0013	***
CREDIT3	0.0039	0.0008	***	0.0164	0.0011	***	0.0316	0.0018	***
CREDIT4	0.0159	0.0013	***	0.0376	0.0019	***	0.0647	0.0027	***
CREDIT5	0.0239	0.0016	***	0.0633	0.0024	***	0.1019	0.0033	***
CREDIT6	0.0551	0.0021	***	0.1169	0.0030	***	0.1790	0.0040	***
CREDIT7	0.1180	0.0039	***	0.2186	0.0052	***	0.2879	0.0061	***
CREDIT8	0.1297	0.0103	***	0.2247	0.0131	***	0.2793	0.0145	***
YEAR2004	0.0113	0.0010	***	0.0255	0.0017	***	0.0236	0.0022	***
YEAR2005	0.0213	0.0013	***	0.0301	0.0020	***	0.0373	0.0026	***
YEAR2006	0.0222	0.0015	***	0.0476	0.0024	***	0.0411	0.0029	***
YEAR2007	0.0345	0.0019	***	0.0433	0.0025	***	0.0357	0.0030	***
YEAR2008	0.0183	0.0028	***	0.0194	0.0038	***	0.0164	0.0048	***
YEAR2009	0.0127	0.0032	***	0.0157	0.0044	***	0.0160	0.0056	***
YEAR2010	0.0163	0.0032	***	0.0308	0.0044	***	0.0302	0.0057	***
YEAR2011	0.0238	0.0033	***	0.0400	0.0047	***	0.0767	0.0067	***
YEAR2012	0.0236	0.0033	***	0.0526	0.0052	***	0.8244	0.0077	***
YEAR2013	0.0245	0.0037	***	0.8848	0.0081	***	0.8138	0.0104	***
Constant	0.0027	0.0083		0.0266	0.0141	*	0.0794	0.0187	***
Industry dummies	yes			yes			yes		
NOB	178912			163667			147953		
F-value	110.71			981.6			1963.94		
Prob > F	0			0			0		
R-squared	0.0521			0.1			0.1478		
Root MSE	0.13781			0.20795			0.25646		

Panel (b)	Dependent variable: Virtual BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
POST	0.0012	0.0008		0.0018	0.0014		0.0028	0.0019	
LEVERAGE	0.0021	0.0006	***	0.0085	0.0012	***	0.0266	0.0037	***
ROA	-0.0005	0.0004		-0.0011	0.0010		-0.0019	0.0017	
lnSALES	0.0004	0.0001	***	0.0009	0.0002	***	0.0014	0.0003	***
TANGIBILITY	-0.0043	0.0008	***	-0.0094	0.0014	***	-0.0162	0.0022	***
lnAGE	-0.0012	0.0002	***	-0.0040	0.0005	***	-0.0075	0.0007	***
CREDIT2	0.0000	0.0001		-0.0003	0.0003		-0.0013	0.0005	**
CREDIT3	-0.0003	0.0002		0.0008	0.0004	**	0.0012	0.0008	
CREDIT4	0.0020	0.0004	***	0.0041	0.0007	***	0.0068	0.0012	***
CREDIT5	0.0025	0.0005	***	0.0084	0.0009	***	0.0140	0.0016	***
CREDIT6	0.0052	0.0007	***	0.0143	0.0012	***	0.0261	0.0020	***
CREDIT7	0.0086	0.0012	***	0.0305	0.0024	***	0.0579	0.0038	***
CREDIT8	0.0293	0.0054	***	0.0558	0.0080	***	0.0831	0.0104	***
YEAR2004	-0.0007	0.0004	*	0.0011	0.0007	*	0.0039	0.0010	***
YEAR2005	-0.0002	0.0005		0.0042	0.0008	***	0.0085	0.0012	***
YEAR2006	0.0026	0.0007	***	0.0100	0.0012	***	0.0125	0.0015	***
YEAR2007	0.0045	0.0008	***	0.0087	0.0012	***	0.0091	0.0014	***
YEAR2008	-0.0005	0.0008		0.0005	0.0013		-0.0002	0.0018	
YEAR2009	-0.0021	0.0009	**	-0.0027	0.0015	*	-0.0053	0.0021	**
YEAR2010	-0.0022	0.0009	**	-0.0024	0.0015		-0.0036	0.0021	*
YEAR2011	-0.0024	0.0009	***	-0.0022	0.0016		-0.0023	0.0024	
YEAR2012	-0.0021	0.0009	**	-0.0021	0.0016		0.9682	0.0052	***
YEAR2013	-0.0024	0.0010	**	0.9776	0.0092	***	0.9543	0.0162	***
Constant	0.0037	0.0031		0.0103	0.0062	*	0.0161	0.0091	*
Industry dummies	yes			yes			yes		
NOB	175596			156308			137065		
F-value	10.62			441.15			1723.65		
Prob > F	0			0			0		
R-squared	0.0072			0.0187			0.0391		
Root MSE	0.044			0.07591			0.10462		

Table 8: Estimation results for collateralized borrowers to test ex ante theory of collateral (contd.)

Panel (c)	Dependent variable: BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
POST	0.0014	0.0004	***	0.0011	0.0009		0.0012	0.0013	
LEVERAGE	0.0009	0.0005	**	0.0040	0.0009	***	0.0101	0.0013	***
ROA	-0.0003	0.0003		-0.0006	0.0005		-0.0008	0.0007	
lnSALES	0.0005	0.0001	***	0.0014	0.0002	***	0.0023	0.0002	***
TANGIBILITY	-0.0024	0.0006	***	-0.0054	0.0010	***	-0.0082	0.0015	***
lnAGE	-0.0007	0.0002	***	-0.0022	0.0004	***	-0.0037	0.0006	***
CREDIT2	0.0001	0.0001		-0.0002	0.0002		-0.0002	0.0003	
CREDIT3	0.0000	0.0001		0.0003	0.0003		0.0010	0.0004	**
CREDIT4	0.0015	0.0003	***	0.0028	0.0006	***	0.0046	0.0008	***
CREDIT5	0.0013	0.0003	***	0.0049	0.0007	***	0.0085	0.0010	***
CREDIT6	0.0033	0.0005	***	0.0084	0.0009	***	0.0157	0.0014	***
CREDIT7	0.0054	0.0009	***	0.0186	0.0019	***	0.0350	0.0029	***
CREDIT8	0.0162	0.0040	***	0.0358	0.0065	***	0.0578	0.0087	***
YEAR2004	0.0001	0.0003		0.0009	0.0005	*	0.0024	0.0008	***
YEAR2005	0.0005	0.0003		0.0024	0.0006	***	0.0062	0.0010	***
YEAR2006	0.0018	0.0005	***	0.0069	0.0009	***	0.0068	0.0011	***
YEAR2007	0.0040	0.0007	***	0.0056	0.0009	***	0.0061	0.0011	***
YEAR2008	-0.0008	0.0002	***	-0.0003	0.0009		-0.0009	0.0012	
YEAR2009	-0.0015	0.0004	***	-0.0016	0.0011		-0.0027	0.0014	*
YEAR2010	-0.0016	0.0004	***	-0.0016	0.0010		-0.0019	0.0014	
YEAR2011	-0.0020	0.0004	***	-0.0017	0.0011		-0.0006	0.0016	
YEAR2012	-0.0015	0.0005	***	-0.0007	0.0012		0.9853	0.0035	***
YEAR2013	-0.0015	0.0005	***	0.9873	0.0061	***	0.9756	0.0107	***
Constant	0.0013	0.0030		0.0043	0.0060		0.0067	0.0087	
Industry dummies	yes			yes			yes		
NOB	175454			155930			136378		
F-value	6.71			988.71			3653.64		
Prob > F	0			0			0		
R-squared	0.0044			0.0156			0.0336		
Root MSE	0.03375			0.05856			0.07925		

Panel (d)	Dependent variable: CREDIT								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
POST	-0.029	0.028		-0.028	0.034		-0.080	0.038	**
LEVERAGE	1.028	0.074	***	1.370	0.097	***	1.597	0.119	***
ROA	-0.033	0.020		-0.029	0.017	*	-0.026	0.014	*
lnSALES	-0.045	0.003	***	-0.071	0.004	***	-0.100	0.005	***
TANGIBILITY	-0.139	0.027	***	-0.308	0.036	***	-0.440	0.043	***
lnAGE	0.022	0.007	***	0.028	0.009	***	0.028	0.010	***
CREDIT2	0.748	0.012	***	0.689	0.016	***	0.651	0.019	***
CREDIT3	1.616	0.017	***	1.527	0.022	***	1.471	0.026	***
CREDIT4	2.449	0.020	***	2.299	0.026	***	2.241	0.031	***
CREDIT5	3.244	0.024	***	3.051	0.031	***	2.903	0.037	***
CREDIT6	4.042	0.026	***	3.770	0.033	***	3.589	0.041	***
CREDIT7	4.745	0.033	***	4.427	0.041	***	4.137	0.049	***
CREDIT8	4.812	0.069	***	4.402	0.081	***	3.994	0.089	***
YEAR2004	0.123	0.010	***	0.124	0.013	***	0.185	0.015	***
YEAR2005	0.117	0.011	***	0.215	0.015	***	0.320	0.017	***
YEAR2006	0.274	0.014	***	0.491	0.017	***	0.653	0.019	***
YEAR2007	0.382	0.015	***	0.688	0.018	***	0.707	0.021	***
YEAR2008	0.483	0.026	***	0.561	0.031	***	0.513	0.035	***
YEAR2009	0.229	0.030	***	0.205	0.037	***	0.504	0.042	***
YEAR2010	0.150	0.030	***	0.483	0.038	***	0.603	0.042	***
YEAR2011	0.490	0.032	***	0.629	0.039	***	0.611	0.046	***
YEAR2012	0.308	0.031	***	0.262	0.041	***			
YEAR2013	0.176	0.035	***						
Constant	1.056	0.075	***	1.278	0.103	***	1.590	0.129	***
Industry dummies	yes			yes			yes		
NOB	178949			163884			147775		
F-value	8485.59			4956.37			3507.73		
Prob > F	0			0			0		
R-squared	0.5892			0.4631			0.3925		
Root MSE	1.2694			1.5855			1.7835		

Table 8: Estimation results for collateralized borrowers to test ex ante theory of collateral (contd.)

Panel (e)	Dependent variable: d_lnSALES								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
POST	-0.024	0.005	***	-0.014	0.005	***	-0.013	0.006	**
LEVERAGE	0.013	0.003	***	0.040	0.005	***	0.033	0.007	***
ROA	-0.001	0.001		0.000	0.001		0.000	0.001	
lnSALES	-0.001	0.001	*	0.002	0.001	***	0.006	0.001	***
TANGIBILITY	-0.006	0.003	**	0.026	0.004	***	0.049	0.005	***
lnAGE	-0.017	0.001	***	-0.028	0.002	***	-0.032	0.002	***
CREDIT2	0.001	0.001		-0.006	0.002	***	-0.005	0.003	*
CREDIT3	-0.002	0.002		-0.015	0.002	***	-0.022	0.003	***
CREDIT4	-0.006	0.002	***	-0.025	0.003	***	-0.030	0.004	***
CREDIT5	-0.011	0.002	***	-0.035	0.003	***	-0.046	0.004	***
CREDIT6	-0.015	0.002	***	-0.041	0.003	***	-0.057	0.004	***
CREDIT7	-0.027	0.003	***	-0.061	0.004	***	-0.088	0.006	***
CREDIT8	-0.033	0.006	***	-0.084	0.010	***	-0.066	0.012	***
YEAR2004	-0.007	0.002	***	0.001	0.002		-0.011	0.003	***
YEAR2005	0.003	0.002		0.000	0.002		-0.053	0.003	***
YEAR2006	-0.012	0.002	***	-0.056	0.003	***	-0.244	0.004	***
YEAR2007	-0.047	0.002	***	-0.229	0.003	***	-0.252	0.004	***
YEAR2008	-0.179	0.004	***	-0.187	0.005	***	-0.195	0.006	***
YEAR2009	-0.002	0.005		-0.016	0.006	***	-0.038	0.007	***
YEAR2010	0.016	0.005	***	-0.011	0.006	*	-0.028	0.007	***
YEAR2011	0.001	0.005		-0.020	0.006	***	-0.006	0.007	
YEAR2012	0.008	0.005		0.009	0.006				
YEAR2013	0.046	0.005	***						
Constant	0.085	0.011	***	0.111	0.016	***	0.111	0.021	***
Industry dummies	yes			yes			yes		
NOB	179290			164555			148743		
F-value	311.63			452.87			486.9		
Prob > F	0			0			0		
R-squared	0.0763			0.083			0.0909		
Root MSE	0.18029			0.25169			0.3046		

Panel (f)	Dependent variable: ROA								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
POST	-0.0028	0.0011	**	0.0008	0.0011		-0.0012	0.0011	
LEVERAGE	-0.0032	0.0055		0.0322	0.0265		0.0062	0.0017	***
ROA	0.0037	0.0027		0.0026	0.0017		0.0019	0.0012	
lnSALES	0.0070	0.0002	***	0.0098	0.0033	***	0.0063	0.0001	***
TANGIBILITY	-0.0076	0.0020	***	-0.0219	0.0178		-0.0002	0.0010	
lnAGE	-0.0086	0.0004	***	-0.0078	0.0005	***	-0.0072	0.0004	***
CREDIT2	-0.0139	0.0008	***	-0.0172	0.0035	***	-0.0130	0.0006	***
CREDIT3	-0.0206	0.0012	***	-0.0254	0.0050	***	-0.0193	0.0006	***
CREDIT4	-0.0234	0.0012	***	-0.0288	0.0059	***	-0.0213	0.0007	***
CREDIT5	-0.0243	0.0016	***	-0.0301	0.0063	***	-0.0220	0.0008	***
CREDIT6	-0.0267	0.0016	***	-0.0320	0.0066	***	-0.0225	0.0008	***
CREDIT7	-0.0261	0.0020	***	-0.0583	0.0330	*	-0.0232	0.0010	***
CREDIT8	-0.0219	0.0025	***	-0.0265	0.0055	***	-0.0167	0.0023	***
YEAR2004	-0.0020	0.0005	***	-0.0078	0.0073		-0.0025	0.0005	***
YEAR2005	-0.0029	0.0005	***	-0.0040	0.0011	***	-0.0133	0.0006	***
YEAR2006	-0.0072	0.0006	***	-0.0149	0.0007	***	-0.0286	0.0006	***
YEAR2007	-0.0181	0.0006	***	-0.0315	0.0015	***	-0.0184	0.0006	***
YEAR2008	-0.0305	0.0010	***	-0.0194	0.0016	***	-0.0140	0.0011	***
YEAR2009	-0.0130	0.0012	***	-0.0136	0.0012	***	-0.0106	0.0012	***
YEAR2010	-0.0110	0.0012	***	-0.0133	0.0012	***	-0.0103	0.0013	***
YEAR2011	-0.0118	0.0013	***	-0.0149	0.0017	***	-0.0066	0.0013	***
YEAR2012	-0.0098	0.0013	***	-0.0072	0.0015	***			
YEAR2013	-0.0046	0.0013	***						
Constant	0.0385	0.0038	***	-0.5746	0.6036		0.0291	0.0040	***
Industry dummies	yes			yes			yes		
NOB	179291			163601			147479		
F-value	468.84			294.68			274.3		
Prob > F	0			0			0		
R-squared	0.0795			0.0046			0.0556		
Root MSE	0.05295			0.46687			0.05307		

Table 9: Estimation results for non-collateralized borrowers to test ex ante theory of collateral

Panel (a)	Dependent variable: Possible BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
MARGIN	-0.0016	0.0022		-0.0012	0.0043		-0.0019	0.0091	
LEVERAGE	0.0397	0.0066	***	0.0955	0.0123	***	0.1496	0.0272	***
ROA	-0.3228	0.0260	***	-0.6106	0.0505	***	-1.2581	0.1142	***
lnSALES	0.0003	0.0010		-0.0049	0.0021	**	-0.0059	0.0047	
TANGIBILITY	-0.0053	0.0058		-0.0187	0.0117		-0.0788	0.0254	***
lnAGE	-0.0076	0.0019	***	-0.0170	0.0036	***	-0.0395	0.0080	***
CREDIT2	0.0008	0.0017		0.0032	0.0041		0.0204	0.0112	*
CREDIT3	0.0027	0.0021		0.0201	0.0049	***	0.0770	0.0135	***
CREDIT4	0.0100	0.0032	***	0.0268	0.0068	***	0.0907	0.0182	***
CREDIT5	0.0243	0.0050	***	0.0686	0.0102	***	0.1548	0.0229	***
CREDIT6	0.0488	0.0045	***	0.1318	0.0092	***	0.2422	0.0186	***
CREDIT7	0.1706	0.0125	***	0.2969	0.0182	***	0.3380	0.0254	***
CREDIT8	0.1922	0.0404	***	0.4138	0.0620	***	0.3395	0.0618	***
YEAR2012	-0.0083	0.0022	***	0.0023	0.0042		0.6824	0.0111	***
YEAR2013	-0.0116	0.0027	***	0.8147	0.0139	***	0.6874	0.0164	***
Constant	0.0135	0.0103		0.0370	0.0212	*	0.0450	0.0609	
Industry dummies	yes			yes			yes		
NOB	26647			16599			6496		
F-value	28.96			306.8			778.93		
Prob > F	0			0			0		
R-squared	0.067			0.1692			0.3637		
Root MSE	0.15982			0.24941			0.3418		

Panel (b)	Dependent variable: Virtual BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
MARGIN	-0.0012	0.0004	***	-0.0022	0.0011	**	-0.0034	0.0032	
LEVERAGE	0.0018	0.0017		0.0118	0.0040	***	0.0412	0.0121	***
ROA	0.0035	0.0036		-0.0254	0.0119	**	-0.0750	0.0355	**
lnSALES	0.0005	0.0002	**	0.0022	0.0007	***	0.0067	0.0020	***
TANGIBILITY	0.0020	0.0014		0.0001	0.0039		-0.0132	0.0110	
lnAGE	-0.0013	0.0006	**	-0.0041	0.0013	***	-0.0102	0.0038	***
CREDIT2	0.0005	0.0003		0.0006	0.0008		0.0034	0.0024	
CREDIT3	-0.0005	0.0003		-0.0011	0.0011		-0.0030	0.0031	
CREDIT4	0.0026	0.0011	**	0.0078	0.0025	***	0.0185	0.0079	**
CREDIT5	0.0025	0.0012	**	0.0049	0.0029	*	0.0112	0.0079	
CREDIT6	0.0003	0.0006		0.0006	0.0017		0.0046	0.0057	
CREDIT7	0.0134	0.0042	***	0.0358	0.0092	***	0.0731	0.0210	***
CREDIT8	-0.0004	0.0005		-0.0037	0.0014	***	0.1942	0.0912	**
YEAR2012	-0.0011	0.0005	**	-0.0009	0.0011		0.9618	0.0085	***
YEAR2013	0.0000	0.0007		0.9743	0.0086	***	0.9414	0.0187	***
Constant	-0.0011	0.0020		-0.0059	0.0062		-0.0252	0.0208	
Industry dummies	yes			yes			yes		
NOB	25931			15329			5023		
F-value	1.55			837.5			.		
Prob > F	0.0469			0			.		
R-squared	0.006			0.0982			0.3149		
Root MSE	0.03609			0.0689			0.11183		

Table 9: Estimation results for non-collateralized borrowers to test ex ante theory of collateral (contd.)

Panel (c)	Dependent variable: BANKRUPTCY								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
MARGIN	-0.0006	0.0003	**	-0.0015	0.0009	*	-0.0036	0.0024	
LEVERAGE	0.0010	0.0011		0.0052	0.0024	**	0.0232	0.0078	***
ROA	0.0027	0.0020		-0.0156	0.0076	**	-0.0390	0.0238	
lnSALES	0.0003	0.0001	**	0.0019	0.0005	***	0.0055	0.0015	***
TANGIBILITY	0.0005	0.0007		0.0029	0.0019		0.0025	0.0058	
lnAGE	0.0000	0.0003		-0.0002	0.0007		0.0002	0.0023	
CREDIT2	0.0007	0.0003	***	0.0008	0.0005	*	0.0028	0.0015	**
CREDIT3	-0.0001	0.0002		-0.0005	0.0006		-0.0024	0.0021	
CREDIT4	0.0011	0.0007	*	0.0041	0.0019	**	0.0094	0.0059	
CREDIT5	0.0005	0.0007		-0.0002	0.0011		-0.0002	0.0041	
CREDIT6	-0.0001	0.0003		0.0012	0.0013		0.0041	0.0047	
CREDIT7	0.0049	0.0026	*	0.0165	0.0065	**	0.0197	0.0130	
CREDIT8	0.0000	0.0003		-0.0012	0.0008		-0.0064	0.0029	**
YEAR2012	-0.0004	0.0003		-0.0004	0.0008		0.9803	0.0062	***
YEAR2013	-0.0003	0.0004		0.9989	0.0009	***	0.9923	0.0050	***
Constant	-0.0029	0.0017	*	-0.0155	0.0048	***	-0.0508	0.0156	***
Industry dummies	yes			yes			yes		
NOB	25912			15287			4975		
F-value	0.68			.			.		
Prob > F	0.861			0			.		
R-squared	0.0019			0.0572			0.2734		
Root MSE	0.02404			0.04902			0.08089		

Panel (d)	Dependent variable: CREDIT								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
MARGIN	0.0103	0.0186		0.0343	0.0297		0.0378	0.0560	
LEVERAGE	1.8602	0.0571	***	2.3833	0.0868	***	2.6628	0.1667	***
ROA	-5.9664	0.2234	***	-4.9491	0.3387	***	-3.8934	0.6485	***
lnSALES	-0.0147	0.0089	*	-0.0367	0.0144	**	-0.0427	0.0273	
TANGIBILITY	-0.7563	0.0495	***	-0.9615	0.0786	***	-1.1612	0.1468	***
lnAGE	-0.0633	0.0157	***	-0.1179	0.0240	***	-0.1812	0.0454	***
CREDIT2	0.6678	0.0267	***	0.6305	0.0443	***	0.6970	0.0829	***
CREDIT3	1.4738	0.0296	***	1.4386	0.0483	***	1.4636	0.0924	***
CREDIT4	2.1013	0.0360	***	1.9337	0.0589	***	1.9166	0.1103	***
CREDIT5	2.8314	0.0437	***	2.5807	0.0702	***	2.4732	0.1370	***
CREDIT6	3.4931	0.0377	***	3.2005	0.0597	***	3.0807	0.1105	***
CREDIT7	4.3441	0.0609	***	3.8962	0.0897	***	3.5647	0.1599	***
CREDIT8	4.8709	0.1817	***	3.9098	0.3190	***	3.3309	0.6114	***
YEAR2012	-0.2889	0.0185	***	-0.3642	0.0281	***			
YEAR2013	-0.3783	0.0248	***						
Constant	1.7125	0.1815	***	1.4224	0.2187	***	1.4554	0.5490	***
Industry dummies	yes			yes			yes		
NOB	26647			16876			6018		
F-value	1531.24			590.72			.		
Prob > F	0			0			.		
R-squared	0.529			0.3941			0.3249		
Root MSE	1.3749			1.7267			1.948		

Table 9: Estimation results for non-collateralized borrowers to test ex ante theory of collateral (contd.)

Panel (e)	Dependent variable: d_lnSALES								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
MARGIN	0.0012	0.0024		-0.0039	0.0043		-0.0106	0.0077	
LEVERAGE	-0.0094	0.0084		0.0088	0.0170		0.0442	0.0262	*
ROA	-0.1414	0.0373	***	-0.0728	0.0713		-0.0720	0.1083	
lnSALES	-0.0076	0.0018	***	-0.0047	0.0029		-0.0098	0.0045	**
TANGIBILITY	-0.0300	0.0076	***	-0.0069	0.0123		-0.0292	0.0248	
lnAGE	-0.0175	0.0023	***	-0.0346	0.0042	***	-0.0540	0.0079	***
CREDIT2	0.0028	0.0036		0.0018	0.0071		-0.0109	0.0117	
CREDIT3	0.0055	0.0040		0.0035	0.0073		-0.0208	0.0129	
CREDIT4	0.0094	0.0047	**	0.0115	0.0089		-0.0438	0.0196	**
CREDIT5	0.0093	0.0058		0.0013	0.0101		-0.0654	0.0183	***
CREDIT6	-0.0065	0.0048		-0.0199	0.0082	**	-0.0627	0.0164	***
CREDIT7	-0.0332	0.0094	***	-0.0294	0.0134	**	-0.0787	0.0301	***
CREDIT8	0.0373	0.0394		-0.0150	0.0510		-0.1715	0.0896	*
YEAR2012	0.0047	0.0024	**	0.0167	0.0041	***			
YEAR2013	0.0350	0.0029	***						
Constant	0.2039	0.0326	***	0.3328	0.0744	***	0.5651	0.2859	**
Industry dummies	yes			yes			yes		
NOB	26680			16910			6051		
F-value	24.8			19.11			.		
Prob > F	0			0			.		
R-squared	0.0249			0.0294			0.047		
Root MSE	0.17664			0.25918			0.2881		

Panel (f)	Dependent variable: ROA								
	(1)			(2)			(3)		
	t+1			t+2			t+3		
	Coef.	Std. Err		Coef.	Std. Err		Coef.	Std. Err	
MARGIN	-0.0012	0.0005	**	-0.0001	0.0008		0.0004	0.0013	
LEVERAGE	-0.0044	0.0020	**	-0.0027	0.0029		-0.0064	0.0044	
ROA	0.5770	0.0115	***	0.4093	0.0167	***	0.2986	0.0243	***
lnSALES	0.0016	0.0003	***	0.0023	0.0004	***	0.0011	0.0008	
TANGIBILITY	-0.0044	0.0018	**	-0.0042	0.0028		0.0079	0.0048	
lnAGE	-0.0013	0.0006	**	-0.0028	0.0009	***	-0.0065	0.0015	***
CREDIT2	-0.0026	0.0010	***	-0.0029	0.0015	*	-0.0059	0.0027	**
CREDIT3	-0.0041	0.0011	***	-0.0067	0.0016	***	-0.0107	0.0028	***
CREDIT4	-0.0030	0.0013	**	-0.0046	0.0018	**	-0.0126	0.0031	***
CREDIT5	-0.0055	0.0017	***	-0.0038	0.0024		-0.0091	0.0038	**
CREDIT6	-0.0043	0.0013	***	-0.0079	0.0018	***	-0.0120	0.0030	***
CREDIT7	-0.0056	0.0019	***	-0.0027	0.0029		-0.0129	0.0039	***
CREDIT8	0.0079	0.0061		0.0214	0.0140		-0.0237	0.0320	
YEAR2012	0.0000	0.0006		0.0035	0.0008	***			
YEAR2013	0.0031	0.0008	***						
Constant	0.0384	0.0102	***	0.0597	0.0299	**	0.1397	0.0759	*
Industry dummies	yes			yes			yes		
NOB	26682			16349			5998		
F-value	161.83			55.54			.		
Prob > F	0			0			.		
R-squared	0.2453			0.133			0.0941		
Root MSE	0.0451			0.05155			0.05066		