Examining the Effects of the Emergency Credit Guarantee Program on the Availability of Small Business Credit*

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Abstract

This paper examines the effectiveness of Japan's Emergency Credit Guarantee (ECG) program, which was set up during the financial turmoil after the failure of Lehman Brothers, in increasing credit availability and improving ex-post performance of small businesses. In particular, the paper examines whether lending relationships enhance or dampen the effects of the ECG program by using a unique firm-bank matched dataset. The ECG program significantly improves credit availability for the user firms. However, when the main bank of a firm extends the ECG loan, this positive effect is partially, if not completely, offset by the decrease in non-ECG loans extended by the same main bank. In addition, one year after ECG loans are provided, these borrowers deteriorate their performance more than those that do not obtain ECG loans. We do not find such loan "substitution" effects when a non-main bank extends the ECG loan. Our findings suggest that close firm-bank relationships may have perverse effects on the efficacy of the public credit guarantees.

Keywords: loan guarantees, relationship lending, small business credit

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1. Introduction

The financial crisis that erupted after the failure of Lehman Brothers in the fall of 2008 prompted governments in many countries to introduce a number of policy measures in order to alleviate firms' distress. These measures include tax reduction, export facilitation, and enhancing firms' access to credits. The credit guarantee program, which aims to improve firms' credit availability, is one of the most frequently employed measures. For instance, OECD (2009) evidences that 19 out of 23 OECD member countries have introduced or strengthened credit guarantee programs since the onset of the crisis.

Among others, the Japanese government has introduced the Emergency Credit Guarantee Program (hereafter ECG program) at the end of October 2008. This program is of particular interest to researchers because it is one of the largest single credit guarantee programs in OECD countries, with planned guaranteed amount of 36 trillion yen (approximately 400 billion U.S. dollars). We focus on this ECG program and empirically examine its effectiveness in increasing firms' credit availability and in improving their ex-post performance by utilizing a unique firm-bank matched dataset.

Although credit guarantee programs are widely used policy instruments to help small businesses in difficulty around the world, existing theoretical and empirical studies have yet to reach decisive conclusions on their economic impacts. On the one hand, credit guarantees may attenuate the credit rationing under asymmetric information between a borrower and a lender à la Stiglitz and Weiss (1981), and may result in funding profitable projects that would not be realized without government intervention (Mankiw, 1986; Gale, 1990, 1991). On the other hand, if the unfettered market (pooling) equilibrium under asymmetric information is such that some projects with negative net present values are funded, then credit guarantees may exacerbate the "overlending" problem (de Meza and Webb, 1987; de Meza, 2002). Existing empirical studies using micro data generally find

positive impacts of credit guarantees on the availability of credit to small businesses (Cowling, 2010; Riding, Madill, and Haines, 2007; Uesugi, Sakai, and Yamashiro, 2010; Zecchini and Ventura, 2009). However, the effects on ex-post performance of the credit guarantee users are mixed (Kang and Heshmati, 2007; Oh, Lee, Choi, and Heshmati, 2009; Uesugi, Sakai, and Yamashiro, 2010, Riding and Haines, 2001).

Credit rationing (or overlending) under asymmetric information may be dissolved through other contractual devices. One of such devices is the relationship lending, which is the focus of this paper. In the strand of literature on small business financing, it has been argued that close firm-bank relationships reduce the informational frictions and enhance the credit availability of firms, either in normal times or during the financial crisis (Angelini, Di Salvo, and Ferri, 1998; Cole, 1998; Jiangli, Unal, and Yom, 2008; Petersen and Rajan, 1994). What has not been remarked in much of the literature, however, is how firm-bank relationships affect the economic effects of public credit guarantee programs.

On the one hand, if a relationship lender uses the credit guarantee program in order to supplement its efforts to help borrowers in temporary distress, then it is likely that the provision of guaranteed loans is associated with the increase in non-guaranteed loans, and results in the improvement of ex-post performance of borrower firms. On the other hand, close firm-bank relationships may have perverse effects if the credit guarantee program provides the relationship lender an opportunity to exploit its informational advantages. Similar to the problem of conflicts of interests for bank underwriting of corporate bonds (in which an informed bank underwrites and distributes corporate bonds of low quality firms to outside investors in order to redeem its existing loans), an informed relationship lender may switch from non-guaranteed loans to guaranteed loans of risky firms, thus transferring credit risks to the public credit guarantee programs. If this is the case, we would observe a decrease in non-guaranteed loans and the deterioration of ex-post performance

for borrowers that have obtained guaranteed loans from relationship lenders.

Using a unique firm-bank matched panel dataset of about 2,500 observations during the current financial crisis, we examine whether the ECG program is effective in increasing the availability of small business loans and improving borrower firms' performance. In particular, we investigate whether lending relationships (whether the lender is the main bank of the firm) enhance or dampen the effects of the ECG program.

Our dataset contains a variety of information that is particularly valuable for our analysis. First, we can identify user firms of the ECG program as well as non-users. Thus, we are able to identify the factors that commonly affect the availability of credits for program users and non-users and to distinguish the effect of the program. Second, and most importantly, we can identify the "main bank" and a non-main bank of a firm. This allows us to explore how lending relationships interact with the usage of the ECG program, which is the primary issue of this paper. Further, for each firm-bank match, we can identify the amount of an ECG loan and the amount of total loans outstanding including both ECG loans and non-ECG loans provided by the same bank. Hence we are able to make inferences on the changes in a bank's existing loans at the time the bank extends an ECG loan. Finally, although for a short-time horizon (one year after ECG loans are provided), we have ex-post performance variables that are quite useful in evaluating the efficacy of the ECG program.

The major empirical findings we have obtained are the following. The ECG program significantly improves the availability of credit for the program user firms. However, when the main bank of a firm extends an ECG loan, this positive effect of the program is partially, if not completely, offset by the decrease in non-ECG loans by the main bank. Further, ex-post creditworthiness (the credit score one year later) of the ECG program users deteriorates more than that of non-users. Such loan "substitution" effects do not necessarily occur when non-main banks extend ECG loans. These

findings suggest that close firm-bank relationships may have perverse effects on the efficacy of the public credit guarantees program.

The remainder of the paper is organized as follows. Section 2 briefly describes the credit guarantee system in Japan, with particular attention paid to the ECG program. Section 3 presents our empirical hypotheses. Section 4 describes the data, variables, and the empirical approach employed. Section 5 presents the empirical results. And Section 6 concludes.

2. Emergency Credit Guarantee Program

2.1. The Credit Guarantee System in Japan

To facilitate the flow of funds to SMEs, the Japanese government has implemented a variety of programs, including direct lending by government-backed financial institutions as well as loan guarantee schemes. In terms of the amount of loans outstanding, government credit guarantees have been used more extensively than direct loans. Further, the use rate of guarantees is far higher than that of direct loans, with nearly 40 percent of all Japanese SMEs having received guarantees.

Three parties are involved in credit guarantee transactions in Japan: a small business borrower, a financial institution, and a credit guarantee corporation, which is financially backed by the government. In order to obtain guaranteed loans, small businesses have to file an application with a credit guarantee corporation in the first place. Financial institutions, as agencies of small business borrowers, file most of the applications, although some firms file on their own behalf. In the first case, the financial institution may conduct a preliminary screening before it actually delivers the application to a credit guarantee corporation. Then, the credit guarantee corporation examines and makes the credit decision. Finally, based on a letter of approval from the credit guarantee corporation, the financial institution extends a loan to the small business. The borrowing firm is then required to pay a guarantee premium whose amount depends on the credit risk of the firm in

principle. The average premium is about 1.35 percent of the total loans amount extended. In the case where the firm is unable to repay its debt to the bank, the credit guarantee corporation covers the debt, whereupon it receives the loan claim from the bank. The ratio of credit covered by the credit guarantee corporation had been 100% of the guaranteed loan amount until October 2007, but was reduced to 80% since then. Then, the corporation, or the financial institution that acts on behalf of the corporation, collects the claim by, in many cases, assisting the firm's business restructuring that may take quite a while.

2.2. Emergency Credit Guarantee Program

In response to the financial crisis started in the fall of 2008, the Japanese government introduced stimulus packages in order to alleviate the massive adverse shocks to the economy. These include temporary corporate tax reduction, lump-sum cash handouts to households, and larger employment adjustment subsidies. Among them, in addition to the regular credit guarantee program explained above, the government introduced a temporary program called the Emergency Credit Guarantee (ECG) Program on October 31st 2008. The ECG program runs from the date through the end of March 2011. The scale of the ECG program is unprecedented and surpasses the size of the previous temporary program called Special Credit Guarantee program (30 trillion yen) implemented from October 1998 to March 2001. The amount of credit facility was initially capped by 6 trillion yen, but one week later it was increased to 20 million yen (November 2008), followed by another increases to 30 trillion yen (April 2009) and to 36 trillion yen (February 2010). The ratio of the amount of the credit facility to the total SME loans outstanding in Japan is about 15 percent. By the end of March 2010, the ECG loans that have been extended amounted to almost 20 trillion yen.

In comparison with the regular credit guarantee program, the ECG program has following institutional features. First, the ratio of credit covered by the credit guarantee corporation is 100%

and thus banks that extend ECG loans bear no credit risks. Second, the maximum duration of the ECG loan is ten years, whereas that of the regular credit guaranteed loan is seven years. Third, the guarantee premium is the same for every user firms, whereas the premium varies depending on the credit risk of a borrowing firm in the regular program. The level of premium differs among credit guarantee corporations, but most are set at about 0.75-0.80%. Finally, while the risk weight of regular credit guaranteed loans under the Basel II Capital Accord is 10%, the risk weight of the ECG loans are set as 0% in order to facilitate the use of the ECG program by banks.

Japanese government has implemented a similar temporary credit guarantee program in the midst of the financial crisis during the late 90s: the Special Credit Guarantee (hereafter SCG) program. The purpose of the SCG program was to alleviate the severe credit crunch to small businesses caused by the non-performing loans problem of Japanese banks. Note that the situation under the current crisis is quite contrary in that the sharp decline of business activities, rather than the deterioration of banks' health, is the main reason for firms' worsening financial positions.

Comparing the ECG program with the SCG program, there are both similarities and differences. On similarities, the ratio of credit covered by the credit guarantee corporation is 100% in both programs, although the coverage ration under the regular program was also 100% when the SCG program was introduced. In addition, both programs do not ask borrower firms to pledge collateral in principle.

On the other hand, there are also substantial differences between the ECG and the SCG program. First, the loan screening policy of the ECG program becomes stricter than that of the SCG program. A loan application for the SCG program could be rejected only when a prospective borrower met certain conditions such as significantly negative net worth, tax delinquency, default, or window dressing of the balance sheets. In contrast, there are no such explicitly lenient conditions for the ECG loan applications to be approved. The difference in loan screening policy may be due to

huge budget deficits that credit guarantee corporations currently have, as well as many criticisms to the SCG program on its lenient screening policy and resulting misuse of funds, as evidenced by a number of anecdotes.[1] On the other hand, in terms of the maximum size and duration of a loan, the ECG program allows the user-firm to borrow a larger amount of loans for a longer period than the SCG program did: the maximum amount and duration of the ECG loans are 280 million yen and ten years, respectively, whereas those of the SCG loans were 250 million yen and seven years, respectively.

3. Empirical Hypotheses

3.1. Effects of Credit Guarantees

The economic effects of public credit guarantees have been analyzed by a variety of theoretical studies. Many studies are based on the presumption that the adverse selection problem under asymmetric information between borrowers and lenders yields the undersupply, or rationing, of credits à la Stiglitz and Weiss (1981). Then, the introduction of public credit guarantees results in an increase in the availability of loans for previously unfunded projects and *may* contribute to restoring efficiency (Mankiw, 1986; Gale, 1990, 1991). An alternative model by de Meza and Webb (1987) argues that, under the assumption that investment returns are ranked in terms of first-order stochastic dominance[2], asymmetric information will result in excess supply of credit and yield "too much investment." In the analytical framework of de Meza and Webb (1987), public credit guarantees will also increase the availability of loans to firms, but exacerbate the over-investment problem of low quality borrowers (de Meza, 2002; Innes 1991).

[1] For the detailed accounts of the SCG program, see Uesugi, Sakai, and Yamashiro (2010).
[2] The theoretical model in Stiglitz and Weiss (1981) assumes second-order stochastic dominance. The contrasting results between Stiglitz and Weiss (1981) and de Meza and Webb (1987) rest on the assumption about the risk-return relationship of investment projects. See Freixas and Rochet (2008, p177) and de Meza (2002).

Note that even in theoretical models based on Stiglitz and Weiss (1981), public credit guarantees do not necessarily ensure improvements in the average quality of projects implemented. Hence whether the public guarantees will improve ex-post performances of program users is an empirical matter. Moreover, several contractual features of the ECG program may worsen the ex-post performance of borrowers. First, the 100 percent coverage of default costs by the credit guarantee corporation significantly reduces banks' incentives to monitor borrower firms (lender moral hazard). Second, reduced requirements for collateral in the ECG program may also exacerbate the moral hazard problem on the part of borrower firms, such as reduced managerial effort (Boot, Thakor, and Udell, 1991) and/or the asset substitution (Stulz and Johnson, 1985). To summarize, we put forward our first empirical hypothesis as follows:

Hypothesis 1 (Effects of Credit Guarantees): Availability of loans increases for users of public credit guarantees. Ex-post performance of firms using credit guarantees improves if increased credit is used for profitable projects with positive net present values. Alternatively, ex-post performance of guarantee user firms deteriorates if increased credit exacerbates the over-investment problem and/or induces moral hazard problems.

Previous empirical literature on credit guarantees generally find positive impacts of credit guarantees on the availability of credit to small businesses (see Cowling (2010) for UK; Riding, Madill, and Haines (2007) for Canada; Uesugi, Sakai, and Yamashiro (2010) for Japan; Zecchini and Ventura (2009) for Italy). However, evidences on ex-post performances of guarantees users are mixed. Riding and Haines (2001) find positive job creation amongst Canadian guarantee program users. They also note that the default rates of program users are particularly sensitive to the coverage ratio of the guarantee program. Using firm level data of Korean credit guarantees user and non-user

firms, Kang and Heshmati (2007) and Oh, Lee, Choi, and Heshmati (2009) examine the determinants and ex-post performance of guarantees users. Although two papers employ different empirical approaches (Heckman's two-step estimation in the former and the propensity score matching estimation in the latter), both papers find that the use of credit guarantees positively affects the growth of sales and reduces default rates of firms. Oh, Lee, Choi, and Heshmati (2009) suggest the possibility that the declined default rate is the evidence of credit rationing in the absence of credit guarantee programs. Evidences on employment growth and productivity growth are mixed, and they do not find a significant effect on investment. Finally, using Japanese firm level data and employing propensity score matching, Uesugi, Sakai, and Yamashiro (2010) find that firms that participated in the SCG program in the late 90s experienced decreases in profitability and increases in the probability of financial distress and default.

3.2. Main Bank Relationships and Effects of Credit Guarantees

As we noted in the introduction of this paper, a number of theoretical and empirical papers have examined whether close firm-bank relationships would reduce informational frictions between a borrower and a lender and thus improve the availability of credit, especially for smaller and younger firms that are more informationally opaque (Angelini, Di Salvo, and Ferri, 1998; Cole, 1998; Jiangli, Unal, and Yom, 2008; Petersen and Rajan, 1994). What has not been remarked on much in the literature, however, is how firm-bank relationships affect the economic effects of public credit guarantees programs.

On the one hand, a relationship lender (main bank in our analysis) may use the credit guarantee program in order to supplement its efforts to help borrowers in temporary distress. If that is the case, then it is likely that the non-guaranteed loan provided by a relationship lender is complementary to the guaranteed loan in increasing the credit availability. By utilizing soft

information that the relationship lender has accumulated, provision of guaranteed loans is likely to result in the improvement of ex-post performances of borrower firms. Complementarity between lending relationships and the credit guarantee program may well appear if a bank is risk-averse and/or the size of loan is large enough so that a bank has an incentive for risk-sharing.

On the other hand, a bank may want to substitute guaranteed loans for its existing loans (Vogel and Adams, 1997). In this case, close firm-bank relationships may be detrimental for the effectiveness of credit guarantees program, because relationship lenders will exploit their informational advantages. Similar to the problem of conflicts of interests for bank underwriting of corporate bonds in which an informed bank underwrites and distributes corporate bonds of low quality firms to outside investors in order to redeem its existing loans[3], an informed relationship lender may switch from non-guaranteed loans to guaranteed loans, and thus transfer credit risks of deteriorating firms to the public credit guarantee program. Then, we would observe decreases in non-guaranteed loans and the deterioration of ex-post performance of the borrower that has obtained the guaranteed loan from its relationship lender. To summarize:

Hypothesis 2 (Main Bank Relationships and Effects of Credit Guarantees): Credit availability and ex-post performance of a firm improve if the main bank uses the guarantee program in order to augment its efforts to support firms in difficulties. Alternatively, the firm's credit availability and ex-post performance deteriorate if the main bank exploits its informational advantages to identify low quality firms, substitutes guaranteed loans for non-guaranteed loans, and transfers the firms' credit risks to the guarantee program.

[3] A number of studies empirically examined whether the pricing and default performance of corporate bonds underwritten by commercial banks or their affiliates are consistent with the conflict-of-interests hypothesis. See, for instance, Kroszner and Rajan (1994, 1997) and Puri (1996) on the pre-Glass-Steagall-Act period in the U.S., Gande, Puri, Saunders, and Walter (1997) on Section 20 subsidiaries during the pre-Gramm-Leach-Bliley-Act period in the U.S., Hamao and Hoshi (2000) and Kang and Liu (2007) on the after-1933 Financial System Reform Act-period in Japan.

Note that the relationship between non-guaranteed loans and guaranteed loans also depends on the institutional features of credit guarantee programs. As discussed in Riding, Madill, and Haines (2007), guarantee programs in the United States are designed to act as lenders of last resort, and are provided only to the small businesses that fail to obtain other sources of financing. Loan guarantee programs in countries including Canada and UK allow credit guarantee applicants to have their own non-guaranteed loan balances, but are also explicit in their stated objectives that majority of firms obtaining guaranteed loans ought to be those who have been unable to obtain financing from alternative sources[4]. In these countries, the guaranteed loans are almost always substitutes for non-guaranteed loans. Nevertheless, our empirical hypothesis may shed light on the effectiveness of credit guarantees in these countries as well, because relationship lenders in these countries also have incentives and opportunities to exploit their informational advantages at the expense of public guarantees programs.

4. Data and Empirical Approach

4.1. Data Sources

The data used in this study are mainly taken from the Survey on Transactions with Firms and Financial Institutions in February 2008 and the Survey on Transactions with Firms and Financial Institutions under the Financial Crisis in February 2009. Both surveys are conducted by the Research Institute of Economy, Trade and Industry (hereafter RIETI surveys), a research institution affiliated with the Ministry of Economy, Trade and Industry of Japan. These RIETI surveys ask firms a variety of issues such as the uses of credit guarantees, the amount of guaranteed loans obtained, total loans amount outstanding, and their relationships with banks (e.g. duration). Further, the 2009 survey

[4] This principle is referred to as *additionality* or *incrementality*.

includes several questions regarding the impact of the financial crisis that erupted after the failure of Lehman Brothers in the fall of 2008, including the use of the ECG program that is the focus of this paper.

The 2008 survey questionnaire was sent to 17,018 firms chosen from firms that had responded to previous government surveys compiled by the Small and Medium Enterprise Agency. Firms surveyed are randomly drawn from the database of Tokyo Shoko Research (hereafter TSR database), a business database company. TSR database covers more than 1.2 million Japanese firms and maintains information on firms' financial statements as well as their primary characteristics including the firm age, ownership structure of the firm, and the identities of banks in transactions. The number of respondent firms to the 2008 survey is 6,079 with the response rate of 35.7%. The size distribution of these responding firms compared with that of original sample is slightly skewed toward the center, i.e. fewer firms are distributed at both tails. The 2009 survey questionnaire was sent to 5,979 firms, those that responded to the 2008 survey excluding defaulters. The number of respondent firms in the year is 4,103 with the response rate of 68.6%. Based on these respondent firms to the 2008 and 2009 surveys, we produce a balanced firm-bank matched panel dataset used for our analysis.

RIETI surveys have a few notable features that are particularly suitable for testing the effectiveness of a credit guarantee program. First, for each firm, the surveys identify at most two banks (deposit-taking financial institutions) that have the largest and second-largest loans outstanding. Hence, we are able to concatenate the financial characteristics of these banks that may affect firms' availability of credits. In addition, the surveys also identify the main bank of a firm, and we use the information in order to define which bank is the relationship lender of a firm. 89% of firms in our dataset responds that its main bank is the same as the bank that has the largest loans outstanding to the firm. Second, for each firm-bank match in which a bank is either a main bank or a

non-main bank, the 2009 survey identifies the use of ECG loans including loans amount. In addition, RIETI surveys identify the amount of total loans outstanding, including both ECG loans and non-ECG loans in years 2008 and 2009. Hence, we are able to examine not only the amount of the ECG loan extended to a firm but also the yearly changes in the amount of non-ECG loans outstanding to the firm. Non-ECG loans consists of regular credit guaranteed loans and non-guaranteed loans, and 39.4% of our firm-bank matched data includes the loan with regular credit guarantees.

Other than the RIETI surveys, firms' financial data are collected from the TSR database. Firms whose most recent financial statements in the TSR database are before January 2008 are excluded from our dataset. Financial data on main and non-main banks are mostly provided by the Nikkei Financial Quest. We then supplement the missing variables/data by the website of Financial Services Agency (FSA) that contains the information on regional financial institutions[5] and banks' annual reports. Observations that we cannot obtain banks' data (e.g. credit cooperatives) are also dropped from our dataset.

Using these data sources, we construct a firm-bank matched panel dataset with dependent and independent variables explained in the following subsection. Because of exclusions of the observations explained above as well as occasional missing answers to RIETI surveys[6], we are left with 2,498 firm-bank matched observations (1,732 firms), with 1,502 for firm-main bank matches and 998 for firm-non-main banks matches. These constitute our dataset for the analysis.

4.2. Variables

We have three sets of variables to examine our empirical hypotheses. A list of variables and their

[5] http://www.fsa.go.jp/policy/chusho/shihyou.html

[6] The most frequent missing variables are the identity of main banks and non-main banks as well as the bank-firm relationship variables described below.

definitions are presented in Table 1.

4.2.1. Availability of Loans and Ex-post Performance

First, in order to gauge the availability of loans, the following variables are used: the amount of ECG loans provided by a bank (ECG_LOAN_RATIO), yearly changes (between February 2008 to February 2009) in loans outstanding provided by the same bank (dB_LOAN_RATIO), yearly changes in *total* loans outstanding provided by all the financial institutions in transactions (dB_TLOAN_RATIO). In order to control for the size of a firm, loans amounts are divided by the firm's total assets as of year 2008. Because dB_LOAN_RATIO consists of ECG loans and non-ECG loans (regular credit guaranteed loans and non-guaranteed loans), the difference between dB_LOAN_RATIO and ECG_LOAN_RATIO represents changes in the amount of non-ECG loans within a firm-bank match. In contrast, the difference between dB_TLOAN_RATIO and dB_LOAN_RATIO represents changes in the amount of other banks' loans.

Somewhat similar to dB_TLOAN_RATIO, we also use dLOAN_RATIO, yearly changes in total loans outstanding provided by both financial institutions and non-financial institutions (such as parent companies, owners, etc.). The virtue of dLOAN_RATIO is that we can divide it into short-term loans (dSHORT_RATIO) and long-term loans (dLONG_RATIO), so that we can make inference on how the use of ECG loans affects the firm's maturity of loans outstanding.

Second, in order to see how firms allocate ECG loans and change their performance, following variables are employed. Note that all the variables below are yearly differences between years 2008 and 2009, so that we effectively look at changes within a year after ECG loans are extended. To see how ECG loans are allocated, we use dCASHRATIO and dTANGIBLERATIO that measure changes in liquidity position and investment activity of a firm, respectively. Proxies for a firm's ex-post performances are: dROA (return on assets for profitability), dSCORE (TSR credit

scores for creditworthiness), and dlnEMP (number of employees in logarithm for growth). The changes in ROA decompose to changes in gross sales (dSALESRATIO) and changes in operating costs (dCOSTRATIO). dRATE (interest payments divided by firms' total assets) is also employed to see whether the use of ECG loans contributes to a decrease in interest payment.

4.2.2. Determinants of the use of ECG program

In analyzing determinants of the use of ECG program, we consider four categories of variables: characteristics of credit guarantees, borrower firm characteristics, characteristics of the bank (either a main bank or a non-main bank) that extends ECG or non-ECG loans, and variables describing the relationship between a firm and the bank that extends ECG or non-ECG loans. Table 2 presents summary statistics of these variables, with the left, center, and right blocks in columns present summary statistics for the full-sample, for ECG loans user firms, and for non-ECG loans user firms, respectively. Tables 3 and 4 present similar summary statistics for firm-main bank matches and firm-non-main bank matches, respectively.

The dependent variable, ECG_DUM, is the dummy variable that equals one if a borrower firm obtained ECG loans from October 31, 2008 (the onset of ECG Program) to February 2009 (when the 2009 RIETI survey was conducted). About 15 percent of our entire sample started using the ECG program during this period (Table 3). Tables 4 and 5 indicate that the ratio is substantially higher for firm-main bank matches (21.2%) than for firm-non-main bank matches (4.7%), indicating that ECG loans are more likely to be provided by main banks.

As noted above, we consider four categories of independent variables: characteristics of credit guarantees, firm characteristics, bank characteristics, and bank-firm relationships. Firm and bank characteristics variables are as of year 2008 (one year prior to the 2009 RIETI survey), whereas bank-firm relationships are as of February 2009. A few things are worth mentioning.

First, 39.4 % of our entire sample uses regular credit guarantees (RCG) loans at the time of 2009 RIETI survey. Among ECG loans users, the ratio RCG_DUM is 76.2%, implying that ECG loans are used supplementary to the regular program loans. Second, regarding firms' characteristics, profitability (SHARPERATIO) and creditworthiness (SCORE) of ECG-loan users are lower than non-ECG-loan users on average, and the difference of these variables between the two groups of users (e.g. $SCORE_{ECG\_DUM=1} - SCORE_{ECG\_DUM=0}$) is larger for firm-main bank matches than for firm-non-main bank matches. That is, the relative performance of the ECG loans user is worse if the firm obtains the ECG loan from its main bank.

Third, mean values of regional bank dummy B_REGIONAL indicate ECG loans are more likely to be provided by regional banks, especially when it is the main bank of a firm. Table 4 shows that, within the subsample of firm-main bank matches, 87.4 % of ECG loan are extended by regional banks, whereas the ratio is 70.9 % for non-ECG loans.

Lastly, the dummy variable LOAN_ENQUIRY represents whether a firm has requested for a loan within a year, and we treat this variable as a proxy for loan demand. For firm-main bank matches (Table 4), the mean value of LOAN_ENQUIRY is higher for ECG loan user firms (0.506) than that of non-users (0.368), indicating the use of ECG program is positively associated with the strength of firms' loan demand. In contrast, for firm-non-main bank matches (Table 5), the use of ECG program is negatively associated with LOAN_ENQUIRY (0.170 for ECG loan users and 0.292 for non-users). This suggests that these firms obtain ECG loans as a result of solicitations from non-main banks, rather than enquiries by firms themselves.

4.3. Empirical Approach

Using the dataset just described, we proceed to examine economic effects of the ECG program. Note, however, that a simple comparison of the loans availability and ex-post performances of the ECG

program users and non-users is not appropriate because of possible selection bias. For example, if firms that obtain ECG loans are observably riskier than those not using the ECG program ex-ante, then a simple comparison between the two groups confounds ex-ante riskiness and ex-post riskiness (changes in borrowers' riskiness after the loan is extended). To circumvent the problem, we need to control for any possible selection bias in our estimation. To do so, we employ the matching estimation approach. The procedure is as follows:

(i) We implement a probit estimation that models the probability of firms' using the ECG program during October 31, 2008 to February 2009 conditional on firm characteristics, bank characteristics, and bank-firm relationships. Borrowers that obtain ECG loans (ECG_DUM=1) are labeled treatment observations. We then attach a propensity score to each observation. The propensity score is defined as

$$e(X_t) \equiv \Pr(ECG\_DUM_t = 1 | X_{t-1})$$

where X_{t-1} is a vector of covariates in the probit estimation.

(ii) Next, for each treatment observation, we identify matched observations from the non-ECG users sample. The matched observations are those who have the "closest" propensity scores to a particular treatment observation and are labeled control observations. It should be noted that we use a non-treated observation more than once as a control, that is, a non-treatment observation may be used as a control for one treatment observation and as a control for another treatment observation at the same time. There are several matching algorithms to find the "closest" control observations. As a base-line for our analysis, we employ kernel matching.

(iii) Finally, we compare the change (yearly difference) in the loan availability and the ex-post performance variables of the treatment and the control group as described in the previous subsection. To be precise, for ex-post performance variables, we use the difference-in-difference (DID) estimator defined as $\Delta Y_{t+1}^{T,i} - \Delta Y_{t+1}^{C,i}$ where Y indicates the loan availability variable, t is the year in which

firms decide whether to use the ECG program, and uppercase *T, i* and *C, i* stand for the treatment firm *i* and its control group firms, respectively.

With respect to loan availability variables, we measure the changes from year *t-1* to *t*, because we would like to know contemporaneous effects of the ECG loan on the same bank's non-ECG loans and on the other banks' loans.

One of the benefits of employing propensity score matching estimation is that we can match treatment and control observations using the scalar propensity score. The propensity score, which is the conditional probability of being treated given the value of observed characteristics, is a very useful variable in dealing with a highly dimensional vector of covariates. Rosenbaum and Rubin (1983) show that treatment observations (in our case those who use ECG loans) and control observations (those who did not use ECG loans) with the same propensity score value have the same distribution of the full vector of covariates. It is thus sufficient to match firms in terms of the propensity score in order to obtain the same probability distribution of covariates for treatment and control observations.

In propensity score matching, an assumption known as unconfoundedness has to be satisfied so that the differences in ex-post performance variables between the treated observations and the control observations with the same propensity scores are attributable to the treatment effect of using the ECG program (Rosenbaum and Rubin (1983)). That is,

$$(\Delta Y_{t+1}^{T}, \Delta Y_{t+1}^{C}) \perp ECG\_DUM_{t} \left| e(X_{t-1}) \right.$$

needs to hold. Although there is no direct test for the unconfoundedness, this assumption indicates the need to control for all relevant variables X_{t-1} that influence treatment assignments and ex-post performance variables. We believe that our data is rich enough to include all the necessary covariates. Furthermore, the DID matching estimator that we use allows for the existence of differences in time-invariant unobservable characteristics between the treatment and the control group.

5. Results

We use a probit model in order to estimate a propensity score for each firm-bank match observation in Section 5.1, followed by the treatment effect estimation in Section 5.2. Further, we specifically focus on the quantitative impact of the ECG program on the amount of total loan increase in Section 5.3. We examine how many percentage points of increase of total loans correspond to one percentage point of increase of ECG loans by OLS regressions.

5.1. Probit model estimation

We start our estimation procedure with the probit model equation, as specified in equation (1).

$$\Pr(ECG_{ijt}=1 \mid X_{ijt-1}) = \Psi(\beta_0 + \beta_1 CreditGuarantees_{ijt} + \beta_2 Firm_{it-1} + \beta_3 Bank_{jt-1} + \beta_4 Relationship_{ijt}) \quad (1)$$

We have two groups of firm-bank matched observations: firm-main bank matches and firm-non-main bank matches. There may well be different coefficients between these two groups. We first divide the entire set of observations into these two groups and estimate equation (1) for each of them. Then we estimate for the entire sample.

The estimation results are presented in Table 5. The left, center, and right blocks represent the parameters for the sample of firm-main bank matches, the sample of firm-non-main bank matches, and the sample of all the firm-bank matches, respectively. For the firm-main bank matched sample, the coefficient on RCG_DUM is significantly positive, indicating that the use of Emergency Credit Guarantees and the use of regular credit guarantees are complementary.

For firm characteristics, coefficients on SCORE and CAPRATIO_NG are negative and significant. These indicate that low creditworthy firms are more likely to use the ECG program, but they are less likely to obtain ECG loans once they become distressed to the point of negative capital ratio, presumably because of relatively stringent lending standards under the ECG program. In contrast, profitability of the firms (SHARPERATIO) does not have a significant effect on the use of

the ECG program. Coefficients on LOANRATIO and lnSALES are both significantly positive and negative, respectively, while that of lnFIRMAGE is insignificant. That is, firms whose reliance on debt-financing is larger and smaller firms are more likely to use the program. A firm's procurement demand, as proxied by LOAN_ENQUIRY, has a significant positive effect on the use of the ECG program.

Turning to bank characteristics of the firm-main bank matched sample, the capital-asset ratio based on the Basel Capital Accord has different impacts on the use of Emergency Credit Guarantees depending on the type of the bank each firm transacts with. If it is a regional bank, the impact of the bank's capital-asset ratio (the sum of coefficients on B_REGIONAL*BIS and BIS) is not significant on the use of the program. In contrast, if it is a city bank or other large bank, its capital-asset ratio is positively associated with the use of the program. The difference between city banks and regional banks implies that the former, most of which need to abide by a more stringent capital requirement applied to banks operating internationally, faces higher pressure to have larger capital buffer. Hence, city banks are more likely to provide ECG loans whose risk weight (0%) is smaller than that of non-ECG loans. The coefficient on HHI is marginally but significantly negative, indicating that firms located in a prefecture with fiercer competition among banks are more likely to obtain ECG loans. In contrast, the sign of BANKSHARE is positive, albeit its effect is insignificant.

It is worth comparing the above results with those using firm-non-main bank matched sample. Similar to estimation results for firm-main banks matched sample, coefficients on RCG_DUM and LOANRATIO are significantly positive and the variables for bank characteristics have parameters of the same signs. Although the level of significance is at 10% level, the coefficient of CAPRATIO_NG is also negative. In contrast, some of the variables that are significant in the firm-main bank matches including SCORE and lnSALES become insignificant when we focus on firm-non-main bank matched observations. Unlike firms that obtain ECG loans from their main

banks, ECG-user firms that obtain ECG loans from non-main banks are neither riskier nor smaller. Further, the coefficient on LOAN_ENQUIRY turns significantly negative, indicating that firms without loan demand are likely to be solicited by their non-main banks to use the ECG program.

Finally, we conduct the probit model estimation for the entire sample. We introduce an interaction term between B_MAIN and LOAN_ENQUIRY, which is to incorporate opposite parameter signs for LOAN_ENQUIRY between the two subsamples. Consistent with the summary statistics, ECG loans are more likely to be extended by the main bank, as indicated by coefficients on B_MAIN and B_MAIN*ENQUIRY. The result on other variables appear to be more in line with the result using firm-main bank matched observations than it is with the result using firm-non-main bank matches. In addition, some of the variables which are insignificant or only marginally significant in the previous subsample estimations become significant due to smaller standard errors. These include BANKSHARE and HHI. We are going to use this result and calculate propensity scores in order to implement the treatment effect estimation.

5.2. Treatment effect estimation

Based on the propensity scores obtained from the probit model regression for the entire sample in the previous subsection, we estimate the treatment effect of the ECG program using kernel matching estimators. We match each treated observation with the non-treated observations each of which has its own weight that is proportional to the “closeness” to the treated. Here, closeness is measured by the propensity scores of treated and non-treated observations. Note that we omit non-treated observations of the identical firm that receives ECG loans from another bank from the sample. We do it in order not to have the same firm appear both in the treatment and control groups.

We report estimation results for the treatment effect in Table 6. In the first panel (a) of Table 6, we have the result for the entire sample, which is considered as the baseline case. The

second and the third panels (b) and (c) represent the results for the subsamples of firm-main bank matches and firm-non-main bank matches, respectively. For each of the variables, there are an unmatched estimator and an ATT (average treatment effect on the treated) estimator, both of which are shown in the column of "Difference." In the baseline case, for example, the difference-in-differences (DID) unmatched estimator for ECG_LOAN_RATIO is 0.103, indicating that ECG loans that amounts to 10.3 percentage to total assets are extended to the program users. Since all the non-treated observations have the value of zero for this variable, the unmatched and ATT estimators for ECG_LOAN_RATIO are the same. In contrast, these two estimators take different values for other variables. For example, the DID unmatched and ATT estimators for dB_LOAN_RATIO are 0.042 and 0.050, respectively. In what follows, we only examine ATT estimators since they adjust for the ex-ante differences in characteristics between treated and non-treated observations.

We start from the baseline case in the first panel of Table 6 (a). For the loan availability variables, we observe significant improvements in most of the variables. Not only dB_LOAN_RATIO but also dB_TLOAN_RATIO and dLOAN_RATIO have significantly positive treatment effects. For the components of dLOAN_RATIO, dLONG_RATIO has a significantly positive treatment effect, while the effect on dSHORT_RATIO is insignificant, suggesting that most of the ECG loans are for long-term. The size of the treatment effects is the largest for ECG_LOAN_RATIO (0.103) and the increase is partially reflected in the treatment effect on dB_LOAN_RATIO (0.050) that sums up the changes of both ECG loans and non-ECG loans extended by the same bank. Also, much of the positive impact on dB_LOAN_RATIO is reflected in the increase of total loans provided by all the banks (dB_TLOAN_RATIO) and by all the creditors (dLOAN_RATIO). These indicate two things. First, banks that extend ECG loans partially offset their increment by the decrease of non-ECG loans, resulting in the increase of loans amount

outstanding about half the size of ECG loans amount. Second, with all the banks and other procurement sources, there is still a significant increase in the loan availability among the ECG users. Overall, the results are consistent with the first part of Hypothesis 1.

For the allocation of funds obtained by the program users, treatment effects on dTANGIBLERATIO, dlnEMP, and dCASHRATIO are insignificant. The increment in loans outstanding results in no significant changes in their capital investment behavior, employment, nor cash holdings. For the performance of the program users, many of the variables observe a significant decline. These include dSCORE, dSALESRATIO, and dCOSTRATIO. In contrast, there is no significant impact on dROA. Since the time window used for the treatment effect estimation here is only for one year, it is difficult to assure that the significant decline of performance among ECG users lasts for the following years. However, it should be emphasized that there are sizable ex-post declines in the amount of sales (12.9 percentage points to the asset size) as well as costs (11.4 percentage points) among users. These results are inconsistent with the theoretical prediction which argues that public credit guarantees enhance additional investments with positive net present values and increase economic efficiency.

Next, Table 6 (b) indicates that much of the “loan-substitution” between ECG loans and non-ECG loans by the same bank and the deterioration in ex-post performance of the ECG program users are attributable to firms that obtain ECG loans from main banks. The signs as well as the size of the treatment effects in this panel are quite similar to those in panel (a). In addition, dCASHRATIO turns into marginally positive. This indicates that the ECG program users tend to reserve cash rather than to invest in tangible or intangible assets. Overall, the results are consistent with the latter part of Hypothesis 2, that is, main banks misuse the ECG program so as to transfer credit risks of their existing low quality firms to the credit guarantee program.

Finally, Table 6 (c) examines the effects for the firm-non-main bank matched observations.

There are significant differences from the ones in the previous panels. First, even though non-main banks that extend ECG loans partially offset the increase by reducing the amount of non-ECG loans, the extent of offsetting behavior appears to be relatively smaller. The difference between ECG_LOAN_RATIO and dB_LOAN_RATIO in the firm-non-main bank matched sample is 0.019 (=0.072-0.053), while the difference in the firm-main bank matched sample amounts to 0.057 (=0.107-0.050).

Second, treatment effects turn into insignificant or only marginally significant for dB_TLOAN_RATIO and dLOAN_RATIO. The result indicates that other banks appear to withdraw their non-ECG loans, which nullifies the positive treatment effects for ECG_LOAN_RATIO and dB_LOAN_RATIO. However, it is too hasty to conclude that the result contradicts the first part of Hypothesis 1, which expects improvement of credit availability. Probit estimations in Table 5 indicate that the effect of LOAN_ENQUIRY on the use of ECG loans is negative among firms that obtain ECG loans from non-main banks. That is, firms that receive ECG loans from their non-main banks may want to reduce their total loan balances since they have no need to procure additional funds. Partly as a result of no significant improvement of loan availability among the ECG users in this subsample, we do not observe significant treatment effects among variables on the asset allocation of funds. Neither do we observe significant treatment effects for performance variables among the ECG users.

5.3. OLS regression for the relationship between ECG loans and firm's loan availability

In the previous subsection, we have argued that the loan "substitution" effects between ECG loans and non-ECG loans are more sizable among firm-main bank matched sample. In order to reexamine the issue, we employ OLS estimations to gauge the impact of ECG_LOAN_RATIO (explanatory variable) on dB_LOAN_RATIO and dB_TLOAN_RATIO (dependent variables)

quantitatively. We have the same set of other explanatory variables as we do in the probit model estimation.

Table 7 shows the results with two panels. The first panel (a) is for the subsample of firm-main bank matched observations and the second panel (b) is for that of firm-non-main bank matched observations. We focus on the coefficients on ECG_LOAN_RATIO. For the estimation with the dependent variable of dB_LOAN_RATIO, the coefficient on ECG_LOAN_RATIO in panel (a) is 0.444, while the coefficient in panel (b) is 0.905. That is, one percentage point of ECG loans provided by a main bank results in 0.4 percentage points of increase of total loans extended by the same main bank, whereas the one percentage point of ECG loans by a non-main bank results in 0.9 percentage points of increase of total loans extended by the same non-main bank. For the sample of main bank matches we reject the coefficient being significantly different from unity, while we are not able to reject it for the sample of non-main bank matches (results not reported). These are consistent with the results obtained in the previous subsection as well as with the latter part of Hypothesis 2, in which offsetting behavior of reducing non-ECG loans is significantly stronger by main banks than by non-main banks. In contrast, for the estimation with the dependent variable of dB_TLOAN_RATIO, the coefficient in the firm-main bank matched sample (0.256) becomes actually larger than that in the firm-non-main bank matched sample (0.026 and insignificant). This result is also in line with treatment effects obtained in the previous subsection.

6. Conclusion

We have empirically examined whether the ECG program would increase the availability of bank loans to small businesses and contribute to improving firm performance. Since these firms have limited access to other financing options such as commercial papers, corporate bonds, or equities, the issue is critical for small business financing. The importance of better credit availability is further

pronounced in the face of the current financial crisis. Even though the credit crunch on firms is less severe in Japan than in the US and Europe, the introduction of a massive credit guarantee scheme might have helped ameliorate the financing conditions of small businesses.

Our empirical findings, in most cases, confirm that the ECG program is effective in improving firm's access to credit. However, we cannot find firm evidence that incremental funds supplied by the ECG program contribute to boosting investment or employment of the firm. Nor do we find evidence that the program improves the ex-post (after-one-year) profitability or creditworthiness of the ECG program users. On the contrary, we find a significantly negative impact of the ECG program on the firm's creditworthiness as represented by the decline in the TSR credit score. Although we cannot make solid inference from just one year observations, our results are consistent with the moral hazard effect of credit guarantees.

We also find evidence that determinants of the use of the ECG program and its economic impacts differ depending on the extent of firm-bank relationships. In particular, we find that a relationship lender (main bank) is more likely to extend ECG loans to observably riskier firms and to offset partially, if not completely, the increase in ECG loans by the decrease in non-ECG loans. We do not find such a loan "substitution" effect when the ECG loans are extended by non-main banks. In addition, our treatment effect estimations based on propensity score matching methodology find the deterioration of the TSR credit score only in the firm-main bank matched subsample. Taken together, these suggest that the main bank uses the ECG program in order to exploit its informational advantages over their borrowers and transfer credit risks of low quality firms to the guarantee program.

Emergency Credit Guarantees Program is scheduled to expire in March 2011, and the 100% coverage of the program will be reduced to the original level of 80%. We believe it is the right first step to restrain banks' misbehaviors. Additionally, our findings have some policy implications

on the institutional architecture of the credit guarantee program.

In the realm of literature on small business financing, a stable relationship between a firm and a bank is generally regarded to be beneficial in improving access to credit when a firm is in temporary distress. However, when combined with the credit guarantee program, close firm-bank relationships may have perverse effects as the credit guarantees may distort banks' incentives. That is, a bank that has proprietary information on firms may exploit its advantage and extend guaranteed loans to substitute for its non-guaranteed loan to risky firms.

In order to circumvent such misuse of the program by a relationship lender, several institutional changes may be worth considering. One measure to discipline financial institutions is to introduce a program that would differentiate lenders based on the ex-post performance of their guaranteed loans (for instance, ex-post default rate of guaranteed loans). Such scheme can be found, for instance, in the U.S. SBA's Certified and Preferred Lenders Program. Limiting eligible firms for the credit guarantees program to those that do not establish stable relationships with banks (e.g. newly established firms) would be an alternative way to prevent the abuse of the program. These firms are most likely to be benefited from the guarantee program since they are immune to the informational exploitation by a bank and suffer most from adverse shocks including the current financial crisis.

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Table 1: Definitions of variables

(a) Outcome variables

Loan availability	
ECG_LOAN_RATIO	= ECG loan provided by a bank / firm's assets
dB_LOAN_RATIO	= changes in loans outstanding by a bank / firm's assets
dB_TLOAN_RATIO	= changes in the firm's total loans outstanding by banks / firm's assets
dLOAN_RATIO	= changes in the firm's total loans outstanding / firm's assets, which consists of short term loans and bills discounted (*dSHORT_RATIO*) and long term loans (*dLONG_RATIO*)
Ex-post firm performance	
dCASHRATIO	= changes in cash and deposits / firm's assets
dTANGIBLERATIO	= changes in tangible assets / firm's assets
dROA	= changes in ROA (operating profits / firm's assets), which equals to *dSALESRATIO* (changes in gross sales ratio) minus *dCOSTRATIO* (changes in operating costs ratio)
dSCORE	= changes in TSR credit score (1-100 points)
dlnEMP	= changes in number of employees in logarithm
dRATE	= changes in interest payments / firm's total loans outstanding

(b) Determinant variables

Characteristics of credit guarantees	
ECG_DUM	1 if a firm obtains Emergency Credit Guarantees (ECG) loans from a bank, 0 otherwise
RCG_DUM	1 if a firm has obtained regular credit guarantees program loans from a bank, 0 otherwise
Firm characteristics	
LOAN_ENQUIRY	1 if a firm has asked a bank to extend the loan within a year, 0 otherwise
SHARPERATIO	Sharpe ratio: ROA / Std. deviation of ROA, where ROA=operating profits / total assets. Standard deviation of ROA is calculated for years available in the TSR database which dates back from 2007 to as old as 1982.
SCORE	TSR credit score (1-100 points, higher score indicates higher creditworthiness)
CAPRATIO_NG	1 if a firm's capital-asset ratio is negative (a firm has negative net worth), 0 otherwise
LOANRATIO	Firms' total loans outstanding / total assets
LN_SALES	Log of gross annual sales
LN_FIRMAGE	Log of firm age
IND1-IND9	Dummy variable by industry: 1: construction, 2: manufacturing, 3: communication and information, 4: transportation, 5: wholesale, 6: retail, 7: real estate, 8: services, 9: others
Bank characteristics	
B_REGIONAL	1 if a bank is either a regional bank, second regional bank, or Shinkin bank, 0 otherwise
BIS	Capital asset ratio based on Basel capital framework
BANKSHARE	Bank's share of branches within a prefecture of a borrowing firm
HHI	Herfindahl Index computed based on shares of bank branches within a prefecture of a borrowing firm
Characteristics of bank-firm relationships	
B_MAIN	1 if a bank is a main bank, 0 otherwise
B_CONTACT	Index variable indicating the frequency of meeting between a borrower firm and a bank: 1: everyday, 2: weekly, 3. several times in a week, 4: monthly, 5: once in 2-3 months, 6: semi-annually, 7: annually, 8: more than annually, 9: no direct meeting

Table 2: Summary statistics: ECG users and non-ECG users

This table presents summary statistics of the variables used in the probit estimations (Table 5). Definitions of the variables are provided in Table 1. In the columns labeled under "ECG_DUM=1", summary statistics for firm-bank matches in which firms use the ECG loans are reported. In the columns labeled under "ECG_DUM=0", summary statistics for firm-bank matches in which firms do not use the ECG loans are reported.

	All						ECG_DUM=1				ECG_DUM=0			
Entire sample	N	mean	sd	min	p50	max	N	mean	sd	p50	N	mean	sd	p50
Characteristics of credit guarantees														
ECG_DUM	2498	0.146	0.353	0	0	1	365	1.000	0.000	1	2133	0.000	0.000	0
RCG_DUM	2498	0.394	0.489	0	0	1	365	0.762	0.427	1	2133	0.331	0.471	0
Firm characteristics														
LOAN_ENQUIRY	2498	0.353	0.478	0	0	1	365	0.463	0.499	0	2133	0.334	0.472	0
SHARPERATIO	2498	0.077	1.030	-10.032	0.079	6.117	365	-0.170	0.922	-0.164	2133	0.119	1.041	0.127
SCORE	2498	55.251	6.521	27	54	87	365	51.397	4.445	51	2133	55.910	6.592	55
CAPRATIO_NG	2498	0.048	0.214	0	0	1	365	0.079	0.271	0	2133	0.043	0.202	0
LOANRATIO	2498	0.393	0.266	0.000	0.360	3.639	365	0.547	0.241	0.548	2133	0.366	0.261	0.326
lnSALES	2498	7.484	1.652	0.000	7.333	14.352	365	6.723	1.214	6.653	2133	7.615	1.682	7.474
lnFIRMAGE	2498	3.637	0.516	1.946	3.761	4.787	365	3.536	0.524	3.638	2133	3.655	0.512	3.784
IND1	2498	0.235	0.424	0	0	1	365	0.315	0.465	0	2133	0.221	0.415	0
IND2	2498	0.257	0.437	0	0	1	365	0.238	0.427	0	2133	0.260	0.439	0
IND3	2498	0.032	0.177	0	0	1	365	0.022	0.147	0	2133	0.034	0.182	0
IND4	2498	0.037	0.188	0	0	1	365	0.030	0.171	0	2133	0.038	0.191	0
IND5	2498	0.227	0.419	0	0	1	365	0.195	0.396	0	2133	0.233	0.423	0
IND6	2498	0.097	0.296	0	0	1	365	0.101	0.302	0	2133	0.096	0.295	0
IND7	2498	0.020	0.140	0	0	1	365	0.019	0.137	0	2133	0.020	0.141	0
IND8	2498	0.004	0.066	0	0	1	365	0.003	0.052	0	2133	0.005	0.068	0
IND9	2498	0.091	0.287	0	0	1	365	0.077	0.266	0	2133	0.093	0.291	0
Bank characteristics														
B_REGIONAL	2498	0.716	0.451	0	1	1	365	0.847	0.361	1	2133	0.693	0.461	1
B_REGIONAL*BIS	2498	7.801	5.913	-11.570	10.050	35.300	365	9.369	4.962	10.210	2133	7.533	6.021	9.910
BIS	2498	11.113	3.344	-11.570	11.410	35.300	365	11.070	2.974	10.750	2133	11.120	3.403	11.440
BANKSHARE	2498	0.136	0.114	0.000	0.111	0.462	365	0.160	0.120	0.132	2133	0.132	0.112	0.106
HHI	2498	0.107	0.066	0.037	0.100	0.292	365	0.113	0.068	0.100	2133	0.106	0.065	0.091
Characteristics of bank-firm relationship														
B_MAIN*ENQUIRY	2498	0.239	0.427	0	0	1	365	0.441	0.497	0	2133	0.204	0.403	0
B_MAIN	2498	0.601	0.490	0	1	1	365	0.871	0.335	1	2133	0.555	0.497	1
B_CONTACT	2498	3.805	1.327	1	4	9	365	3.564	1.236	4	2133	3.846	1.337	4

Table 3: Summary statistics: transactions with main-bank

This table presents summary statistics of the variables used in the probit estimations (Table 5) for firm-main bank matches. Definitions of the variables are provided in Table 1. In the columns labeled under "ECG_DUM=1", summary statistics for firm-bank matches in which firms use the ECG loans are reported. In the columns labeled under "ECG_DUM=0", summary statistics for firm-bank matches in which firms do not use the ECG loans are reported.

	All						ECG_DUM=1				ECG_DUM=0			
B_MAIN=1	N	mean	sd	min	p50	max	N	mean	sd	p50	N	mean	sd	p50
Characteristics of credit guarantees														
ECG_DUM	1502	0.212	0.409	0	0	1	318	1.000	0.000	1	1184	0.000	0.000	0
RCG_DUM	1502	0.426	0.495	0	0	1	318	0.783	0.413	1	1184	0.330	0.470	0
Firm characteristics														
LOAN_ENQUIRY	1502	0.397	0.490	0	0	1	318	0.506	0.501	1	1184	0.368	0.483	0
SCORE	1502	55.147	6.469	31	54	87	318	51.116	4.411	51	1184	56.230	6.507	55
CAPRATIO_NG	1502	0.051	0.221	0	0	1	318	0.088	0.284	0	1184	0.041	0.199	0
LOANRATIO	1502	0.394	0.271	0.000	0.360	3.639	318	0.555	0.242	0.557	1184	0.350	0.262	0.311
lnSALES	1502	7.435	1.642	0.000	7.304	14.352	318	6.676	1.212	6.615	1184	7.639	1.682	7.512
lnFIRMAGE	1502	3.642	0.517	1.946	3.761	4.787	318	3.542	0.515	3.638	1184	3.669	0.514	3.784
IND1	1502	0.242	0.428	0	0	1	318	0.333	0.472	0	1184	0.217	0.412	0
IND2	1502	0.256	0.436	0	0	1	318	0.239	0.427	0	1184	0.260	0.439	0
IND3	1502	0.031	0.172	0	0	1	318	0.009	0.097	0	1184	0.036	0.187	0
IND4	1502	0.037	0.190	0	0	1	318	0.031	0.175	0	1184	0.039	0.193	0
IND5	1502	0.228	0.419	0	0	1	318	0.198	0.399	0	1184	0.236	0.425	0
IND6	1502	0.098	0.297	0	0	1	318	0.094	0.293	0	1184	0.099	0.299	0
IND7	1502	0.019	0.138	0	0	1	318	0.019	0.136	0	1184	0.019	0.138	0
IND8	1502	0.004	0.063	0	0	1	318	0.003	0.056	0	1184	0.004	0.065	0
IND9	1502	0.086	0.280	0	0	1	318	0.072	0.259	0	1184	0.090	0.286	0
Bank characteristics														
B_REGIONAL	1502	0.744	0.436	0	1	1	318	0.874	0.332	1	1184	0.709	0.454	1
B_REGIONAL*BIS	1502	8.176	5.725	-11.570	10.100	35.170	318	9.664	4.777	10.340	1184	7.776	5.892	10.100
BIS	1502	11.151	3.181	-11.570	11.420	35.170	318	11.063	3.078	10.710	1184	11.174	3.208	11.440
BANKSHARE	1502	0.158	0.120	0.000	0.119	0.462	318	0.169	0.123	0.153	1184	0.155	0.120	0.118
HHI	1502	0.112	0.067	0.037	0.100	0.292	318	0.117	0.069	0.103	1184	0.110	0.066	0.100
Characteristics of bank-firm relationship														
B_MAIN*ENQUIRY	1502	0.397	0.490	0	0	1	318	0.506	0.501	1	1184	0.368	0.483	0
B_MAIN	1502	1.000	0.000	1	1	1	318	1.000	0.000	1	1184	1.000	0.000	1
B_CONTACT	1502	3.607	1.295	1	4	9	318	3.522	1.255	4	1184	3.630	1.305	4

Table 4: Summary statistics: transactions with non-main-bank

This table presents summary statistics of the variables used in the probit estimations (Table 5) for firm-non-main bank matches. Definitions of the variables are provided in Table 1. In the columns labeled under "ECG_DUM=1", summary statistics for firm-bank matches in which firms use the ECG loans are reported. In the columns labeled under "ECG_DUM=0", summary statistics for firm-bank matches in which firms do not use the ECG loans are reported.

	All						ECG_DUM=1				ECG_DUM=0			
B_MAIN=0	N	mean	sd	min	p50	max	N	mean	sd	p50	N	mean	sd	p50
Characteristics of credit guarantees														
ECG_DUM	996	0.047	0.212	0	0	1	47	1.000	0.000	1	949	0.000	0.000	0
RCG_DUM	996	0.345	0.476	0	0	1	47	0.617	0.491	1	949	0.332	0.471	0
Firm characteristics														
LOAN_ENQUIRY	996	0.286	0.452	0	0	1	47	0.170	0.380	0	949	0.292	0.455	0
SCORE	996	55.408	6.598	27	54	87	47	53.298	4.242	52	949	55.512	6.678	55
CAPRATIO_NG	996	0.043	0.203	0	0	1	47	0.021	0.146	0	949	0.044	0.206	0
LOANRATIO	996	0.392	0.258	0.000	0.360	2.026	47	0.489	0.224	0.495	949	0.387	0.258	0.352
lnSALES	996	7.559	1.666	0.000	7.374	13.875	47	7.041	1.195	6.835	949	7.585	1.682	7.413
lnFIRMAGE	996	3.630	0.515	1.946	3.761	4.787	47	3.495	0.590	3.664	949	3.637	0.510	3.761
IND1	996	0.224	0.417	0	0	1	47	0.191	0.398	0	949	0.226	0.418	0
IND2	996	0.258	0.438	0	0	1	47	0.234	0.428	0	949	0.259	0.438	0
IND3	996	0.035	0.184	0	0	1	47	0.106	0.312	0	949	0.032	0.175	0
IND4	996	0.036	0.187	0	0	1	47	0.021	0.146	0	949	0.037	0.189	0
IND5	996	0.227	0.419	0	0	1	47	0.170	0.380	0	949	0.230	0.421	0
IND6	996	0.095	0.294	0	0	1	47	0.149	0.360	0	949	0.093	0.290	0
IND7	996	0.021	0.144	0	0	1	47	0.021	0.146	0	949	0.021	0.144	0
IND8	996	0.005	0.071	0	0	1	47	0.000	0.000	0	949	0.005	0.072	0
IND9	996	0.098	0.298	0	0	1	47	0.106	0.312	0	949	0.098	0.297	0
Bank characteristics														
B_REGIONAL	996	0.673	0.469	0	1	1	47	0.660	0.479	1	949	0.673	0.469	1
B_REGIONAL*BIS	996	7.236	6.146	-11.570	9.510	35.300	47	7.368	5.734	9.480	949	7.229	6.169	9.510
BIS	996	11.055	3.576	-11.570	11.210	35.300	47	11.120	2.162	10.780	949	11.052	3.633	11.210
BANKSHARE	996	0.102	0.094	0.000	0.074	0.444	47	0.100	0.082	0.072	949	0.103	0.095	0.074
HHI	996	0.099	0.063	0.037	0.080	0.292	47	0.083	0.054	0.066	949	0.100	0.063	0.080
Characteristics of bank-firm relationship														
B_MAIN*ENQUIRY	996	0.000	0.000	0	0	0	47	0.000	0.000	0	949	0.000	0.000	0
B_MAIN	996	0.000	0.000	0	0	0	47	0.000	0.000	0	949	0.000	0.000	0
B_CONTACT	996	4.103	1.319	1	4	9	47	3.851	1.063	4	949	4.116	1.329	4

Table 5: Probit estimations on determinants of the use of ECG loans

This table presents the probit estimation results for the subsample of main banks (left column), the subsample of non-main banks (center), and all firm-bank matches (right). Definitions of the variables are provided in Table 1. ***, **, * indicate a significance level of 1, 5, and 10%, respectively.

Estimation method: Probit	B_MAIN=1			B_MAIN=0			Entire sample		
Dependent variable: ECG_DUM	Coef.	Std. Err	z	Coef.	Std. Err	z	Coef.	Std. Err	z
Characteristics of credit guarantees									
RCG_DUM	0.685 ***	0.094	7.310	0.379 **	0.165	2.300	0.621 ***	0.080	7.730
Firm characteristics									
LOAN_ENQUIRY	0.220 ***	0.086	2.560	-0.373 *	0.196	-1.900	-0.439 **	0.190	-2.300
SHARPERATIO	-0.025	0.046	-0.530	-0.090	0.084	-1.070	-0.039	0.040	-0.990
SCORE	-0.043 ***	0.010	-4.150	-0.014	0.018	-0.740	-0.035 ***	0.009	-3.920
CAPRATIO_NG	-0.595 ***	0.183	-3.240	-0.842 *	0.471	-1.790	-0.612 ***	0.163	-3.750
LOANRATIO	0.770 ***	0.181	4.260	0.724 **	0.370	1.960	0.769 ***	0.159	4.830
lnSALES	-0.093 ***	0.036	-2.540	-0.026	0.064	-0.400	-0.079 ***	0.031	-2.530
lnFIRMAGE	-0.054	0.089	-0.610	-0.139	0.158	-0.880	-0.074	0.076	-0.970
Bank characteristics									
B_REGIONAL	-2.582 **	1.253	-2.060	-4.099 ***	1.502	-2.730	-3.292 ***	0.964	-3.410
B_REGIONAL*BIS	0.240 **	0.110	2.170	0.352 ***	0.133	2.660	0.294 ***	0.085	3.460
BIS	-0.239 **	0.110	-2.180	-0.345 ***	0.130	-2.650	-0.292 ***	0.084	-3.470
BANKSHARE	0.743	0.499	1.490	0.491	0.997	0.490	0.833 **	0.431	1.930
HHI	-1.542 *	0.937	-1.650	-3.155 **	1.600	-1.970	-1.894 **	0.786	-2.410
Characteristics of bank-firm relationship									
B_MAIN*ENQUIRY							0.663 ***	0.205	3.230
B_MAIN							0.645 ***	0.103	6.270
B_CONTACT	-0.034	0.033	-1.040	-0.160 **	0.068	-2.360	-0.064 **	0.029	-2.200
constant	4.201 ***	1.443	2.910	3.891 **	1.948	2.000	3.899 ***	1.140	3.420
Industry_dummies	Yes			Yes			Yes		
Number of Observations	1502			991			2498		
LRchi2	338.6			51.43			501.73		
Prob > chi2	0			0			0		
Pseudo R2	0.22			0.14			0.24		
Log likelihood	-606.07			-163.44			-788.09		

Table 6: Treatment effect estimations on loans availability and ex-post performances of ECG loans users

These tables present treatment effect estimations results on loans availability and ex-post performances of ECG loans users. Definitions of the variables are provided in Table 1. ***, **, * indicate a significance level of 1, 5, and 10%, respectively.

(a) Entire sample

Entire sample							
Variables		Treated	Controls	Difference		S.E.	t
ECG_LOAN_RATIO	Unmatched	0.103	0.000	0.103	***	0.003	33.770
	ATT	0.103	0.000	0.103	***	0.008	13.610
dB_LOAN_RATIO	Unmatched	0.050	0.008	0.042	***	0.008	5.380
	ATT	0.050	0.000	0.050	***	0.010	4.850
dB_TLOAN_RATIO	Unmatched	0.042	0.009	0.033	***	0.011	3.120
	ATT	0.042	0.001	0.041	***	0.013	3.250
dLOAN_RATIO	Unmatched	0.026	0.003	0.022	***	0.007	3.240
	ATT	0.026	-0.010	0.036	***	0.009	3.920
dSHORT_RATIO	Unmatched	-0.013	-0.006	-0.007		0.005	-1.340
	ATT	-0.013	-0.015	0.002		0.007	0.230
dLONG_RATIO	Unmatched	0.039	0.009	0.029	***	0.005	5.760
	ATT	0.039	0.005	0.034	***	0.007	4.810
dCASHRATIO	Unmatched	0.014	0.007	0.006		0.005	1.340
	ATT	0.014	0.003	0.010		0.006	1.590
dTANGIBLERATIO	Unmatched	-0.006	0.000	-0.006		0.005	-1.240
	ATT	-0.006	-0.001	-0.005		0.006	-0.800
dROA	Unmatched	-0.020	-0.013	-0.008		0.006	-1.380
	ATT	-0.020	-0.005	-0.015		0.010	-1.530
dSALESRATIO	Unmatched	-0.141	-0.018	-0.123	***	0.030	-4.060
	ATT	-0.141	-0.012	-0.129	***	0.039	-3.270
dCOSTRATIO	Unmatched	-0.120	-0.005	-0.115	***	0.030	-3.850
	ATT	-0.120	-0.006	-0.114	***	0.040	-2.880
dSCORE	Unmatched	-1.132	-0.975	-0.157		0.166	-0.940
	ATT	-1.132	-0.499	-0.633	***	0.214	-2.950
dlnEMP	Unmatched	-0.027	-0.013	-0.013		0.018	-0.740
	ATT	-0.027	-0.018	-0.009		0.018	-0.520
dRATE	Unmatched	-0.003	-0.002	-0.001		0.004	-0.270
	ATT	-0.003	-0.001	-0.002		0.004	-0.620

(b) Main bank subsample

B_MAIN=1							
Variables		Treated	Controls	Difference		S.E.	t
ECG_LOAN_RATIO	Unmatched	0.107	0.000	0.107	***	0.004	26.600
	ATT	0.107	0.000	0.107	***	0.008	12.870
dB_LOAN_RATIO	Unmatched	0.049	0.007	0.042	***	0.009	4.620
	ATT	0.049	-0.002	0.050	***	0.012	4.360
dB_TLOAN_RATIO	Unmatched	0.044	0.008	0.036	***	0.012	3.120
	ATT	0.044	0.003	0.041	***	0.014	2.980
dLOAN_RATIO	Unmatched	0.024	0.004	0.020	***	0.008	2.660
	ATT	0.024	-0.010	0.034	***	0.010	3.390
dSHORT_RATIO	Unmatched	-0.015	-0.004	-0.011	*	0.006	-1.770
	ATT	-0.015	-0.014	-0.001		0.008	-0.080
dLONG_RATIO	Unmatched	0.039	0.008	0.031	***	0.006	5.540
	ATT	0.039	0.005	0.034	***	0.008	4.570
dCASHRATIO	Unmatched	0.015	0.007	0.008		0.005	1.420
	ATT	0.015	0.003	0.011	*	0.007	1.690
dTANGIBLERATIO	Unmatched	-0.004	-0.003	-0.001		0.006	-0.170
	ATT	-0.004	-0.002	-0.002		0.007	-0.260
dROA	Unmatched	-0.020	-0.011	-0.009		0.007	-1.390
	ATT	-0.020	-0.005	-0.015		0.011	-1.350
dSALESRATIO	Unmatched	-0.151	-0.014	-0.137	***	0.035	-3.900
	ATT	-0.151	-0.013	-0.138	***	0.044	-3.100
dCOSTRATIO	Unmatched	-0.131	-0.003	-0.128	***	0.035	-3.670
	ATT	-0.131	-0.008	-0.123	***	0.045	-2.740
dSCORE	Unmatched	-1.140	-0.930	-0.210		0.184	-1.140
	ATT	-1.140	-0.506	-0.634	***	0.234	-2.710
dlnEMP	Unmatched	-0.023	-0.007	-0.016		0.021	-0.760
	ATT	-0.023	-0.020	-0.003		0.021	-0.130
dRATE	Unmatched	-0.002	-0.004	0.002		0.005	0.370
	ATT	-0.002	-0.001	-0.001		0.004	-0.210

(c) Non-main bank subsample

B_MAIN=0 Variables		Treated	Controls	Difference		S.E.	t
ECG_LOAN_RATIO	Unmatched	0.072	0.000	0.072	***	0.003	24.250
	ATT	0.072	0.000	0.072	***	0.015	4.880
dB_LOAN_RATIO	Unmatched	0.057	0.007	0.050	***	0.018	2.730
	ATT	0.057	0.004	0.053	***	0.019	2.780
dB_TLOAN_RATIO	Unmatched	0.023	0.013	0.010		0.029	0.330
	ATT	0.023	0.009	0.014		0.022	0.640
dLOAN_RATIO	Unmatched	0.034	0.007	0.026		0.017	1.510
	ATT	0.034	0.001	0.033	*	0.019	1.700
dSHORT_RATIO	Unmatched	-0.001	-0.008	0.007		0.013	0.570
	ATT	-0.001	-0.018	0.017		0.014	1.180
dLONG_RATIO	Unmatched	0.035	0.016	0.019		0.013	1.420
	ATT	0.035	0.019	0.016		0.018	0.890
dCASHRATIO	Unmatched	0.007	0.008	-0.001		0.013	-0.070
	ATT	0.007	0.007	0.000		0.021	0.000
dTANGIBLERATIO	Unmatched	-0.021	0.001	-0.022	*	0.013	-1.800
	ATT	-0.021	-0.002	-0.019	*	0.010	-1.990
dROA	Unmatched	-0.021	-0.017	-0.005		0.018	-0.250
	ATT	-0.021	-0.023	0.001		0.014	0.100
dSALESRATIO	Unmatched	-0.074	-0.037	-0.037		0.074	-0.500
	ATT	-0.074	-0.051	-0.023		0.071	-0.320
dCOSTRATIO	Unmatched	-0.053	-0.021	-0.032		0.073	-0.440
	ATT	-0.053	-0.028	-0.024		0.068	-0.350
dSCORE	Unmatched	-1.069	-1.092	0.023		0.484	0.050
	ATT	-1.069	-0.944	-0.125		0.444	-0.280
dlnEMP	Unmatched	-0.051	-0.025	-0.026		0.042	-0.630
	ATT	-0.051	-0.024	-0.027		0.022	-1.250
dRATE	Unmatched	-0.011	-0.001	-0.010		0.007	-1.400
	ATT	-0.011	0.000	-0.011		0.007	-1.450

Table 7. OLS estimations on loans availability

These tables present OLS estimations results on loans availability. Definitions of the variables are provided in Table 1. ***, **, * indicate a significance level of 1, 5, and 10%, respectively.

(a) Main bank subsample

	dB_LOAN_RATIO		dB_TLOAN_RATIO		dLOAN_RATIO	
Estimation method: OLS	B_MAIN=1		B_MAIN=1		B_MAIN=1	
Dependent variable:	Coef.	t	Coef.	t	Coef.	t
Characteristics of credit guarantees						
ECG_LOAN_RATIO	0.444 ***	7.160	0.256 ***	3.230	0.170 ***	3.380
RP_DUM	0.002	0.250	0.000	0.030	0.002	0.280
Firm characteristics						
LOAN_ENQUIRY	0.023 ***	2.880	0.016	1.590	0.009	1.450
SHARPERATIO	-0.001	-0.170	-0.003	-0.490	-0.001	-0.310
SCORE	0.000	-0.370	0.001	0.840	-0.001 **	-2.000
CAPRATIO_NG	0.020	0.930	-0.020	-0.740	0.024	1.410
LOANRATIO	-0.058 ***	-3.260	-0.024	-1.040	-0.115 ***	-7.970
lnSALES	0.003	0.790	0.004	0.940	-0.002	-0.860
lnFIRMAGE	0.004	0.450	-0.018 *	-1.680	0.003	0.400
Bank characteristics						
B_REGIONAL	0.009	0.110	0.005	0.050	0.076	1.130
B_REGIONAL*BIS	0.001	0.190	0.002	0.260	-0.006	-1.110
BIS	-0.003	-0.360	-0.003	-0.290	0.006	1.140
BANKSHARE	0.037	0.810	-0.005	-0.090	0.013	0.360
HHI	-0.084	-1.020	-0.206 **	-1.960	-0.067	-1.000
Characteristics of bank-firm relationship						
B_MAIN*ENQUIRY	0.000	-0.160	0.003	0.880	-0.001	-0.320
constant	0.012	0.120	-0.032	-0.250	0.029	0.360
Industry_dummies	Yes		Yes		Yes	
Number of Observations	931		931		931	
F value	3.51		1.58		3.62	
Prob > F	0.00		0.04		0	
Adj R-squared	0.06		0.01		0.06	

(b) Non-main bank subsample

Estimation method: OLS	dB_LOAN_RATIO B_MAIN=0		dB_TLOAN_RATIO B_MAIN=0		dLOAN_RATIO B_MAIN=0	
Dependent variable:	Coef.	t	Coef.	t	Coef.	t
Characteristics of credit guarantees						
ECG_LOAN_RATIO	0.905 ***	4.730	0.026	0.090	0.895 ***	4.800
RP_DUM	-0.041 ***	-4.230	-0.020	-1.300	-0.013	-1.340
Firm characteristics						
LOAN_ENQUIRY	0.001	0.070	0.000	0.020	0.002	0.190
SHARPERATIO	0.002	0.480	0.001	0.110	-0.002	-0.500
SCORE	0.000	0.570	0.001	0.590	0.001	0.690
CAPRATIO_NG	-0.038	-1.590	-0.084 ***	-2.260	0.011	0.500
LOANRATIO	0.054 ***	2.630	0.036	1.120	-0.045 **	-2.260
lnSALES	-0.002	-0.650	0.000	0.010	-0.001	-0.470
lnFIRMAGE	-0.008	-0.930	-0.009	-0.630	-0.006	-0.690
Bank characteristics						
B_REGIONAL	-0.096	-1.210	0.046	0.370	0.017	0.220
B_REGIONAL*BIS	0.009	1.260	-0.003	-0.280	-0.002	-0.280
BIS	-0.008	-1.150	0.002	0.220	0.002	0.320
BANKSHARE	0.038	0.790	0.004	0.060	-0.050	-1.060
HHI	-0.118 *	-1.650	-0.132	-1.170	0.023	0.330
Characteristics of bank-firm relationship						
B_MAIN*ENQUIRY	-0.003	-0.860	-0.006	-1.250	-0.003	-0.880
constant	0.110	0.990	0.214	1.230	0.027	0.250
Industry_dummies	Yes		Yes		Yes	
Number of Observations	625		625		625	
F value	2.75		1.32		2.89	
Prob > F	0		0.14		0	
Adj R-squared	0.06		0.01		0.07	