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**Forgiveness Versus Financing:
The determinants and impact of SME debt forbearance in Japan**

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Forgiveness Versus Financing: The determinants and impact of SME debt forbearance in Japan¹

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Abstract

This paper empirically examines the impact of Japan's debt forbearance policies with regard to small and medium-sized enterprises (SMEs) stipulated in the "Act concerning Temporary Measures to Facilitate Financing for SMEs." Using unique Japanese firm survey data that identify firms that received "financing" (such as through the deferral of debt repayments) and firms that received "debt forgiveness" (such as through a reduction in principal and/or interest), we examine the determinants and the effects of debt forbearance to test the theoretical predictions of Krugman's (1988) "financing vs. forgiving a debt overhang" analysis. We find, first, that banks choose debt forgiveness for firms that are more creditworthy and more profitable, which is consistent with the theory of debt overhang. Second, among firms that received debt forbearance, those that had received debt forgiveness had better access to new loans and showed superior ex-post performance than those that received financing, which is also consistent with the theory of debt overhang. Third, compared to firms that had not received any debt forbearance, firms that had received financing were more leveraged and exhibited worse performance, especially those whose forborne loans were covered by public credit guarantees, while firms that had received debt forgiveness exhibited better performance, especially those without public credit guarantees. This suggests that the effectiveness of the SME forbearance policy is adversely affected by the moral hazard generated by public credit guarantee programs.

Keywords: Debt forbearance, Debt overhang, Public credit guarantee programs

JEL classification: G21; G28; G33

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1. Introduction

The recent global financial crisis shed light on the long-standing issue in finance as to whether a high level of household and corporate debt generates significant deadweight losses and whether debt forbearance provides significant positive effects on the economy. Theory predicts that a debt overhang distorts borrowers' incentives so that the borrower may forego necessary investments, exert too little effort, and strategically pay out cash to themselves, since the benefits of new investments and business restructuring mainly accrue to creditors (debt holders) rather than equity holders (Myers 1977, Krugman 1988). Myers (1977: 161) argues that "voluntary forbearance would be the simplest and best solution to the investment incentive problem," and some empirical studies find evidence that debt forbearance can correct the incentive problem and improve borrower performance (Giroud et al. 2011, Melzer 2012). On the other hand, debt forbearance may generate moral hazard problems on the part of borrowers as they may abuse a culture of prudent borrowing and repayment (Kanz 2016), and may amplify moral hazard on the part of lenders by allowing the "evergreening" of loans (Peek and Rosengren 2005) to persist.

Against this background, this paper empirically investigates the impact of debt forbearance on firm performance by examining the large-scale debt forbearance policy with regard to SMEs (small and medium-sized enterprises) stipulated in the "Act concerning Temporary Measures to Facilitate Financing for SMEs" (referred to as the "SME Financing Facilitation Act" hereafter), which was implemented between December 2009 and March 2013 in Japan. As explained below, the almost-mandatory nature of the SME Financing Facilitation Act provides a good testing ground for Krugman's (1988) theoretical insights on "financing vs. forgiving debt overhang." Throughout this study, we use the term "financing" for the type of debt forbearance that effectively refinances firms' existing debts, including the extension of borrowing terms and the deferral of debt repayment, while we use the term "debt forgiveness" for the type of debt forbearance that reduces the amount of principal and/or interest firms incur.¹ The main theoretical insights of Krugman (1988) are as follows. First, financing gives lenders an option value in the sense that if it turns out that debtors perform well, lenders will not have to write down their claims. Second, however, it may be in the interest of lenders, as well as that

¹ Following Arrowsmith et al. (2013), we use the term "forbearance" to include both "financing" and "forgiving." Chart 2 of Arrowsmith et al. (2013) classifies debt forbearance into payment delay (which is equivalent to financing) and payment relief (debt forgiveness).

of borrowers, to forgive existing debts if borrowers have a debt overhang, as a result of which the benefits of good borrower performance go largely to lenders.

Based on Krugman's discussion, we hypothesize that lenders choose debt forgiveness if firms suffers from a debt overhang and their probability of future debt repayment after having their debt forgiven is sufficiently high, while they choose financing otherwise. We also predict that the ex-post performance of firms that received debt forgiveness is better than that of firms that received financing because of improved incentives. We examine these hypotheses making use of a unique firm survey of Japanese SMEs that contains detailed information on the debt forbearance they received, if any, after the implementation of the SME Financing Facilitation Act. More specifically, we first conduct a probit estimation to examine the determinants of the type of debt forbearance provided by financial institutions after the SME Financing Facilitation Act. We then compare the ex-post performance of firms that received debt forgiveness and firms that received financing. In order to address the possible selection bias that whether a firm receives debt forgiveness or financing is endogenous, we use the propensity score matching estimation approach, where the propensity scores are calculated based on the results of the first-stage probit estimation. In the propensity score matching, we also use the difference-in-differences strategy to eliminate time-invariant firm characteristics (PSM-DID approach).

In our empirical investigation, we also consider the following possible scenarios to take into account institutional features in Japan that affect lenders' incentives, which are not taken into account in Krugman (1988). First, some of the loans for which SMEs asked for debt forbearance were covered by public credit guarantees, which may have affected the type of debt forbearance lenders chose and the ex-post performance of firms. That is, if loans are covered by credit guarantees and lenders bear no (or little) credit risk, they are likely to finance existing loans and may not require borrowing firms to severely restructure their business. Second, the SME Financing Facilitation Act provided an incentive for lenders to provide debt forbearance by allowing lenders under certain conditions to not classify the forborne loans as nonperforming. Thus, the Act may have aggravated the possible moral hazard problem on the part of lenders, as revealed by the so-called evergreening of loans found in previous studies on corporate finance in Japan (Caballero et al. 2008, Peek and Rosengren 2005). The evergreening loan problem is likely to be more acute for firms that received financing than for firms that received debt forgiveness, and for loans covered by credit guarantees than for non-guaranteed loans.

We obtain the following empirical results. First, we find that banks are more likely to forgive existing loans if firms are more creditworthy as indicated by their credit score and more

profitable as indicated by their return on assets (ROA), which is consistent with the theory of debt overhang. However, we do not find that more leveraged firms are more likely to receive debt forgiveness, which is inconsistent with the theory of debt overhang. Second, among firms that received debt forbearance, those that received debt forgiveness had better access to new loans than firms that received financing. Regarding the ex-post performance of firms, we find that, on average, the improvement in credit scores after debt forbearance was larger for firms that received debt forgiveness than for firms that received financing. These results are consistent with debt overhang theory. Third, we find that banks choose financing if client firms' loans are covered by public credit guarantees. More importantly, when we evaluate the impact of debt forbearance using firms that did not receive any debt forbearance as a control group, the leverage of firms that received financing increased, while their credit score and number of employees decreased, especially in the case of firms whose forborne loans were covered by credit guarantees. In contrast, firms that received debt forgiveness – and especially those without credit guarantees – had better credit scores than firms without debt forbearance. This suggests that the effectiveness of debt forbearance was adversely affected by the moral hazard generated by the public credit guarantee programs.

The remainder of the paper proceeds as follows. Section 2 describes the SME Financing Facilitation Act and the public credit guarantee programs in Japan. Section 3 presents our empirical hypotheses, while Section 4 explains our data, key variables, and the empirical strategy. Section 5 presents the empirical results. Finally, Section 6 concludes.

2. Institutional background

The recent global financial crisis threw the Japanese economy into a severe recession and badly affected many SMEs. In response, the Japanese government, along with a variety of other measures, introduced policy measures to improve credit availability for SMEs.

To lighten the debt burden of existing debt on SMEs, the Japanese government implemented the SME Financing Facilitation Act in December 2009. The Act required financial institutions to make their best effort to respond positively to requests by client SME borrowers to amend loan contract terms, such as deferring loan repayments and reducing the principal of and/or the interest on loans. In order to provide an incentive for financial institutions to accept such requests from borrowers, the Act allowed the amended loans to not be classified as nonperforming loans as long as borrowers made a credible business

restructuring plan.² While the Japanese government introduced the Act as a temporary measure and initially planned to end it in March 2011, the government extended the Act twice and finally ended it in March 2013. According to statistics provided by the Financial Service Agency, the cumulative number of loans for which firms applied to have the loan contract terms amended was more than 4.37 million, which is remarkable given that the number of SMEs in Japan is about 4 million.³ In addition, 97.3 percent of the requests by borrower SMEs were accepted. This high acceptance rate suggests that financial institutions felt almost obliged to provide debt forbearance to SMEs due to pressure from the government and/or sufficient incentives to do so voluntarily.

Before the implementation of the SME Financing Facilitation Act, at the end of October 2008, the government introduced a temporary guarantee program called the Emergency Credit Guarantee (ECG) program. Even before the crisis, Japan had loan guarantee programs to facilitate the provision of new loans to SMEs, and nearly 40 percent of all Japanese SMEs were receiving guarantees. Under the guarantee programs, loans to SMEs extended by a private financial institution are covered by credit guarantee corporations, which are financially backed by the central government and/or local governments. In the regular programs, which still remain in place, credit guarantees extend to 80 percent of the loan amount. In the ECG program, the ratio of credit covered was 100 percent and banks that extended ECG loans bore no credit risk.⁴ After the ECG program ended in April 2011, the Japanese government expanded the scope of SMEs that are eligible for another special program called the Safety-Net Guarantee program, under which the ratio of credit covered is 100 percent. As will be seen below, many loans for which SMEs received debt forbearance were covered by credit guarantee programs, and whether the loans were guaranteed is likely to have had a significant impact on the choice and the effects of debt forbearance (i.e., debt forgiveness or financing).

3. Empirical hypotheses and literature review

² To be more precise, the amended loans were not classified as nonperforming as long as the borrower firm committed itself to submitting a business restructuring plan to the lender within one year.

³ The figures are taken from the following website: <http://www.fsa.go.jp/news/25/ginkou/20140627-9.html> (in Japanese). Note, however, that the number of firms that applied to have their loan contract terms amended likely was much smaller than 4.37 million, because many firms seem to have applied for several loans to be amended and/or applied several times for the same loan to be amended. For example, the *Nikkei Shinbun* (December 30, 2013) reported that in practice about 400,000–500,000 SMEs, i.e., only slightly more than 10 percent of the total SMEs in Japan, were able to amend their loan contract terms.

⁴ For details of the ECG program and its effect on the availability of credit for and the ex-post performance of SMEs, see Ono et al. (2013).

3.1. Hypotheses development

Our empirical hypotheses closely follow the theoretical insights of Krugman (1988) on debt overhang.⁵ We consider the case that the debtor (a firm in our case) has existing debt and is unable to repay part of the debt in due time. The borrower can service the debt by obtaining new loans or by receiving some form of forbearance of existing debt from the lender. If the borrower cannot service the debt, there is a disorderly default.

Assuming that the future is uncertain and that borrower effort is unobservable by the lender, Krugman (1988) theoretically shows the following. First, the lender may provide new money to the borrower even if the expected present value of the future funds that the borrower obtains to service the debt is negative. This is because there exists an option value for the lender to postpone default, which may result in full repayment of existing debt if the borrower turns out to perform well in the future. Thus from the viewpoint of the lender, it has an incentive to “finance” existing debt at an expected loss, as long as the expected present value of financing is larger than that of what the lender can collect in the case of default (liquidation value). Second, while the lender has an incentive to lend, financing existing debt may distort the incentives for a debt-laden borrower, since the benefits of good performance in the future largely go to the lender rather than the firm itself (debt overhang problem). In such cases, forgiving part of the existing debt rather than financing is in the interest of the lender as a way to induce the borrower to make an effort to repay the remaining debt, which will eventually increase the expected probability of debt repayment. On the other hand, forgiving existing debt clearly entails the cost of writing down existing claims, so the lender faces a tradeoff. Under such a tradeoff, we would expect the lender to choose partial debt forgiveness only if the borrower faces a debt overhang and the probability of future repayment of the remaining debt by the borrower is sufficiently high. In sum, we put forward the following empirical hypotheses:

Hypothesis 1 (Determinants of the type of debt forbearance): Lenders choose forgiving if debtor firms face a debt overhang and the expected present value of their business is positive.

Hypothesis 2 (Effects of debt forbearance): Firms that received debt forgiveness have better access to new loans and show better ex-post performance than firms that received financing.

⁵ While Krugman (1988) considers debt overhang in public finances, his model can be applied to other borrowers such as households (Kanz 2016) and firms (Giroud et al. 2011, Kroszner 1998).

Given the almost-mandatory nature of the SME Financing Facilitation Act described in Section 2, we think that the debt forbearance induced by the Act provides a good testing ground for Krugman's (1988) predictions. The reasons are as follows. First, Krugman (1998) considers a situation in which borrower effort is important for future debt repayment but is unobservable by lenders. Since many SMEs tend to be informationally opaque, this assumption is likely to hold for the sample of this study. Second, Krugman (1998) assumes that the expected liquidation value of a loan and the transaction costs of debt renegotiation are sufficiently small, so that the lender's option to liquidate a loan is not explicitly considered in his analysis. This poses a potential problem, since in practice, as highlighted by Gilson (1997), both the liquidation value of a loan when a firm defaults and the transaction costs involved in debt renegotiation can be quite large. However, because loans to SMEs tend to be small when compared to loans to listed firms, it is likely that the liquidation value of loans to firms in our sample is also relatively small. Regarding transactions costs, it may be costly for banks to renegotiate loan terms with SMEs, but the high acceptance rate of debt forbearance (97.3 percent) highlighted in Section 2 suggests that renegotiation costs were not prohibitively high. Nevertheless, to control for transactions costs, we include proxies for firm size in our empirical analysis.

While debt forbearance may alleviate the debt overhang problem, it may distort debtor incentives (Kanz 2016). In addition, in light of the following institutional settings in Japan, the SME Financing Facilitation Act may have adversely affected lender incentives. First, as explained in Section 2, many SMEs used public credit guarantee programs, especially the ECG program implemented between October 2008 and March 2011. Because public credit guarantee programs covered 80–100 percent of the loan, the option value of financing existing debt for the lender is larger for loans covered by the guarantee program, as the lender has almost nothing to lose even if the debtor eventually defaults on existing loans. Public credit guarantee programs may also have adverse effects on firm performance, because the programs depress lenders' incentive to urge business restructuring by firms that received financing or debt forgiveness. Second, critics of the SME Financing Facilitation Act worried that the SME forbearance policy would generate moral hazard problems not only on the part of borrowers but also on the part of lenders by allowing the evergreening of loans to persist (e.g., International Monetary Fund 2012). While the evergreening issue, as argued by some (Caballero et al. 2008, Peek and Rosengren 2005, Sekine et al. 2003), may be especially relevant in Japan, the same problem may exist in other countries as well (see, for instance,

Arrowsmith et al. (2013) for the U.K. and Homar et al. (2015) for Europe). With respect to the type of debt forbearance, the evergreening issue is likely to be more acute for firms that received financing than for firms that received debt forgiveness, and for loans covered by credit guarantees than for non-guaranteed loans.

Based on the above discussion, we put forward our third empirical hypothesis regarding the effect of public credit guarantees:

Hypothesis 3 (Effects of public credit guarantees): Lenders choose financing if a firm's existing debt is covered by public credit guarantees. Public credit guarantees adversely affect the availability of new loans for and the ex-post performance of firms, especially of those that received financing.

3.2. Related literature

This study contributes to the following two strands of literature. First, the study contributes to the literature on the impact of debt forbearance on debtor outcomes. Since the seminal theoretical studies by Myers (1977) and Krugman (1988), many empirical studies have examined the theory of debt overhang by investigating the ex-post outcomes of borrowers (households and firms) that experienced legal bankruptcy settlements or private (out-of-court) debt workouts. The results of previous studies are mixed. Studies consistent with the theory of debt overhang include that by Giroud et al. (2011), who examine the private debt restructuring of a sample of highly leveraged Austrian ski hotels and find that a decrease in borrowers' leverage due to private debt restructurings leads to a significant improvement in operating performance. Meanwhile, Kroszner (1998) examines asset price responses to the decision of the U.S. government during the Great Depression to repudiate the gold indexation clauses attached to long-term debts, which effectively reduced the debt-burden of firms that had issued corporate bonds with gold indexation clauses. Kroszner (1998) finds that corporate bond price increased after the Supreme Court upheld the government's decision to repudiate the gold indexation clauses, which suggests that bond investors saw the debt forgiveness in a positive light. Agarwal et al. (2013) evaluate the impact of the 2009 Home Affordable Modification Program (HAMP) implemented in the United States during the global financial crisis, and report that renegotiations under HAMP resulted in a modest reduction in the rate of foreclosures, although the number of reduced foreclosures was substantially smaller than the program target. In contrast with these studies, Kanz (2016) obtains empirical results that are inconsistent with the theory of debt overhang. Specifically, examining the impact of the 2008

debt relief initiative in India, Kanz (2016) finds that the debt relief led to reduced investment and lower productivity of households that were targeted in the initiative. Kanz (2016) also shows that beneficiaries of the debt relief became less concerned about the reputational consequences of future default, which suggests that debt forbearance policies potentially exacerbate moral hazard on the part of debtors.

The second strand of literature this study is related to is the literature on the so-called evergreening of loans (Peek and Rosengren 2005), forbearance lending (Sekine et al. 2003), and zombie lending (Caballero et al. 2008), where lenders extend additional loans to insolvent firms in order to gamble on their resurrection. For instance, examining the ex-post performance of Japanese listed firms that experienced out-of-court debt restructuring between 1990 and 2005, Inoue et al. (2010) find that the operating performance of such firms was significantly lower than the industry median. They argue that this result provides evidence of evergreening in the sense that lenders extended insufficient out-of-court debt restructuring in order to avoid accounting losses of their own.

Our study contributes to the above two strands of literature by investigating the effect of debt forbearance on Japan's SMEs. The study closest to ours is that by Miyakawa and Ohashi (2016), who use the same firm survey as this study and examine the causes and consequences of private debt restructurings under the SME Financing Facilitation Act. However, while our study shares the same basic motivation as theirs, the present study differs from Miyakawa and Ohashi's (2016) in the following respects. First, Miyakawa and Ohashi (2016) are interested in the nature of "temporary" debt restructuring, which firms and lender banks expect to renegotiate again in the near future, to investigate whether such temporary debt restructuring is an optimal arrangement to weather short-run difficulties or is instead used as an instrument for evergreening. In contrast, this study is interested in the difference between "financing" and "debt forgiveness" in order to examine the predictions of debt overhang theory. Second, based on the theoretical predictions of Bruche and Llobet (2014), Miyakawa and Ohashi (2016) investigate how the lender bank's balance sheet affects the ex-post performance of firms that experienced temporary debt restructuring. They find that when lender banks' balance sheet is weak, the ex-post performance of firms with temporary debt restructuring is worse than that of firms experiencing non-temporary debt restructuring. Instead of focusing on bank balance sheet conditions, this study examines the effect of public credit guarantees on the choice and outcomes of "financing" and "debt forgiveness." As we explained above, in the context of loans to SMEs, whether a loan is guaranteed is likely to have a significant impact on lenders' incentives. Consistent with this reasoning, findings in previous empirical studies suggest that

Japan's public credit guarantees create moral hazard on the part of lenders (Ono et al. 2013, Saito and Tsuruta 2014, Uesugi et al. 2010).

4. Data, variables, and empirical approach

4.1. Data and sample selection

The data used in this paper are mainly taken from the Kinyuenkatsukaho Shuryogo ni okeru Kinyu Jittai Chosa (Survey on the Aftermath of the SME Financing Facilitation Act, RIETI survey hereafter) in October 2014.⁶ The survey was conducted by the Research Institute of Economy, Trade and Industry (RIETI), a research institution affiliated with the Ministry of Economy, Trade and Industry of Japan. The main aim of the RIETI survey was to investigate the effects of the introduction and termination of the SME Financing Facilitation Act on the financing of affected SMEs and on their business conditions. More specifically, the survey asked SMEs about whether they had received debt forbearance from their lenders since December 2009, and if so, about details of the debt forbearance including the date(s) and type, the identity of the lender that provided debt forbearance, the use of public credit guarantees for the forborne loans, and so on. The RIETI survey also asked about the ex-post performance of firms after they received debt forbearance including their general business and financing conditions as well as their relationship(s) with the lender(s) that provided debt forbearance.

The RIETI survey was sent to 20,000 SMEs chosen from the database of Tokyo Shoko Research (hereafter TSR database), a major business database company in Japan. In order to increase the number of respondent firms that experienced debt forbearance, firms to which the survey questionnaires were sent were selected based on the following criteria. First, 4,087 firms for which the words "Joken henko" (amendment of contract terms) and/or "Enkatsukaho" (SME Financing Facilitation Act) were included in the TSR credit reports were selected from the TSR database in order to increase the number of firms that received debt forbearance. Second, 5,207 firms that had responded to a previous RIETI survey conducted in 2008 were selected in order to constitute a control group (firms that did not receive any debt forbearance). Third, because less creditworthy firms are more likely to receive debt forbearance, 10,706 firms with a TSR credit score, which measures a firm's creditworthiness, of less than 50 points were chosen. The number of firms that responded to the RIETI survey is 6,002, for a response rate of about 30%.

⁶ A paper summarizing the results of this survey is available in Japanese (Uesugi et al. 2015).

Apart from the RIETI survey, we use the TSR database to obtain firms' financial data. To be more precise, from the TSR database, we gather firms' financial data for the years 2008–2009 and the years 2013–2014, i.e., before (2008–2009) and after (2013–2014) the SME Financing Facilitation Act applied. We then match the data obtained from the TSR database with the data in the RIETI survey to construct a firm-level dataset. Because of missing answers to particular questions in the RIETI survey and missing observations in the TSR database, we are left with a sample of 782 firms for our main analysis in Sections 5.1 and 5.2, which only includes firms that experienced debt forbearance.⁷ To conduct further analyses, we also employ an expanded sample with 955 firms in Section 5.3, which additionally includes firms that had demand for but did not receive any debt forbearance.

4.2. Key variables

The key variables in our analysis are those that represent the type of debt forbearance that a firm received after the implementation of the SME Financing Facilitation Act. In the RIETI survey, Question 19-2 asked respondent firms about debt forbearance (“Kashitsuke-saiken no hennsai jouken no henko (Amendment of loan contract terms regarding repayments)”) during December 2009 to October 2014. Specifically, respondent firms were asked to select one of the following five choices: (1) if a firm had applied for debt forbearance and was approved; (2) if a firm had applied for debt forbearance but was rejected; (3) if a firm wanted to apply for debt forbearance but did not do so in anticipation of being rejected; (4) if a firm wanted to apply for debt forbearance but did not do so in consideration of possible negative effects on its relationship with the lender; (5) if a firm had not applied because it did not need any debt forbearance. If a firm chose “(1) (applied and approved),” then in Question 29 of the RIETI survey, the firm was asked to choose the type of the first debt forbearance it received.⁸ Table 1 shows the results using all observations from the RIETI survey and our sample for the main analysis. The most frequently used type of debt forbearance is the deferral of principal (Choice 3 in Question 29) and term extensions (Choices 1 and 2). These types of debt forbearance are effectively equivalent to providing new loans to finance existing debt due and we consequently regard these as “financing.” On the other hand, we regard a reduction in the interest rate (Choice

⁷ The number of observations when we conduct the treatment effects estimation (explained in Section 4.3.2) is smaller than 782, because not all variables are available for all firms.

⁸ As noted in footnote 3, a respondent firm may have experienced debt forbearance on a loan several times. In this case, firms were asked to report the type of debt forbearance at the first time.

4), a partial write-off (Choice 5), a debt-equity swap (Choice 6), and a debt-debt swap (Choice 7) as “debt forgiveness.”

[Table 1 here]

From Question 19-2 and Question 29 of the RIETI survey, we construct the following debt forbearance variables: `dum_DF_FORGIVE`, `dum_DF_FINANCE`, `dum_DF`, and `DF_TYPE` (also see Table 2 for definitions). First, for our analyses in Sections 5.1 and 5.2, we use the sample of firms that experienced debt forbearance to construct `dum_DF_FORGIVE` and `dum_DF_FINANCE`. The dummy variable `dum_DF_FORGIVE` takes a value of 1 if a firm answered with Choices 4, 5, 6, or 7 to Question 29 in the RIETI survey. Similarly, the dummy variable `dum_DF_FINANCE` takes a value of 1 if a firm answered with Choices 1, 2, or 3 to Question 29 in the RIETI survey. If a firm chose multiple answers (i.e., a firm received more than one type of debt forbearance for a particular loan), we classify the firm based on the most generous forbearance type (i.e., the highest-numbered choice). We exclude firms from our sample that only answered “Other” (Choice 8) to Question 29.⁹

Second, for our analyses in Section 5.3, we additionally include firms in our sample that had demand for but did not receive debt forbearance and construct `dum_DF` and `DF_TYPE`. The dummy variable `dum_DF` takes a value of 1 for firms where either `dum_DF_FORGIVE=1` or `dum_DF_FINANCE=1`, while it takes a value of 0 for firms that answered with Choice 2, 3, or 4 to Question 19-2 in the RIETI survey. We also construct an index variable, `DF_TYPE`, which takes a value of 0 if `dum_DF=0` (no debt forbearance), a value of 1 if `dum_DF_FINANCE=1`, and a value of 2 if `dum_DF_FORGIVE=1`.

To examine the effect of public credit guarantees (Hypotheses 3), we construct from the RIETI survey a dummy variable, `dum_PCG`, that takes a value of 1 if the loan on which a firm received forbearance was covered by public credit guarantees. The RIETI survey does not identify whether firms that did not receive any debt forbearance used any public credit guarantees. Therefore, when examining the effect of public credit guarantees on the type of debt forbearance chosen by the lender bank, we restrict our sample to firms that received debt forbearance. On the other hand, when we examine the effect of public credit guarantees on the ex-post performance of firms that received either debt forgiveness or financing, we include

⁹ If a firm answered with Choice 8 as well as one of the other choices (Choices 1 to 7), we classify the firm based on its other choice.

firms that did not receive any debt forbearance as a control group and compare the performance of firms with guarantees and those without guarantees.

4.3. Empirical approach

4.3.1. Determinants of debt forbearance type: Probit estimation

We begin our analysis by focusing on the determinants of the type of debt forbearance that lender banks chose in order to examine Hypothesis 1 and the first part of Hypothesis 3 in Section 3.1. We use the sample of firms that either received debt forgiveness ($\text{dum_DF_FORGIVE}=1$) or financing ($\text{dum_DF_FINANCE}=1$). We use dum_DF_FORGIVE as the dependent variable. In addition, several proxies to examine our empirical hypotheses as well as a range of control variables are used as independent variables. Table 2 presents a list of the variables used in the following analyses, together with their definitions and sources.

[Table 2 here]

Specifically, we estimate the following probit model:

$$\Pr(\text{dum_DF_FORGIVE}) = \alpha + \beta_1 \text{dum_PCG} + \beta_2 \text{LEVERAGE_RATIO} + \beta_3 \text{SCORE} + \beta_4 \text{ROA} + \beta_5 \text{LN_SALES} + \beta_6 \text{EMP} + \beta_7 \text{FIRMAGE} + \beta_8 \text{OWNERSHARE} + \beta_9 \text{dum_AFFILIATED} + \beta_{10} \text{NUMBANKS} + \mathbf{INDUSTRY\beta} + \varepsilon_i$$

To examine Hypothesis 1, we need variables that represent whether a firm has a debt overhang problem and whether a firm's expected present value of repayment is positive. As a proxy for debt overhang, we use LEVERAGE_RATIO , which is defined as a firm's interest-accruing liabilities divided by its total assets in 2008–2009. We expect a positive relationship between the leverage ratio and the probability that banks select forgiving. As proxies for a firm's net present value, we use SCORE and ROA in 2008–2009. SCORE is the TSR score (1-100 points), where a higher value indicates greater creditworthiness; the TSR score is widely used in studies on Japanese SMEs (e.g., Miyakawa and Ohashi 2016, Ono et al. 2013). ROA is defined as operating profits divided by total assets. We expect a positive relationship between these variables and the probability that banks select debt forgiveness. Finally, to examine the first part of Hypothesis 3 on the effects of public credit guarantee programs, we use the variable dum_PCG , which takes a value of 1 if a firm received public credit guarantees. We expect a negative relationship between the use of guarantee programs and the probability that banks chose debt forgiveness.

In addition to these variables, we include various other variables representing firm characteristics (as of 2008–2009) in the estimation (see panel (b) of Table 2). LN_SALES is defined as the natural logarithm of gross annual sales. EMP is the number of employees. These two variables are included to control for differences in firm size among our sample firms. As noted in Section 3.1, it is important to control for firm size, since the transactions costs involved in debt renegotiations may well be higher for smaller firms. FIRMAGE is the firm age measured in the number of years since a firm was established. Next, dum_AFFILIATED is a dummy variable that equals 1 if a firm is affiliated with other companies, and 0 otherwise. Finally, NUMBANKS is the number of banks a firm transacts with. We include this variable to control for possible coordination failure among lender banks in providing debt forbearance, from which Krugman (1988) abstracts. We also include industry dummies to take industry-specific characteristics into account.

Table 3 presents descriptive statistics of the variables used. They are reported separately for the entire sample and for the subsamples of firms that received debt forgiveness and firms that received financing, to allow comparisons between the two subsamples. Univariate comparisons between firms that received debt forgiveness and firms that received financing show that the ratio of guaranteed loans (dum_PCG) and the leverage ratio (LEVERAGE_RATIO) were higher for firms that received financing. On the other hand, firms that received debt forgiveness had a higher credit score (SCORE) and higher operating profits (ROA). As for firm characteristics, firms that received debt forgiveness tended to have larger gross sales, a larger number of employees, and tended to be older than firms that received financing.

[Table 3 here]

4.3.2. The effects of debt forbearance: Treatment effect estimation

To examine Hypothesis 2 regarding the effects of debt forbearance on credit availability and firm ex-post performance, we employ propensity score matching (PSM) estimation, which was proposed by Rosenbaum and Rubin (1983). By matching treatment firms (i.e., firms that received debt forgiveness) with the appropriate control firms (firms that received financing) that have the “closest” propensity scores, which are calculated based on the probit estimation in the previous subsection, we create a sample that is assumed to be sufficiently similar to the one generated by randomization. Among several matching algorithms to find the “closest” control observations, we employ caliper matching. In caliper matching, control observations

need to satisfy the following condition: $c(p_i) = \min\|p_i - p_j\| \leq \varepsilon$, where p_i represents the propensity score of each treatment observation i , p_j represents that of control observation j , and ε represents the tolerance level that a researcher arbitrarily sets. In our analysis, we set $\varepsilon = 0.01$. In addition, as we explain below, we use difference-in-differences (DID) estimation to difference out time-invariant unobservable characteristics between the treatment and control observations.

We use two measures of credit availability and four measures of ex-post firm performance to examine the effects of the SME Financing Facilitation Act on firms that received different types of debt forbearance. Panel (c) of Table 2 shows the definition of each measure and the data sources. Regarding credit availability, we construct two variables from the RIETI survey that directly measure the availability of new loans after debt forbearance. LENDING_ATTITUDE is an index variable representing the change in banks' lending attitude after the approval of the first debt forbearance. It takes a value from 1 to 5 based on firms' survey response regarding their bank's/banks' lending attitude. Specifically, firms were asked to indicate whether it (1) worsened; (2) worsened somewhat; (3) remained unchanged; (4) improved somewhat; or (5) improved. Finally, dum_NEWLOAN_REJECT is a dummy variable for firms that applied for new loans and that equals 1 if a firm's new loan application to the bank that provided debt forbearance was declined, and 0 if the bank approved the firm's new loan application. dum_NEWLOAN_REJECT is also constructed from the RIETI survey. Based on Hypothesis 2, firms that received debt forgiveness are expected to exhibit better access to new loans than those that received financing and therefore should take a larger value for LENDING_ATTITUDE and a smaller value for dum_NEWLOAN_REJECT.¹⁰

As for variables representing firms' ex-post firm performance, we employ dSCORE, dROA, dEMP, and dTANGIBLERATIO. dSCORE is the change in SCORE, i.e., the TSR credit score (1-100 points). dROA is the change in ROA (operating profits divided by total assets), while dEMP is the change in the number of employees (EMP). Finally, dTANGIBLERATIO is the change in tangible assets divided by total assets and serves as a proxy of a firm's new investment. We measure the change as the difference between 2008–2009 (i.e., before the firm received debt forbearance) and 2013–2014 (i.e., after the firm

¹⁰ Because we do not have data on whether a firm's loan application was rejected prior to receiving debt forbearance, we cannot implement DID estimation for dum_NEWLOAN_REJECT. On the other hand, because LENDING_ATTITUDE measures the change in banks' lending attitude after the first debt forbearance, employing the variable essentially represents DID estimation.

received debt forbearance). If TSR gathered firms' financial statements multiple times during the period 2008–2009, we use the latest financial statement. Similarly, we use the latest financial statements for the period 2013–2014. Based on Hypothesis 2, firms that received debt forgiveness are expected to exhibit better ex-post performance than those that received financing.

4.3.3. The effects of debt forbearance: Treatment effect estimation using multiple treatments

To examine the second part of Hypothesis 3 in Section 3.1 regarding the effect of public credit guarantees on the ex-post performance of firms, we need a common control group in order to compare the performance of treatment firms with credit guarantees and that of treatment firms without guarantees. We therefore expand our estimation sample to include firms with $dum_DF=0$, i.e., firms that have demand for debt forbearance but did not receive it, and use those firms as a control group. We allow for multiple treatments and employ a multinomial logit model to obtain propensity scores for each outcome.¹¹ That is, we employ the index variable DF_TYPE , whose values in the set $\{0,1,2\}$ correspond to three mutually exclusive debt forbearance outcomes: $dum_DF=0$ (the firm did not receive debt forbearance), $dum_DF_FINANCE=1$ (the firm received financing), and $dum_DF_FORGIVE=1$ (the firm received debt forgiveness). As explained in Section 4.2, $dum_DF_FINANCE$ and $dum_DF_FORGIVE$ can be further decomposed into firms with and without guarantees. Thus, we are able to evaluate the relative performance of firms that received financing (or debt forgiveness) with credit guarantees and those without guarantees compared to the common control group, $dum_DF=0$.

Specifically, we implement a multinomial logit estimation to calculate the unconditional probability of each outcome, $\{p^i\}_{i=0}^2$. We then choose two pairs among possible combinations and calculate the conditional propensity scores for each outcome. Specifically, we focus on two conditional probabilities where the treatment observations are either $dum_DF_FINANCE=1$ or $dum_DF_FORGIVE=1$, and the control observation is $dum_DF=0$. We calculate the conditional probabilities of the two treatments, i.e., either financing or debt forgiveness, as follows:

$$p^{DF_TYPE=1\{0,1\}} = \frac{p^{DF_TYPE=1}}{p^{DF_TYPE=1} + p^{DF_TYPE=0}}$$

¹¹ For more details on propensity score matching estimation with multiple treatments, see, for instance, Lechner (2002) and Uchino and Uesugi (2015).

$$p^{\text{DF_TYPE}=2|\{0,2\}} = \frac{p^{\text{DF_TYPE}=2}}{p^{\text{DF_TYPE}=2} + p^{\text{DF_TYPE}=0}}$$

Based on these conditional probabilities, we match treatment firms (i.e., firms that received debt forgiveness or financing) with the control firms (firms that did not receive debt forbearance) using caliper matching to obtain PSM-DID estimators of the outcome variables. Some outcome variables are different from those explained in the previous subsection and are explained in detail in Section 5.3. After matching treatment firms and control firms, we divide treatment firms into subsamples of firms with and without public credit guarantees to examine the effect of public credit guarantees on the ex-post performance of firms.

5. Results

5.1. Probit estimation

Table 4 presents the results of the probit estimation. Regarding Hypothesis 1 presented in Section 3.1, the coefficient on LEVERAGE_RATIO is negative and statistically insignificant. The result implies that the leverage ratio does not affect the probability of receiving debt forgiveness. In contrast, the coefficients on SCORE and ROA are positive and significant. The results are consistent with Hypothesis 1 and indicate that banks are more likely to choose debt forgiveness in the case of more creditworthy and profitable firms.

Turning to the first part of Hypothesis 3 regarding the effect of public credit guarantees, the coefficient on dum_PCG is negative and statistically significant, indicating that banks are more likely to choose financing if the loans for which their client firms requested forbearance are covered by public credit guarantees. The result is consistent with the hypothesis. As for other firm characteristics, the coefficient on LN_SALES is negative and significant, indicating that smaller firms are more likely to receive debt forgiveness from banks.

[Table 4 here]

5.2. Treatment effect estimation

Next, we examine whether different types of debt forbearance result in different outcomes. Based on the propensity scores calculated from the probit estimation in the previous section, we obtain the treatment effects of debt forbearance using PSM-DID matching estimation.

Table 5 presents the estimation results to examine Hypothesis 2. The sample for the estimation consist of firms that received debt forgiveness or financing. For each variable, there is an unmatched estimator and an ATT (average treatment effect on the treated) estimator. For example, regarding the LENDING_ATTITUDE variable, in the row “Unmatched,” there are two values, one for the treated group (firms that received debt forgiveness) and one for the non-treated group (firms that received financing), which are 3.295 and 3.050, respectively. These values indicate that the mean value of firms that received debt forgiveness is significantly larger – by 0.245 points – than that of firms that received financing, which is the unmatched estimate of the treatment effect shown in the column labeled “Difference.” The result of the unmatched estimate shows that the lending attitude of banks that provided debt forgiveness to client firms on average was better than that of banks that provided debt financing.

[Table 5 here]

However, note that the unmatched estimate may well be biased, since ex-ante firm characteristics between firms that received debt forgiveness and firms that received debt financing may differ. The ATT estimator resolves, at least partially, the selection bias due to observable characteristics, and in the row labeled “ATT,” the value for the non-treated group in the “Unmatched” row is replaced by the value for the control group, which represents firms that received debt financing and that in terms of their characteristic are otherwise similar to firms that received debt forgiveness.¹² Thus, the change in the value in the “Difference” column from the “Unmatched” row to the “ATT” row in principle is due to the replacement of non-treated firms with control firms. In the “ATT” row for the LENDING_ATTITUDE variable, the difference between the value for the treatment group and that for the control group is now 0.176 points and is less significant than in the “Unmatched” row. However, it is still marginally significant at the 10 percent level.

In addition to LENDING_ATTITUDE, the second variable to represent firms’ credit availability and test Hypothesis 2 is dum_NEWLOAN_REJECT. The PSM-DID estimate for this variable is negative (−0.206) and statistically significant, indicating that firms that received debt forgiveness are about 20 percentage points less likely to be rejected for new loans. In sum,

¹² The value for the treatment group in the “ATT” row is also different from the value in the “Unmatched” row. This is because some observations for treatment firms are dropped from the estimation sample in the caliper matching.

these results indicate that changes in firms' credit availability are better for firms that received debt forgiveness than those that received financing and are consistent with Hypothesis 2.

As for firm performance, the coefficient on dSCORE is positive and statistically significant, indicating that the credit score of firms that received debt forgiveness improved more than that of firms that received financing. While we do not find significant differences in dROA, dEMP, and dTANGIBLERATIO, the result for dSCORE supports Hypothesis 2.

5.3. Treatment effect estimation using multiple treatments

In this subsection, we reexamine the determinants and effect of debt forbearance using an expanded sample, which, in addition to the firms included in the sample in the previous sections, also includes firms that had demand for but did not receive debt forbearance, i.e., firms with dum_DF=0. As a result, the number of firms in the sample increases from the 782 firms in the previous two sections to 955 firms. We use firms for which dum_DF=0 as the control group for multiple treatment groups, namely, either for firms that received financing or firms that received debt forgiveness.

Table 6 reports descriptive statistics separately for firms that received debt forbearance (i.e., dum_DF =1, so that the figures are identical to those in Table 3) and firms for which dum_DF=0, while Table 7 presents the results of the multinomial logit estimation. In Table 7, the marginal effect of each covariate evaluated at the mean on DF_TYPE is shown. The index variable DF_TYPE takes a value of 0, 1, and 2, which respectively corresponds to dum_DF=0, dum_DF_FINANCE=1, and dum_DF_FORGIVE=1. Column (1) shows the marginal effects on the likelihood that a firm will receive no debt forbearance. The results indicate that firms with a smaller leverage ratio (LEVERAGE_RATIO), with a smaller amount of gross sales (LN_SALES), that are older (FIRMAGE), and that have a larger number of banks they transact with (NUMBANKS) are less likely to receive debt forbearance. The negative marginal effect of LN_SALES suggests that the transactions costs involved in amending loan contract terms are one of the major obstacles to obtaining debt forbearance. Similarly, the negative effect of NUMBANKS suggests that coordination failure among lenders increases with the number of incumbent banks.

Turning to columns (2) and (3), we find that the determinants of the probability that a firm will receive debt financing or debt forgiveness are basically the same as those obtained in the probit estimation in Table 4. That is, from column (3), we find that the marginal effect of LEVERAGE_RATIO is statistically insignificant, while that of SCORE and ROA is significantly positive. These results are qualitatively the same as those in Table 4. Consistent

with these results, column (2) shows that firms with a larger LEVERAGE_RATIO, with a smaller SCORE, and with a lower ROA are more likely to receive debt financing. The significantly positive marginal effect of LEVERAGE_RATIO is inconsistent with Hypothesis 1 and points to the evergreening of loans. Somewhat consistent with this interpretation, we find that the marginal effect of LN_SALES is significantly positive, suggesting that in the case of loans to more leveraged and larger firms, banks are more likely to provide debt financing to engage in evergreening. Finally, we find that firms that transact with a smaller number of banks are more likely to receive financing. Overall, except for the effect of LEVERAGE_RATIO, the results in Table 7 are consistent with the theory of debt overhang as postulated in Hypothesis 1, and the estimation results for LEVERAGE_RATIO suggest the existence of the evergreening of loans.¹³

[Table 6 here]

[Table 7 here]

Next, Table 8 presents the estimation results for the treatment effects based on the conditional propensity scores explained in Section 4.3.3. Panel A of the table shows the results when firms that received financing are the treatment group, while Panel B shows the results when firms that received debt forgiveness are the treatment group. In both panels, the control group consists of firms that did not receive debt forbearance. In each panel, we show the results using (a) the entire sample, (b) the subsample of firms that received public credit guarantees, and (c) the subsample of firms that received no public credit guarantees. As noted in Section 4.2, information on whether a firm used public credit guarantees is only available for firms in the treatment groups.

With regard to the outcome variables representing the availability of new loans, we cannot use LENDING_ATTITUDE and dum_NEWLOAN_REJECT, which we employed in Table 4, since these are available only for firms in the treatment groups. Therefore, in Table 8, instead of these two variables, we use dLEVERAGE_RATIO, which measures the change between 2008–2009 and 2013–2014 in a firm’s interest-accruing liabilities divided by its total assets. A caveat with regard to using dLEVERAGE_RATIO as a proxy for the availability of

¹³ Note that we cannot examine Hypothesis 3 regarding the effect of public credit guarantees, dum_PCG, on the choice of debt forbearance, because dum_PCG is not available for firms that did not receive debt forbearance.

new loans is that it includes the effect of debt forbearance and the provision of new credit. For example, even if the availability of new loans improves for a firm that received debt forgiveness, `dLEVERAGE_RATIO` may take a negative value if the bank wrote off a substantial amount of principal. However, due to the lack of data for the construction of other appropriate variables, we use `dLEVERAGE_RATIO` in Table 8 to substitute for `LENDING ATTITUDE` and `dum_NEWLOAN_REJECT` in Table 4. We also use `dLOAN_SHORT_RATIO` and `dLOAN_LONG_RATIO`, which respectively represent the change in short-term and long-term loans outstanding divided by total assets.

[Table 8 here]

We begin by looking at the estimation results in Panel A using (a) the entire sample. First, the PSM-DID estimate of `dLEVERAGE_RATIO`, which is presented in the “ATT” row and is 0.107, is significantly positive, indicating that firms that received financing experienced a greater increase in the leverage ratio than firms that did not receive any debt forbearance. A possible reason is that firms that did not receive any debt forbearance reduced their debt by selling assets. Dividing `dLEVERAGE_RATIO` into `dLOAN_SHORT_RATIO` and `dLOAN_LONG_RATIO`, the PSM-DID estimates for both are positive and statistically significant, but the estimate for `dLOAN_LONG_RATIO`, which is 0.069, is almost twice as large as that for `dLEVERAGE_RATIO`, which is 0.038. This suggests that the higher leverage of firms that received financing is due mainly to new long-term loans or term extensions for existing debt. We also find that the PSM-DID estimates for `dSCORE` and `dEMP` are significantly negative. These results indicate that, compared to firms that did not receive any debt forbearance, firms that received financing performed worse in the sense that their credit score deteriorated and their number of employees decreased after the debt forbearance. Splitting our entire sample into subsamples of (b) firms with public credit guarantees and (c) those without public credit guarantees, we find that the results obtained for the entire sample stem mainly from (b) firms whose forbore loans were covered by public credit guarantees.

Next, Panel B of Table 8 presents the results when firms that received debt forgiveness are the treatment group and firms that did not receive any debt forbearance are the control group. We find that the only significant result is the PSM-DID estimate of `dSCORE`, which is 0.934, indicating that firms that received debt forgiveness experienced a greater increase in their credit score. Looking at the subsamples of firms (b) with and (c) without public credit guarantees, this result stems from the subsample of firms (c) without public credit guarantees.

To summarize, the results in Table 8 are essentially consistent with Hypothesis 2 in the sense that firms that received debt forgiveness performed better, and firms that received financing performed worse, than firms that did not receive any debt forbearance. In addition, we also find evidence consistent with Hypothesis 3 in the sense that the better performance of firms that received debt forgiveness is driven by the subsample of firms without public credit guarantees, while the worse performance of firms that received financing is driven by the subsample of firms without guarantees.

6. Conclusion

In this paper, we empirically investigated the determinants and effects of different debt forbearance policies toward small and medium-sized enterprises (SMEs) in Japan using a unique firm survey dataset with which we are able to identify firms that received financing and firms that received debt forgiveness after the implementation of the SME Financing Facilitation Act. Our main findings can be summarized as follows.

First, we found that banks choose debt forgiveness in the case of firms that are more creditworthy and more profitable, which is consistent with the theory of debt overhang. We also found that banks choose financing if client firms' loans are covered by public credit guarantees. Second, the results showed that firms that received debt forgiveness had better access to new loans and saw a greater improvement in their performance than firms that received financing. Third, compared to firms that did not receive any debt forbearance, firms that received financing are more leveraged and exhibit worse performance, especially firms whose forborne loans were covered by credit guarantees, while firms that received debt forgiveness exhibit better performance, especially those without credit guarantees. This result suggests that the effectiveness of the SME Financing Facilitation Act is adversely affected by the moral hazard generated by the public credit guarantee programs.

The analyses in this study raise a number of issues that remain to be addressed in future research. First, while we found evidence that firms that received debt forgiveness exhibit better performance than firms that received financing or firms that did not receive debt forbearance, it was beyond the scope of this study to derive welfare implications of the SME Financing Facilitation Act. For instance, given the almost-mandatory nature of the Act, it may well be the case that the transaction costs involved in debt renegotiations exceeded the benefits of the improved performance of firms that received debt forgiveness. Alternatively, it may be the case that the performance of firms that had their debt forgiven improved at the expense of healthy

rival firms that did not receive any debt forbearance. In such cases, debt forgiveness may reduce the welfare of the entire economy. Second, in analyzing the determinants and effects of debt forbearance, we did not exploit the heterogeneity among lenders. For instance, while we provide evidence that public credit guarantees adversely affected not only lenders' incentives regarding the choice of the type debt forbearance, but also the effect of debt forbearance, it is possible that these adverse effects of public credit guarantees differ, for instance, depending on lender banks' business model. That is, the adverse effects might be smaller for regional banks that specialize in lending to SMEs. Or to give another example, lenders' incentive to evergreen loans might differ depending on the strength of banks' balance sheet, as pointed out by Miyakawa and Ohashi (2016). We leave these issues for future research.

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Tables

Table 1 Distribution of types of debt forbearance

	All obs. in the RIETI survey	Our sample	
Number of obs.	1,468	782	
1. Term extension of up to one year	24.9%	25.4%	} Financing (payment delay)
2. Term extension of more than a year	29.8%	33.6%	
3. Deferral of principal	37.9%	41.2%	
4. Reduction of interest rate	16.3%	19.1%	} Forgiving (payment relief)
5. Partial write-off	7.8%	7.7%	
6. Debt-equity swap	0.1%	0.0%	
7. Debt-debt swap (e.g., subordinated debt)	0.9%	0.9%	
8. Other	8.4%	1.3%	

Notes: This table presents the percentage shares of firms in terms of the type of debt forbearance they received (on the occasion of their first debt forbearance) between December 2009 and October 2014. Percentages add up to more than 100%, since firms may have received more than one type of debt forbearance for a particular loan.

Table 2 Variables and their definitions

Variable	Definition	Data source
Panel (a): Debt forbearance variables		
dum_DF_FORGIVE	1 if a firm received debt forbearance including a reduction in principal and/or interest, a debt-debt swap, or a debt-equity swap between December 2009 and October 2014, 0 otherwise	RIETI
dum_DF_FINANCE	1 if a firm received debt forbearance including the postponement of interest and/or principal repayments between December 2009 and October 2014, 0 otherwise	RIETI
dum_DF	1 if dum_DF_FORGIVE=1 or dum_DF_FINANCE=1, 0 if a firm had demand for debt forbearance but did not receive it (either rejected, did not apply because the firm thought that the application would be rejected, or did not apply because the firm thought that the application would negatively affect the relationship with a lender)	RIETI
DF_TYPE	0 if dum_DF=0, 1 if dum_DF_FINANCE=1, 2 if dum_DF_FORGIVE=1	RIETI
Panel (b): Determinant variables		
<i>Characteristics of restructured loan</i>		
dum_PCG	1 if the forborne loan was covered by a public credit guarantee program, 0 otherwise	RIETI
<i>Firm characteristics</i>		
LEVERAGE_RATIO	Interest-accruing liabilities / total assets, as of 2008–2009	TSR
SCORE	TSR credit score (1-100 points; a higher score indicates greater creditworthiness), as of 2008–2009	TSR
ROA	Operating profit / total assets, as of 2008–2009	TSR
LN_SALES	Log of gross annual sales, as of 2008–2009	TSR
FIRMAGE	Firm age, as of 2008–2009	TSR
OWNERSHARE	Percentage share of equity holdings by the CEO (representatives), as of 2008–2009	RIETI
dum_AFFILIATED	1 if a firm was affiliated with other companies as of 2008–2009, 0 otherwise	RIETI
NUMBANKS	Number of banks firm transacted with as of 2008–2009	RIETI
IND1-IND9	Industry dummies, as of 2008–2009: (1) construction, (2) manufacturing, (3) communication and information, (4) transportation, (5) wholesale, (6) retail, (7) real estate, (8) services, and (9) other	TSR
Panel (c): Outcome variables		
<i>Credit availability</i>		
LENDING_ATTITUDE	Index variable that represents the change in the lending attitude of bank(s) that approved debt forbearance (1-5). (1) worsened, (2) worsened somewhat, (3) unchanged, (4) improved somewhat, (5) improved	RIETI
dum_NEWLOAN_REJECT	1 if a firm's new loan application after the first debt forbearance was declined by the bank, 0 if the new loan application was approved	RIETI
<i>Ex-post firm performance</i>		
dSCORE	Change in TSR credit score (1-100 points) between 2008–2009 and 2013–2014	TSR
dROA	Change in ROA (operating profit / total assets) between 2008–2009 and 2013–2014	TSR
dEMP	Change in number of employees between 2008–2009 and 2013–2014	TSR
dTANGIBLERATIO	Change in tangible assets / total assets between 2008–2009 and 2013–2014	TSR

Notes: Regarding the data sources, “RIETI” stands for the RIETI Survey and “TSR” stands for the TSR database. For outcome variables with the prefix “d,” the change between 2008–09 and 2013–14 is measured.

Table 3 Descriptive statistics: Debt forgiveness vs. financing

	All						dum_DF_FORGIVE=1				dum_DF_FINANCE=1			
	N	Mean	S.E.	Min	Median	Max	N	Mean	S.E.	Median	N	Mean	S.E.	Median
Debt forbearance variables														
dum_DF_FORGIVE	782	0.269	0.443	0	0	1	210	1	0	1	572	0	0	0
dum_DF_FINANCE	782	0.731	0.443	0	1	1	210	0	0	0	572	1	0	1
dum_DF	782	1	0	1	1	1	210	1	0	1	572	1	0	1
Determinant variables														
dum_PCG	782	0.816	0.388	0	1	1	210	0.681	0.467	1	572	0.865	0.342	1
LEVERAGE_RATIO	782	0.705	0.411	0	0.672	5.688	210	0.622	0.334	0.625	572	0.735	0.432	0.692
SCORE	782	47.30	4.452	29	48	65	210	48.48	5.278	48	572	46.87	4.026	47
ROA	782	-0.032	0.148	-2.518	0.003	0.494	210	-0.004	0.081	0.011	572	-0.042	0.165	0
LN_SALES	782	13.33	1.246	9.568	13.30	18.02	210	13.53	1.270	13.42	572	13.26	1.230	13.24
EMP	782	48.92	97.59	1	23	1781	210	56.84	139.9	21	572	46.01	76.34	24
FIRMAGE	782	35.66	16.65	3	35.50	120	210	38.27	17.60	37	572	34.71	16.20	34
OWNERSHARE	782	0.763	0.315	0	0.923	1	210	0.726	0.346	90	572	0.776	0.302	94
dum_AFFILIATED	782	0.087	0.282	0	0	1	210	0.105	0.307	0	572	0.080	0.272	0
NUMBANKS	782	0.087	2.347	1	1	10	210	3.162	2.272	3	572	2.692	2.364	1
IND1	782	0.301	0.459	0	0	1	210	0.276	0.448	0	572	0.309	0.463	0
IND2	782	0.286	0.452	0	0	1	210	0.271	0.446	0	572	0.292	0.455	0
IND3	782	0.019	0.137	0	0	1	210	0.005	0.069	0	572	0.024	0.155	0
IND4	782	0.064	0.245	0	0	1	210	0.057	0.233	0	572	0.066	0.249	0
IND5	782	0.130	0.337	0	0	1	210	0.190	0.394	0	572	0.108	0.311	0
IND6	782	0.070	0.256	0	0	1	210	0.086	0.281	0	572	0.065	0.246	0
IND7	782	0.028	0.165	0	0	1	210	0.019	0.137	0	572	0.031	0.175	0
IND8	782	0.013	0.112	0	0	1	210	0.005	0.069	0	572	0.016	0.125	0
IND9	782	0.088	0.284	0	0	1	210	0.090	0.288	0	572	0.087	0.283	0

Notes: This table presents summary statistics of the dependent and independent variables used in the probit estimation in Table 4. Definitions of the variables are provided in Table 2. The block of columns labeled “dum_DF_FORGIVE=1” reports summary statistics for firms that received debt forgiveness. The block of columns labeled “dum_DF_FINANCE=1” reports summary statistics for firms that received financing.

Table 4 Determinants of the type of debt forbearance (Probit model): Forgiveness vs. financing

Estimation method: Probit			
Dependent variable: dum_DF_FORGIVE	dy/dx	S.E.	z
dum_PCG	-0.197 ***	0.050	-4.25
LEVERAGE_RATIO	-0.062	0.056	-1.11
SCORE	0.007 *	0.004	1.71
ROA	0.472 **	0.188	2.49
LN_SALES	-0.030 *	0.018	-1.71
EMP	0.000	0.000	0.34
FIRMAGE	0.002	0.001	1.55
OWNERSHARE	-0.062	0.055	-1.12
dum_AFFILIATED	0.027	0.061	0.45
NUMBANKS	0.010	0.007	1.46
Industry dummies	Yes		
Number of observations			782
LRchi ²			72.25
Prob. > chi ²			0.00
Pseudo R ²			0.08
Log likelihood			-418.8

Notes: This table presents the probit estimation result for the determinants of firms that received debt forgiveness. The column “dy/dx” shows the estimated marginal effect of each variable. All variables are defined in Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 5 The effect of debt forbearance on credit availability and firm performance (PSM-DID treatment effect estimations): Forgiveness (treated) vs. financing (controls)

Entire sample						
Variable		Treated	Controls	Difference	S.E.	t-stat
LENDING_ATTITUDE	Unmatched	3.295	3.050	0.245 ***	0.077	3.17
	ATT	3.291	3.115	0.176 *	0.110	1.59
dum_NEWLOAN_REJECT	Unmatched	0.162	0.365	-0.202 ***	0.050	-4.09
	ATT	0.178	0.383	-0.206 ***	0.073	-2.80
dSCORE	Unmatched	0.598	-0.856	1.454 ***	0.357	4.07
	ATT	0.771	-0.936	1.707 ***	0.533	3.21
dROA	Unmatched	0.036	0.069	-0.033 **	0.017	-1.97
	ATT	0.041	0.039	0.002	0.020	0.08
dEMP	Unmatched	-1.478	-5.728	4.250 *	2.265	1.88
	ATT	-1.577	-3.556	1.979	3.899	0.51
dTANGIBLERATIO	Unmatched	-0.009	-0.006	-0.003	0.011	-0.26
	ATT	-0.012	-0.004	-0.009	0.016	-0.54

Notes: This table presents the estimation results for the PSM-DID treatment effects on credit availability and ex-post firm performance. All variables are defined in Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 6 Descriptive statistics including firms that did not receive debt forbearance

	dum_DF=1						dum_DF=0					
	N	Mean	S.E.	Min	Median	Max	N	Mean	S.E.	Min	Median	Max
Debt forbearance variables												
dum_DF_FORGIVE	782	0.269	0.443	0	0	1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
dum_DF_FINANCE	782	0.731	0.443	0	1	1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
dum_DF	782	1	0	1	1	1	173	0	0	0	0	0
Determinant variables												
dum_PCG	782	0.816	0.388	0	1	1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
LEVERAGE_RATIO	782	0.705	0.411	0	0.672	5.688	173	0.616	0.309	0.031	0.600	2.007
SCORE	782	47.30	4.452	29	48	65	173	47.59	4.420	37	48	64
ROA	782	-0.032	0.148	-2.518	0.003	0.494	173	-0.024	0.115	-0.711	0.002	0.514
LN_SALES	782	13.33	1.246	9.57	13.30	18.02	173	13.152	1.455	6.697	13.06	17.28
EMP	782	48.92	97.59	1	23	1781	173	44.12	116.2	1	20	1405
FIRMAGE	782	35.66	16.65	3	35.50	120	173	38.46	17.80	1	37	114
OWNERSHARE	782	0.763	0.315	0	0.923	1	173	0.742	0.342	0	0.950	1
dum_AFFILIATED	782	0.087	0.282	0	0	1	173	0.121	0.328	0	0	1
NUMBANKS	782	2.818	2.347	1	1	10	173	3.376	2.064	1	3	10
IND1	782	0.301	0.459	0	0	1	173	0.324	0.469	0	0	1
IND2	782	0.286	0.452	0	0	1	173	0.208	0.407	0	0	1
IND3	782	0.019	0.137	0	0	1	173	0.017	0.131	0	0	1
IND4	782	0.064	0.245	0	0	1	173	0.029	0.168	0	0	1
IND5	782	0.130	0.337	0	0	1	173	0.156	0.364	0	0	1
IND6	782	0.070	0.256	0	0	1	173	0.087	0.282	0	0	1
IND7	782	0.028	0.165	0	0	1	173	0.040	0.198	0	0	1
IND8	782	0.013	0.112	0	0	1	173	0.023	0.151	0	0	1
IND9	782	0.088	0.284	0	0	1	173	0.116	0.321	0	0	1

Notes: This table presents summary statistics of the dependent and independent variables used in the multinomial logit estimation in Table 7. All variables are defined in Table 2. The block of columns labeled “dum_DF=1” reports summary statistics for firms that received debt forbearance. The block of columns labeled “dum_DF=0” reports summary statistics for firms that did not receive debt forbearance.

Table 7 Determinants of the approval and type of debt forbearance (Multinomial logit estimation): No forbearance, financing, and forgiveness

Estimation method: Multinomial logit	Baseline (DF_TYPE=0) (No forbearance)			dum_DF_FINANCE=1 (DF_TYPE=1)			dum_DF_FORGIVE=1 (DF_TYPE=2)			
	(1)			(2)			(3)			
Dependent variable: DF_TYPE={0, 1, 2}	dy/dx	S.E.	z	dy/dx	S.E.	z	dy/dx	S.E.	z	
LEVERAGE_RATIO	-0.1429 ***	0.050	-2.84	0.1765 ***	0.0626	2.82	-0.034	0.052	-0.65	
SCORE	-0.0005	0.003	-0.15	-0.0076 *	0.0043	-1.79	0.008 **	0.003	2.33	
ROA	-0.0323	0.124	-0.26	-0.4179 **	0.1794	-2.33	0.450 ***	0.174	2.58	
LN_SALES	-0.0480 ***	0.012	-3.85	0.0571 ***	0.0174	3.28	-0.009	0.014	-0.65	
EMP	0.0001	0.000	0.68	-0.0002	0.0002	-0.96	0.000	0.000	0.72	
FIRMAGE	0.0025 ***	0.001	3.22	-0.0031 ***	0.0010	-3.01	0.001	0.001	0.79	
OWNERSHARE	-0.0116	0.042	-0.28	0.0713	0.0564	1.26	-0.060	0.046	-1.31	
dum_AFFILIATED	0.0738	0.052	1.43	-0.0801	0.0609	-1.32	0.006	0.048	0.13	
NUMBANKS	0.0209 ***	0.005	3.92	-0.0267 ***	0.0072	-3.69	0.006	0.006	0.99	
Industry dummies	Yes			Yes			Yes			
Number of observations										955
LRchi2										106.08
Prob > chi2										0.000
Pseudo R2										0.059
Log likelihood										-853.77

Notes: This table presents the results of the multinomial logit estimation for the determinants of the approval and type of debt forbearance. The columns labeled “dy/dx” show the estimated marginal effect of each variable. All variables are defined in Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table 8 The effect of debt forbearance on credit availability and firm performance (PSM-DID treatment effect estimations): No forbearance, financing, and forgiveness

Panel A: Financing (treated) vs. no debt forbearance (controls)

(a) Entire sample

Entire sample		Treated	Controls	Difference	S.E.	t-stat
dLEVERAGE_RATIO	Unmatched	0.093	0.015	0.077 *	0.040	1.92
	ATT	0.095	-0.011	0.107 **	0.042	2.53
dLOAN_SHORT_RATIO	Unmatched	0.003	-0.015	0.018	0.002	0.84
	ATT	0.008	-0.030	0.038 *	0.020	1.85
dLOAN_LONG_RATIO	Unmatched	0.089	0.030	0.059 *	0.032	1.84
	ATT	0.087	0.018	0.069 **	0.034	2.00
dSCORE	Unmatched	-0.856	-0.058	-0.798 **	0.389	-2.05
	ATT	-0.864	0.149	-1.014 **	0.428	-2.37
dROA	Unmatched	0.069	0.039	0.030	0.020	1.53
	ATT	0.059	0.037	0.022	0.017	1.29
dEMP	Unmatched	-5.728	7.468	-13.196 ***	4.310	-3.06
	ATT	-5.751	14.197	-19.948 **	10.149	-1.97
dTANGIBLERATIO	Unmatched	-0.006	-0.021	0.015	0.012	1.26
	ATT	-0.004	-0.020	0.017	0.012	1.43

(b) Subsample of firms with public credit guarantees (Treated: dum_DF_FINACE=1 & dum_PCG=1)

dum_PCG=1		Treated	Controls	Difference	S.E.	t-stat
dLEVERAGE_RATIO	Unmatched	0.104	0.015	0.089 **	0.043	2.09
	ATT	0.108	-0.010	0.118 ***	0.044	2.69
dLOAN_SHORT_RATIO	Unmatched	0.005	-0.015	0.020	0.219	0.89
	ATT	0.010	-0.031	0.041 **	0.021	1.98
dLOAN_LONG_RATIO	Unmatched	0.100	0.030	0.070 **	0.034	2.06
	ATT	0.097	0.021	0.076 **	0.036	2.13
dSCORE	Unmatched	-0.955	-0.058	-0.897 **	0.381	-2.35
	ATT	-0.968	0.186	-1.154 ***	0.435	-2.65
dROA	Unmatched	0.075	0.039	0.036 **	0.020	1.81
	ATT	0.064	0.036	0.028	0.018	1.56
dEMP	Unmatched	-5.986	7.468	-13.454 ***	4.390	-3.06
	ATT	-6.021	14.003	-20.024 *	10.248	-1.95
dTANGIBLERATIO	Unmatched	-0.008	-0.021	0.013	0.012	1.08
	ATT	-0.005	-0.020	0.015	0.012	1.24

(c) Subsample of firms without public credit guarantees (Treated: dum_DF_FINACE=1 & dum_PCG=0)

dum_PCG=0		Treated	Controls	Difference	S.E.	t-stat
dLEVERAGE_RATIO	Unmatched	0.015	0.015	0.000	0.046	0.00
	ATT	0.015	-0.021	0.036	0.049	0.74
dLOAN_SHORT_RATIO	Unmatched	-0.006	-0.015	0.009	0.027	0.33
	ATT	-0.006	-0.021	0.014	0.033	0.43
dLOAN_LONG_RATIO	Unmatched	0.021	0.030	-0.009	0.039	-0.22
	ATT	0.021	0.000	0.022	0.042	0.52
dSCORE	Unmatched	-0.234	-0.058	-0.176	0.605	-0.29
	ATT	-0.234	-0.075	-0.159	0.744	-0.21
dROA	Unmatched	0.031	0.039	-0.008	0.025	-0.30
	ATT	0.031	0.041	-0.010	0.032	-0.31
dEMP	Unmatched	-4.104	7.468	-11.572	11.084	-1.04
	ATT	-4.104	15.379	-19.483	12.700	-1.53
dTANGIBLERATIO	Unmatched	0.005	-0.021	0.026 *	0.014	1.81
	ATT	0.005	-0.229	0.028 *	0.016	1.68

Panel B: Forgiveness (treated) vs. no debt forbearance (controls)

(a) Entire sample

Entire sample		Treated	Controls	Difference	S.E.	t-stat
dLEVERAGE_RATIO	Unmatched	0.004	0.015	-0.011	0.036	-0.32
	ATT	-0.012	0.011	-0.024	0.035	-0.67
dLOAN_SHORT_RATIO	Unmatched	-0.020	-0.015	-0.005	0.019	-0.27
	ATT	-0.029	-0.012	-0.017	0.019	-0.85
dLOAN_LONG_RATIO	Unmatched	0.024	0.030	-0.006	0.031	-0.20
	ATT	0.017	0.024	-0.007	0.031	-0.22
dSCORE	Unmatched	0.598	-0.058	0.656	0.420	1.56
	ATT	0.763	-0.170	0.934 **	0.465	2.01
dROA	Unmatched	0.036	0.039	-0.003	0.014	-0.23
	ATT	0.035	0.029	0.006	0.013	0.48
dEMP	Unmatched	-1.478	7.468	-8.946	6.987	-1.28
	ATT	-1.492	10.582	-12.074	9.951	-1.21
dTANGIBLERATIO	Unmatched	-0.009	-0.021	0.012	0.011	1.04
	ATT	-0.010	-0.018	0.008	0.013	0.59

(b) Subsample of firms with public credit guarantees (Treated: dum_DF_FORGIVE=1 & dum_PCG=1)

dum_PCG=1		Treated	Controls	Difference	S.E.	t-stat
dLEVERAGE_RATIO	Unmatched	0.004	0.015	-0.011	0.042	-0.27
	ATT	-0.008	0.015	-0.023	0.042	-0.54
dLOAN_SHORT_RATIO	Unmatched	-0.029	-0.015	-0.014	0.021	-0.65
	ATT	-0.034	-0.009	-0.025	0.023	-1.11
dLOAN_LONG_RATIO	Unmatched	0.033	0.030	0.002	0.036	0.07
	ATT	0.026	0.024	0.002	0.037	0.07
dSCORE	Unmatched	0.514	-0.058	0.572	0.464	1.23
	ATT	0.628	-0.161	0.789	0.530	1.49
dROA	Unmatched	0.045	0.039	0.006	0.016	0.41
	ATT	0.045	0.032	0.013	0.015	0.88
dEMP	Unmatched	-3.043	7.468	-10.511	7.824	-1.34
	ATT	-3.292	14.054	-17.347 *	10.466	-1.66
dTANGIBLERATIO	Unmatched	-0.008	-0.021	0.013	0.013	1.03
	ATT	-0.010	-0.019	0.009	0.015	0.65

(c) Subsample of firms without public credit guarantees (Treated: dum_DF_FORGIVE=1 & dum_PCG=0)

dum_PCG=0		Treated	Controls	Difference	S.E.	t-stat
dLEVERAGE_RATIO	Unmatched	0.004	0.015	-0.011	0.048	-0.24
	ATT	-0.020	0.005	-0.025	0.040	-0.64
dLOAN_SHORT_RATIO	Unmatched	-0.003	-0.015	0.012	0.024	0.48
	ATT	-0.018	-0.018	0.000	0.025	0.01
dLOAN_LONG_RATIO	Unmatched	0.007	0.030	-0.023	0.040	-0.57
	ATT	-0.003	0.023	-0.026	0.036	-0.71
dSCORE	Unmatched	0.773	-0.058	0.830	0.550	1.51
	ATT	1.049	-0.191	1.240 *	0.648	1.91
dROA	Unmatched	0.017	0.039	-0.021	0.019	-1.11
	ATT	0.016	0.023	-0.007	0.017	-0.41
dEMP	Unmatched	1.818	7.468	-5.650	12.232	-0.46
	ATT	2.344	3.181	-0.837	9.444	-0.09
dTANGIBLERATIO	Unmatched	-0.011	-0.021	0.010	0.014	0.68
	ATT	-0.011	-0.015	0.004	0.017	0.24

Notes: This table presents the estimation results for the PSM-DID treatment effects on credit availability and ex-post firm performance. All variables are defined in Table 2. ***, **, * denote significance at 1%, 5%, and 10% level, respectively.