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Determinants of the Rehabilitation of Defaulting Small Businesses: Are real or financial factors important? *

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Abstract

We investigate the differences in firm performance between non-defaulting firms and firms that have defaulted on their bank loan, and factors that determine these differences, using small business data. Many previous studies investigate the determinants of loan payment defaults by small businesses. However, few papers investigate small business activities and performance after they default. Using firm-level data from Japan, we show that bank borrowings, return on assets (ROA), and sales growth are all lower after such defaults. These negative effects last approximately 10 years after default if the firm survives, suggesting that the constraints associated with a default have negative effects on firm performance for extended periods. In addition, firms with weak financial statements before the default are unlikely to survive, but those that survive enjoy a high ROA. Next, asset growth, ROA, sales growth, younger management, and the existence of a successor have positive effects on firm survival after a default. These imply that real factors are important for firm survival after a default. Lastly, additional credit and reduction of interest payments have positive effects on sales growth after a default, but negative effects on ROA. This suggests that financial support from banks has a limited effect on the survival of defaulting small businesses.

Keywords: small business, bank loan, default of payment, firm survival, forbearance lending
JEL classification: G21; G32; G33

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1 Introduction

In this paper, we investigate firm activities and performance of small businesses after default of payments on bank loans. Information problems cause credit rationing (Stiglitz and Weiss, 1981), resulting in stronger financing constraints for small businesses than for large firms (Berger and Udell, 1998; Beck et al., 2005, 2006). As some papers (for example, Petersen and Rajan, 1994; Berger and Udell, 1995) argue, small businesses mitigate these issues through repeated transactions with banks, which is called relationship lending. Through these repeated transactions, borrowers acquire good reputations from good credit records. If they damage their reputation by default of payments of bank loans, they face severe credit constraints (as argued by Diamond, 1989, 1991). Therefore, default of payments has important effects on firm activities and performance of small businesses. However, with the exception of some papers (for example, Bonfim et al., 2012; Betz et al., 2016; Honda et al., 2023), empirical studies of default by small firms are rare.

We investigate the following issues. First, we investigate the effects of default on firm performance, focusing on small businesses after default of payment on bank loans. If small businesses damage their reputation by default of payment, the credit constraints become more severe than those firms that do not damage their reputation. As Diamond (1989, 1991) argue, firms build a good reputation through lending relationships with banks. If a firm defaults, its good reputation is not maintained, which leads to credit rationing. The credit constraints for default firms become severe, resulting in lower firm performance. We investigate this issue by comparing firm performance and activities between default and nondefault firms. In addition, we examine how long the negative effects of a damaged reputation last.

Second, although the constraints caused by firm default might harm firm performance, some firms survive and enhance their performance. We investigate the determinants of firm survival and performance after default. As we argued, after default, firms might face severe financial constraints even if they face investment opportunities with positive net

present value. We examine empirically the characteristics of surviving firms after default.

In this paper, we analyze firm survival and performance using pre-default and post-default attributes. To analyze the determinants of pre-default attributes on firm survival and performance, we examine the effects of financial statements in the pre-default year. We estimate whether firms with weak financial statements are likely to survive and recover after default. If financial statements are weak, the firms' reputation is already damaged before the default. For example, their leverage is very high and liquidity is too low if firms have weak financial statements. In contrast, if their financial statements are not weak, their reputation is damaged by the default, which might lead to low firm performance after the default.

To analyze the determinants of post-default attributes on firm survival and performance, we focus on the effects of real and financial factors on firm survival and performance. If real factors are important, asset restructuring or asset investment will significantly affect firm survival and performance. Increases in profitability and sales growth may also have positive effects. In addition, manager characteristics could be important. In this case, the existence of a younger manager and successor could have positive effects on survival and performance. Furthermore, industry performance could have positive effects on firm survival and performance.

We also focus on the effect of financial factors on firm survival and performance. Previous studies (for example Peek and Rosengren, 2005; Caballero et al., 2008) argue that banks offer forbearance or zombie lending for distressed firms. This is caused by the soft budget constraint problem of banks (as argued by Boot, 2000), suggesting that banks offer credit to small business borrowers, even if the borrowers have large losses and become risky. If forbearance lending has positive effects on firm survival and performance, the additional loans and reduction of interest payments improve survival and performance. In contrast, if lending to default firms provides relief to these firms but does not improve performance, the additional loans and reduction of interest payments have negative effects.

We investigate whether the real and financial factors are important for firm survival and performance after payments default.

Using a large dataset on small businesses in Japan, our estimation results are summarized as follows. First, comparing default and nondefault firms, bank borrowings after default are lower. Additionally, return on assets (ROA) and sales growth are also lower after default. The negative effects are observed up to 10 years after default, suggesting that the constraints associated with default have negative effects on firm performance for long periods. However, the negative effects on ROA are statistically insignificant five years after default, while those of sales growth are statistically significant in all years of the sample period. This suggests that default has large negative effects on sales growth. In contrast, negative effects on ROA and sales growth are observed if the number of employees is five or fewer in all years after the default during the sample period.

Second, firms are unlikely to survive after the default if they are financially distressed and have low liquidity, as reflected in weak financial statements. However, if they can survive after the default, their performance improves rapidly compared with firms without weak financial statements. This implies that loss of reputation is severe for firms without weak financial statements. In addition, the condition of financial statements before the default is an important determinant of firm performance after the default.

Third, asset growth, ROA, and sales growth after default all have positive effects on firm survival. These results imply that investment in assets, rather than asset restructuring, has positive effects on firm survival. Lower managers' age and the existence of a successor increase the probability of survival after default. These results imply that real factors are important for firm survival after default.

Fourth, additional credit increases the probability of survival of defaulting small businesses. However, the reduction of interest payments decreases (rather than increases) the probability of survival. This suggests that financial support from banks has a limited effect on the survival of defaulting small businesses. In addition, additional credit and

reduction of interest payments have positive effects on sales growth after default. However, these have negative effects on ROA. These results imply that financial support from banks has limited effects on firm performance after default. In contrast, asset growth has positive effects on sales growth and ROA. This suggests that increases in investment (and not asset restructuring) enhance firm performance after default. In sum, our estimation results imply that financial factors are relatively less important to the rehabilitation of small businesses after default.

Research on the post-default survival and performance of small businesses makes significant contributions to the literature. First, many papers estimate the effects of the predictability of the default probability of borrowers (for example Altman, 1968; Zmijewski, 1984; El Kalak and Hudson, 2016; Modina et al., 2023).[1] However, these papers focus on firm activities and performance before payment default, while few papers investigate these factors after default.

Second, many papers (for example, Hotchkiss, 1995; Inoue et al., 2010; Goto and Uchida, 2012; Srhoj et al., 2023) investigate the determinants of the recovery of distressed firms. For example, Hotchkiss (1995) investigate the post-default performance of public companies that emerged from Chapter 11 in the US. Although some papers, (for example, Bonfim et al., 2012; Betz et al., 2016; Honda et al., 2023), investigate the performance of default firms, including small businesses, few papers investigate the determinants of firm performance after default.

Third, many papers investigate the effects of financial constraints on firm activities and performance (for example Kaplan and Zingales, 1997; Whited and Wu, 2006). These papers focus on large firms, which are mainly listed firms. Unlike small businesses, these firms are not informationally opaque firms; therefore, the financial constraints are not as severe as those for small businesses. We focus on financial constraints for small businesses, which are informationally opaque firms. In addition, we use unique measurements of fi-

[1]See Ciampi et al. (2021) for a comprehensive survey of the default predictability of small businesses.

nancial constraints, i.e., variables relating to post-default performance. To our knowledge, no papers investigate financial constraints by examining the post-default period.

The remainder of this paper is organized as follows. We review the relevant literature in Section 2. Section 3 describes the dataset. We present results for firm activities and performance after default in Section 4. In Section 5, we introduce our empirical strategy to estimate the determinants of firm survival and performance after default, and discuss the results. Section 6 concludes the paper.

2 Literature Review

After the seminal study by Altman (1968), many papers, (for example, Zmijewski, 1984), investigate the determinants of firm default using a number of variables. Focusing on small businesses, Altman and Sabato (2007) develop a one-year default prediction model for SMEs and examine the difference between the results for large firms and SMEs using panel data on US firms. Cathcart et al. (2020) investigate the effects of firm leverage on default of large and small firms. They find that highly leveraged firms are more likely to default if firm size is small. El Kalak and Hudson (2016) estimate the failure probabilities of SMEs in the US using a discrete hazard model. They find that the determinants of the failure probabilities are different from those of large firms. Ciampi (2015) focuses on the effects of corporate governance characteristics on the prediction of default of small businesses. This study shows that in addition to the financial ratios, corporate governance characteristics have significant effects on default. Modina et al. (2023) estimate default prediction models using data of SMEs and banks. They show that credit data of the bank–firm relationship improves default prediction of SMEs. Ciampi et al. (2021) survey the literature on default predictability of SMEs and discuss the important issues for future research. Our paper investigates the determinants of exit following default. We find that leverage, liquidity, and firm performance are significant factors influencing the likelihood of exit. These determinants closely align with those identified in the literature on default

probability estimation.

In addition, other studies focus on several variables that affect firm default. Boissay and Gropp (2013) focus on payment default to suppliers and show that credit constrained firms are more likely to default if they face liquidity shocks. Schaefer (2019) shows that delinquency on relationship-based loans is higher than that on transaction-based loans. After delinquency, relationship banks are more likely to offer more loans and high loan spreads to extract rents. Galema (2020) investigates P2P lending to SMEs, showing that the ex post default rate is lower if the initial investment by investors acquainted with the borrower is high. Goedde-Menke and Ingermann (2024) show that the credit default rates of SMEs are lower if industry specialization of loan officers is higher by focusing on early loan-officer retirements as a quasi-natural experiment. McGuinness et al. (2018) show that the use of trade credit decreases the probabilities of credit constrained SMEs, using data of European Union countries. Duarte et al. (2018) investigate default predictability during the financial crisis, focusing on the effects of business collateral and personal guarantees of SMEs and bank and macroeconomic conditions.

Some papers investigate the performance of financially distressed firms using data of listed firms. For example, Hotchkiss (1995) investigates the post-performance of public companies that emerged from Chapter 11 in the US. They show that after bankruptcy, more than 40 percent of firms suffered operating losses. Inoue et al. (2010) obtain similar results to those of Hotchkiss (1995). They show that unprofitable firms are more likely to survive, using data of Japanese stock listed firms that experienced out-of-court restructuring. Goto and Uchida (2012) show that distressed listed firms are more likely to successfully restructure debt out-of-court if bank debt is unsecured. Srhoj et al. (2023) show that delayed debt restructuring leads to lower firm performance, proxied by survival rate, employment, and profit. Focusing on large firms, Acharya et al. (2007) show that the recovery of default firms is dependent on the performance of the firm's industry. However, the post-default performance of distressed firms using small business data is inadequate.

While many papers focus on the determinants of default, some studies investigate small businesses after default. For example, Bonfim et al. (2012) use a unique dataset from Portugal that includes small businesses, showing that after resolving default, many firms continue to have access to credit. Franks and Sussman (2005) investigate the effects of debt structure on restructuring or liquidating of default firms using a unique dataset of small businesses in the UK. Betz et al. (2016) use unique data of small businesses in Germany, the UK, and the US, showing that country-specific drivers have significant effects on the time to resolution of defaulted loans. Some papers investigate the empirical relationships between debt workouts and firm activities. Honda et al. (2023) investigate the determinants and post-performance of out-of-court debt workouts of SMEs in Japan. They show that debt restructuring has positive effects on sales growth and profitability of distressed SMEs. Our paper also investigates small business defaults. We show that reductions in debt enhances profitability, which is similar to the results of Srhoj et al. (2023) and Honda et al. (2023).

3 Data

We use firm-level data on small businesses from the Credit Risk Database for Small and Medium Enterprises (CRD) established by credit guarantee corporations and financial institutions under the guidance of the Small and Medium Enterprise Agency in Japan.[2] The data collection process targets firms defined as SMEs under the Small and Medium Enterprise Basic Law.[3]

The CRD uses data on the small business clients of financial institutions with regular member status; members have a duty to provide all of their small business client data in return for the CRD's credit risk scoring service, statistical information, and other benefits.

[2]The data are managed by the CRD Association. See https://www.crd-office.net/CRD/en/index.html (last date accessed: February 2024) for information about the CRD.

[3]According to the *White Paper on Small and Medium Enterprises in Japan*, "[U]nder the Small and Medium Enterprise Basic Law, the term SMEs generally refers to enterprises with capital stock under 300 million yen and/or 300 or fewer regular employees, and sole proprietorships with 300 or fewer employees."

If a financial institution ceases transactions with a client firm, subsequent client data are not collected. The data in this study cover the period 2000–2021 (inclusive).

The data include information from clients' yearly financial statements (firm balance sheets and profit and loss statements) and firm default. Default is a variable that has a value of one if firms delay a payment by more than three months, are bankrupt or virtually bankrupt borrowers, and/or are borrowers for which credit guarantee corporations have subrogated. The year and month in which a firm's default occurred is recorded in the CRD. If a firm experienced default during the sample period, we identify the firm as a default firm, otherwise a nondefault firm. Financial statements of several firms before and after the default are available in our database. To investigate after the firm default, observations of default firms are limited to those whose financial statement data are available after the default. In addition, we limit observations to firms whose financial statements are available every year until data are truncated after the firm default.

Table 1 shows the number of observations for each year. Year $\tau = 0$ indicates the year before the default and $\tau = 1$ and greater indicates the years after the default. Therefore, default occurs between $\tau = 0$ and $\tau = 1$. $\tau = n$ means that default occurred between past n-1 and n years.

The number of observations is 129,783 before default in $\tau = 0$, but decreases to 33,799 in year $\tau = 1$. This implies that many default firms exit within one year from default. The number of observations is 5,150 in year $\tau = 10$, which suggests that some firms survive after default.

The number of observations of nondefault firms is 12,632,375, which includes only those firms that have existed for at least three consecutive years. In terms of employee numbers, there are two employees in firms within the first quartile, six at the median, and 15 in the third quartile. The distribution of employees suggests that the CRD data include many micro firms, which are typically more informationally opaque than larger firms. The number of employees at the 99th percentile of firms is 205, which indicates

that our sample includes some larger small businesses.

4 Firm Activity and Performance after Default

4.1 Hypothesis

In this subsection, we investigate the difference of firm activities and performance between post-default and nondefault firms. As we described, the credit constraints are more severe for default firms because they damage their reputation acquired by repeated transactions, which leads to a severe credit constraint. Therefore, we predict that firm activities of default firms are fewer than those of nondefault firms. Similarly, firm performance of default firms is lower than that of nondefault firms. In addition, we investigate to what extent the constraints for default firms are severe. Even if firms do not default, creditors can acquire information about creditworthiness from financial statements and soft information. If the credit risk of firms is high, they damage their reputation among creditors even if they do not default. Therefore, the differences between default and nondefault firms with similar default risk can be insignificant. We also investigate how many years it will take for the differences between default and nondefault firms to be insignificant.

4.2 Descriptive Statistics

To investigate our hypotheses, we examine the quartiles of certain variables after default. To compare between default and nondefault firms, we show the industry-adjusted values, which are calculated by subtracting the median value in the large category in the industrial classification in the same year.

Columns (1) and (2) of Table 2 present the descriptive statistics for firm performance, proxied by ROA and sales growth.[4] Column (1) of Table 2 shows that the median value

[4]Adjusted ROA is defined as the ratio of a firm's operating incomes and total assets, calculated by subtracting the median value in the medium category in the industrial classification. Adjusted sales growth is defined as ln(a firm's sales in year t) minus ln(a firm's sales in year t-1), calculated by subtracting

of ROA is positive in year τ+4, suggesting that profitability of firms recovers to the industry median level four years after default. All quartiles of ROA tend to increase over time. This is caused by the recovery of surviving firms and the exit of unprofitable firms. Column (2) of Table 2 shows that the median and mean values of sales growth are negative for all years after default. This suggests that firm sales do not recover to the industry average after default. This might be caused by the cost side of default, which is the loss of reputation.

Column (3) of Table 2 presents the descriptive statistics for employment, proxied by adjusted employment growth. [5] The median and the 75th quantile are all zero. However, the mean values of adjusted employment growth are negative. Additionally, the magnitude is largest at $\tau = 1$ and second largest at $\tau = 2$. These suggest that on average, firms decrease the number of employed after the default and the negative impact is large immediately after the default.

Columns (4), (5), and (6) of Table 2 show the descriptive statistics for debt structure, proxied by adjusted total borrowings growth, adjusted trade payable growth, and adjusted interest payments.[6] Column (4) shows that the median values of adjusted total borrowings growth are negative in all years after default. This suggests that on average, banks decrease credit to default firms, rather than offer additional credit. However, the mean and 75th percentile of total borrowings growth are positive, suggesting that banks offer additional credit to some default firms.

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the median value in the medium category in the industrial classification.

[5] Adjusted employment growth is defined as ln(1+a firm's number of employed in year t) minus ln(1+a firm's number of employed in year t-1), calculated by subtracting the median value in the medium category in the industrial classification.

[6] Adjusted total borrowings growth is defined as ln(1+a firm's total borrowings in year t) minus ln(1+a firm's total borrowings in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. Adjusted trade payables growth is defined as ln(1+a firm's trade payables in year t) minus ln(1+a firm's trade payables in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. Interest payments represent the ratio of a firm's interest expenses to the sum of its short-term borrowings, long-term borrowings, and discounted bills receivables in year t-1, calculated by subtracting the median value in the medium category in the industrial classification. Adjusted total borrowings growth is defined as ln(1+a firm's trade payables in year t) minus ln(1+a firm's trade payables in year t-1), calculated by subtracting the median value in the medium category in the industrial classification.

Caballero et al. (2008) show that reductions in interest payments and debt forgiveness are the main methods of financial assistance for the troubled large firms. In addition, Uesugi et al. (2015) show that 16.3% of troubled small firms are offered reductions in interest payments. We were unable to obtain direct measures of reductions in interest payments. Therefore, we use an adjusted interest payments measure, calculated from a firm's payment and loss statement as a proxy for reductions in interest payments. Column (5) shows that the mean and median values of adjusted interest payments are positive for all years after default. These results imply that banks do not offer reductions in interest payments to default firms. The 25th quantile is negative for all years after default, suggesting that banks offer reductions in interest payments for some default firms. However, the values range between –0.25 to –0.38%, suggesting that the sizes of the reductions are not large.

Column (6) shows that the mean values of adjusted trade payables growth are negative for all years after default. Additionally, median values are zero for all years. These results suggest that on average, trade creditors do not offer additional credit. Similar to the trend in total borrowings growth, the 75th percentiles are positive, suggesting that some trade creditors offer additional credit to default firms.

Column (7) of Table 2 shows that the mean and median values of adjusted total assets growth are negative for all years after default. This suggests that default firms reduce their assets and achieve asset restructuring. In addition, they cannot achieve additional investment because of severe credit constraints. [7]

[7]Adjusted total assets growth is defined as ln(a firm's total assets in year t) minus ln(a firm's total assets in year t-1), calculated by subtracting the median value in the medium category in the industrial classification.

4.3 Propensity Score Matching

4.3.1 Estimation strategy

The descriptive statistics show the difference in each variable between default and nondefault firms for the same industries and years. However, we do not compare similar firms in terms of financial statements. In this subsection, we compare default and nondefault firms that have similar financial statements using the propensity score matching method.

The treatment (control) group is a subsample of default (nondefault) firms between years t to t+1. The propensity score is the estimated probability of default$_{i,t+1}$. To calculate this score $Pr(\mathbf{Z}_{i,t})$, we estimate the probability of default using the probit model:

$$Pr(default_{i,t+1} = 1 \mid \mathbf{Z}_{i,t}) = \Phi(\mathbf{Z}_{i,t}\rho), \tag{1}$$

where $\mathbf{Z}_{i,t}$ = (size, age, ROA, sales growth, leverage, interest payments, cash holdings, industry dummies, and regional dummies) in year t. Φ is the cumulative distribution function of the standard normal distribution. To control the year fixed effects, equation (1) is estimated by year. We limit the estimation to only those firms that have existed for at least three consecutive years. The numbers of observations of nondefault firms and default firms are 12,632,375 and 115,157, respectively.

Size is the natural logarithm of total assets in year t. Age is the natural logarithm of firm age in year t. Firm age is grouped into five-year categories. For example, firms aged between one and five years are categorized as having a firm age of five years, and those aged between six and 10 years are categorized as 10 years. ROA is defined as the ratio of a firm's operating income to total assets in year t. Sales growth is defined as the annual change in firm sales [ln(1+sales in year t) – ln(1+sales in year t–1)]. Leverage is defined as the book value of debt divided by the book value of assets in year t. Cash holding values are normalized by total assets in year t. Interest payment is defined as the ratio of a firm's interest expenses to the sum of its short- and long-term debt and discounted

notes receivable in year t. In the estimation of propensity matching, we do not use the adjusted value of each variable.

The estimated propensity score $[\hat{Pr}(default_{i,t+1} = 1 \mid \mathbf{Z}_{i,t})]$ for each observation is calculated from the estimated coefficients of equation (1). Based on the scores, the observations of the treatment and control groups are matched using five nearest-neighbor matching. We match treatment to control firms in the same account year to control year fixed effects. Furthermore, we match using $[\hat{Pr}(default_{i,t+1} = 1 \mid \mathbf{Z}_{i,t})]$ before default (at year $\tau = 0$). We can compare firms that are similar in terms of size, age, leverage, interest payments, sales growth, and cash holdings by matching the observations of the treatment and control groups.

4.3.2 Estimation results

Column (1) of Table 4 shows the average value of ROA at one to 10 years after default ($\tau = 1$ to $\tau = 10$). The difference between treatment and control firms is –4.77% at $\tau = 1$, which is economically large. The differences are negative and statistically significant until $\tau = 5$, suggesting that ROA for default firms is lower after controlling the effects of several variables. The differences after $\tau = 6$ are also negative, but not statistically significant. This implies that although average ROA is still negative, ROA of default firms recovers to a similar level to that of nondefault firms after $\tau = 6$.

Column (2) of Table 4 shows the estimation results for sales growth. The difference between treatment and control firms is 14.44% at $\tau = 1$, which is large. All differences are negative and statistically significant after $\tau = 1$, after controlling the effects of some variables. This suggests that the sales growth of default firms does not recover to the level of nondefault firms. However, the differences narrow as τ increases in value.

Column (3) of Table 4 shows the estimation results for employment growth. The difference between treatment and control firms is –8.47% at $\tau = 1$, which is economically significant. The differences are negative and statistically significant for all τ apart from

$\tau = 9$. These results imply that default firms decrease the number of employed even 10 years after the default.

Column (4) of Table 4 shows the estimation results for total borrowings growth. The difference between treatment and control firms is –4,76% at $\tau = 1$, which is the largest between $\tau = 1$ to 10. The differences are all negative and statistically significant apart from $\tau = 5, 7, and 9$. These results suggest that default firms decrease the amount of borrowings, while banks decrease credit supply for the firms after default.

Column (5) of Table 4 shows the estimation results for interest payments. The differences are negative for $\tau = 1$ to 3 and statistically significant at $\tau = 1$ and 2. These results suggest that firms cannot pay interest because of low cash flow after the default. On the contrary, the differences are positive and statistically significant at the 1% level after $\tau = 5$. This suggests that firms are offered higher interest rates after the default.

Column (6) of Table 4 shows the estimation results for trade payables growth. The differences are negative apart from $\tau = 9$, and statistically significant at $\tau = 1 - 4$ and 6. Trade creditors also decrease credit for firms after the default.

Last, column (7) of Table 4 shows the estimation results for total asset growth. The differences are all negative and statistically significant at the 1% level. The difference is the largest at $\tau = 1$ and second largest at $\tau = 2$. The negative effects are smaller when τ is larger. These results suggest that the negative effects on total assets are smaller when time passes from the default.

In sum, the differences in ROA and sales growth between default and nondefault firms are not eliminated. In addition, bank borrowings and trade payables are decreased, while firms pay more interest after the default. They decrease the number of employees and their total assets. These results imply that firms face several constraints and are forced to be less active after default. These negative effects are long lasting, even up to 10 years after the default. However, the differences in ROA are not significant after $\tau = 6$. Therefore, as time passes since default, the impact on ROA becomes less severe.

4.3.3 Heterogeneous treatment effects

In this subsection, we show the heterogeneous treatment effects between default and nondefault firms by several variables, which are firm size, default year, and predicted probability of default before the default.

Firm size Table 5 shows the heterogeneous effects by firm size, proxied by the number of employees in year $\tau = -1$. The outcome variables are the same as those in Table 4. In column(1), we show the averages of difference between treatment (default) and control (nondefault) firms for each subsample, which are firms with 5 or less employees, those with 6–20 employees, those with 21–100 employees, and those with 100 employees or more. We also show the results for the F-test that tests that all average values are equal.

Column (1) shows the differences in ROA between default and nondefault firms by firm size. For $\tau = 1$ to $\tau = 3$, the differences in ROA are negative in all firm size groups. However, after $\tau = 5$, the differences are positive if the number of employees is six or more. In contrast, the differences are all negative if the number of employees is five or fewer. F-tests show that the differences between firm size are statistically significant apart from $\tau = 2$. These suggest that the negative effects on ROA are severe if firm size is very small. However, the constraints associated with the default are less severe if the firm size is large.

Column (2) shows the differences in sales growth between default and nondefault firms by firm size. The differences in sales growth are negative except for firms with 101 or more employees in $\tau = 10$. F-tests show that the differences between firm size are statistically significant before $\tau = 3$. This suggests that sales growth is lower for larger firms until $\tau = 3$, but these differences are statistically insignificant after $\tau = 4$. This suggests that the constraints associated with the default are severe for sales growth in all firm size groups, especially after $\tau = 4$.

Column (3) shows the differences in employment growth. In the groups with employees

over 6, the employment growth is negative, and the negative magnitude is large. F-tests show that the differences between groups are statistically significant before $\tau = 5$. These suggest that larger firms reduce the number of employed after the default for restructuring, while small firms do not. Small firms typically operate with a limited workforce, which may constrain their ability to adjust employment levels through restructuring.

Column (4) shows the difference in total borrowings growth. Before $\tau = 3$, firms in all groups decrease their total borrowings more, compared with nondefault firms. F-tests for the differences are statistically significant, suggesting that the negative magnitude is larger for large firms before $\tau = 3$. After $\tau = 4$, firms across all groups exhibit a tendency to reduce their total borrowings. Column (5) shows the results for the interest rate. F-tests for the differences across the groups are statistically significant in all years. This is caused by the largest and smallest groups paying lower interest compared with the middle-sized firms.

Column (6) shows the results for trade payables growth. The negative trends in trade payables growth are observed before $\tau = 3$ or $\tau = 4$. However, the observed differences are, for the most part, not statistically significant. Column (7) shows the results for total assets growth. The trends of total asset growth are similar to those for total borrowings growth. The firms in all groups decrease their assets more after the default, compared with default firms. The differences across firm size are statistically significant before $\tau = 3$. The negative effect is more pronounced for larger firms, suggesting that such firms engage in more substantial asset restructuring following default.

In sum, the differences across firm size are observed in ROA after the default. In addition, the differences in sales, employment, total borrowings, and total assets growth are observed immediately after default. Larger firms tend to reduce employment, borrowings, and total assets, indicative of active restructuring efforts, which may, in turn, contribute to improvements in ROA.

Default year Table 6 shows the differences in each variable, separating firms by the year in which the default occurred. We separate the default year into three periods—before 2006, 2007–2010 and 2011–2014. These periods are interpreted as the pre-global financial crisis (GFC), during the GFC, and the post-GFC phases. We do not use data after 2015 because the data are truncated when τ is long. The outcome variables in each column are the same as those in Table 4. In all columns, apart from column (6), F-tests show that the differences in each variable are statistically significant. These results suggest that during the GFC, ROA, sales growth, employment growth, total borrowings growth, and total asset growth are lower compared with pre- and post-GFC periods. Similar trends are partially observed prior to $\tau = 3$; however, the differences among the three periods become less apparent after $\tau = 4$.

Probability of default We investigate the difference in each variable divided by the predicted probability of default before the default occurs. To estimate the probability of default for firm i, we estimate equation (1) using observations of all firms before default. Using the estimation results, we calculate the predicted probability of default $Pr(\hat{default}_{i,t+1} = 1 \mid \mathbf{Z}_{i,t})$ in year τ=0, which is named PD. If PD is high, the firms that were likely to default actually defaulted in reality. In contrast, for firms with low PD, the default was predicted rarely. In this case, the default might be caused mainly by unpredictable shocks, not the firm's financial or business risk.

We calculated the PD for all firms and divided the sample into thirds, based on PD. To reveal the characteristics of firms in each group of PD, Table 7 shows the mean and median values of the continuous variables in $\mathbf{Z}_{i,t}$. Firm size and age are higher in the middle PD group, compared with the low and high groups. ROA and sales growth are negatively correlated with PD, which suggests that ROA and sales growth of firms with high PD are low. Median values or ROA for firms with low PD is positive. The difference in ROA between default firms with low PD and all firms is small. Additionally, the mean and median of sales growth of firms with low PD is positive, although those for all firms

are negative. These results suggest that the default signals are not observed from trends in sales and profitability.

Leverage and interest payments are positively correlated with the level of PD. Firms in the high PD group are highly leveraged and pay higher interest rates. These firms are considered to be in a state of financial distress. Furthermore, cash holdings, a proxy for liquidity, is low for firms with high PD. In contrast, cash holdings are high and similar to that of all firms when PD is low. In sum, firms with high estimated PD are more likely to default due to observable indicators of financial distress. By contrast, firms with low PD generally do not exhibit substantial weaknesses in their financial statements, suggesting that their defaults may be attributed to unobserved or latent factors not captured by conventional financial metrics.

Table 8 shows the differences in each variable divided by the predicted PD before the default occurs. Column (1) shows the difference in ROA divided by PD. The differences in ROA are lower if PD is lower. Additionally, the differences in ROA are all negative for firms with high PD. In contrast, the differences in ROA are positive after $\tau = 3$ for firms with high PD. The differences are statistically significant after $\tau = 2$, suggesting that firms with low PD earn lower profit after the default. The recovery of profitability is fast if they have high PD before the default.

Column (2) shows that sales growth is negative in all PD groups. F-tests show that the differences between groups are statistically significant before $\tau = 6$. Contrary to the trends in ROA, sales growth is lower for firms with high and middle PD before $\tau = 6$. Column (3) shows the differences in employment growth, divided by PD. The differences in employment growth are lower if PD is higher before $\tau = 5$. The differences between PD groups are statistically significant before $\tau = 3$. This suggests that firms with high PD reduce the number of employees more.

Column (4) shows the differences in total borrowings growth. Firms with middle and high PD reduce their total borrowings by more, compared with firms with low PD. The

differences are statistically significant before $\tau = 6$. These results suggest that because firms with higher PD suffered financial distress before the default, they reduced their total borrowings after the default. Column (5) shows the differences between interest rates by PD. Firms with high and middle PD pay lower interest rates compared with firms with low PD. The differences are statistically significant before $\tau = 5$ and $\tau = 7$. This suggests that these firms are offered reductions in interest payments from their banks.

Column (6) shows the differences in trade payables. Although the differences are statistically significant at $\tau = 1$, no clear differences are observed in the subsequent years. Column (7) shows the differences in total assets growth. The trends in total assets growth are similar to those in sales growth. Firms with high PD reduce total assets more. The differences between each group are statistically significant before $\tau = 3$ and $\tau = 5$. These results suggest that firms with high PD engage in more substantial asset restructuring following default.

In sum, we show that firms with high PD reduce their sales, employment, total borrowings and total assets by more, compared with those with low PD. Additionally, the recovery in ROA is rapidly achieved compared with firms with low PD. As we mentioned, firms with high PD suffered financial distress, which suggests that their financial statements have severe issues. Therefore, these firms undertake more extensive restructuring efforts, leading to a more rapid improvement in profitability. Moreover, in response to financial distress, firms may engage in employment downsizing or the divestiture of unprofitable business lines to restore financial stability. In contrast, firms with low PD do not exhibit clear signs of financial distress prior to default. As the underlying issues impeding recovery are not readily identifiable for these firms, improvements in profitability may occur more gradually.

5 Determinants of Firm Survival and Performance after Default

5.1 Hypothesis

In this section, we investigate which real or financial factors determine the survival of default firms. If real factors are significant for the survival of default firms, firm fundamentals (proxied by profitability and sales growth) have positive effects on firm survival. In addition, we focus on the characteristics of the manager of a firm, which are the manager's age and the existence of a successor. If a firm's manager is relatively old and the firm does not have a successor, there is a lack of motivation to continue running the firm. Therefore, a manager's age has negative effects on firm survival. Furthermore, the existence of a successor has positive effects on firm survival.

We now consider the financial factors, proxied by leverage, bank borrowings, borrowing cost, and trade credit. If capital structure, proxied by leverage, is a significant factor for firm survival, leverage has some effect on survival. As previous studies, (for example, Opler and Titman, 1994), argued, highly leveraged firms face severe financial constraints, which can cause poor firm performance. If this is true, leverage has negative effects on firm survival. However, previous studies, (for example, Jensen, 1986), argue that debt financing disciplines firms by preventing risky and unprofitable projects. In this case, leverage has positive effects on firm survival.

We also examine the behavior of banks and trade creditors as financial factors. Peek and Rosengren (2005) argue that troubled firms are more likely to receive additional bank credit, which is called forbearance lending. If forbearance lending is effective, increases in bank borrowings have positive impacts on firm survival. Furthermore, banks relieve default firms by reducing interest payments. The lower interest payments increase the firm survival rate if relief by banks is effective. Additionally, as Wilner (2000) and Cunat (2007) argue, trade creditors can be liquidity providers for distressed firms. If liquidity

provision of trade creditors is effective for firm survival, increases in trade payables have positive effects on firm survival.

5.2 Empirical Strategy

5.2.1 Firm survival

In this section, we investigate which default firms are more likely to survive using the following regression:

$$Pr(S_{i,t+1,\tau+1} = 1) \quad = \quad \Phi(\alpha_1 X_{i,t,\tau} + \alpha_2 \tau_{i,t} + \epsilon_i + \zeta_i + \eta_t)$$

where the probabilities of survival are the dependent variables for firm i in years t+1 and τ+1; $\mathbf{X}_{i,t,\tau}$ is a vector of variables (firm size, adjusted asset growth, firm age, adjusted ROA, adjusted sales growth, adjusted leverage, adjusted Δtotal borrowings, adjusted Δtrade payables, adjusted interest payments, adjusted cash holdings in year t, default year dummies, and predicted probability of default in τ=0); $S_{i,t+1,\tau+1}$ is a dummy variable that takes a value of one if we observe the data in years t+1 and τ+1, and zero otherwise; ϵ_i is industry fixed effects; ζ_i is region fixed effects; and eta_t is year fixed effects for year t. Φ is the cumulative distribution function of the standard normal distribution. τ is the number of years after default. Default year dummy$_i^t$ equals one if a firm i defaults in year t. To estimate equation (2), we use only the data of default firms.

Firm size and firm age are the natural logarithms of total assets and firm age, respectively. Assets growth is defined as the annual change in total assets [ln(total assets in years t and τ) – ln(total assets in years t–1 and τ–1)]. ROA is defined as the ratio of a firm's operating income to total assets in year t and τ. Sales growth is defined as the annual change in firm sales [ln(1+sales in years t and τ) – ln(1+sales in years t–1 and τ–1)]. Leverage is defined as the book value of debt divided by the book value of assets in years t and τ. Δtotal borrowings is defined as the annual change in total borrowings

[ln(1+total borrowings in years t and τ) – ln(1+total borrowings in years t–1 and τ–1)]. Δtrade payables is defined as the annual change in trade payables [ln(1+trade payables in years t and τ) – ln(1+trade payables in years t–1 and τ–1)]. Interest payment is defined as the ratio of a firm's interest expenses to the sum of its short- and long-term debt and discounted notes receivable in years t and τ. Cash holdings are defined as the ratio of cash holdings to total assets in years t and τ. Adjusted values are calculated by subtracting the median value in the large category in the industrial classification in the same year. Predicted probability of default in τ=0 (PD) is calculated as explained in Subsection 4.3.3.

In addition to equation (2), we estimate another equation including $X_{i,t,\tau}$, industry ROA, industry sales growth, zombie firm dummy, existence of successor, and current manager's age as independent variables. $Successor_{i,t,\tau}$ is a dummy variable equal to one if the successor has been identified. We estimate the effects of current manager age by including three types of dummies: a 60–69 age dummy that equals one if the current manager's age is between 60 and 69 years, a 70–79 age dummy that equals one if the current manager's age is between 70 and 79 years, and an 80-and-over age dummy that equals one if the current manager's age is 80 years or more. Data of successor and manager's age for some observations are missing.

5.2.2 Principal component analysis

In the previous section, we used profitability and sales growth as proxies for real factors, and leverage, bank borrowings, and borrowing costs as proxies for financial factors. However, it is difficult to accurately distinguish between real and financial factors using these proxies, as high-performing firms may also increase bank borrowings to finance profitable investments, resulting in both high profitability and high bank borrowings. To more precisely identify real and financial factors, we apply principal component analysis (PCA). We construct synthetic indicators of financial and real factors using adjusted asset growth,

adjusted ROA, adjusted sales growth, adjusted leverage, adjusted Δtotal borrowings, and adjusted interest payments in year t.

Table 9 shows the PCA estimation results. The first component (Comp1) is positively associated with ROA, sales growth, asset growth, Δtotal borrowings, and interest payments, and negatively associated with leverage. This component takes on high values when firms perform well and increase their bank borrowings. Therefore, Comp1 can be interpreted as reflecting both real and financial factors. The second component (Comp2) is positively associated with asset growth, Δ total borrowings, and leverage, and negatively associated with ROA, sales growth, and interest payments. When this component is high, firms increase bank borrowings, while incurring low interest payments, but their performance remains weak. The elevated leverage suggests that these firms are still experiencing financial distress. They continue to increase bank borrowings despite stagnant firm performance. Therefore, Comp2 can be interpreted as reflecting financial factors, specifically forbearance or zombie lending.

The third component (Comp3) is positively associated with ROA, sales growth, and leverage, and negatively associated with asset growth, Δtotal borrowings, and interest payments. When this component is high, firms are profitable and experience sales growth. Although these firms are highly leveraged, they reduce their bank borrowings and asset holdings, which may indicate that they are engaging in debt and asset restructuring. In sum, Comp3 can be interpreted as reflecting real factors, as firms improve their performance without increasing bank borrowings.

Using the PCA estimation results, we also estimate the following equation.

$$Pr(S_{i,t+1,\tau+1} = 1) \quad = \quad \Phi(\alpha_1 W_{i,t,\tau} + \alpha_2 \tau_{i,t} + \epsilon_i + \zeta_i + \eta_t)$$

where the probabilities of survival are the dependent variables for firm i in years t+1 and τ+1; $\mathbf{W}_{i,t,\tau}$ is a vector of variables (Comp1, Comp2, Comp3, firm size, firm age, adjusted

Δtrade payables, adjusted interest payments, adjusted cash holdings in year t, default year dummies, and predicted PD in τ=0).

5.2.3 Ex post performance

In addition to the effects on survival, we estimate the determinants of ex post performance (proxied by profitability and sales growth) of default firms. As we mentioned, many firms exited the database after default. This can lead to selection bias caused by endogeneity. To control this issue, we estimate the following Heckman selection model.

$$Expost\ performance_{i,t+1,\tau+1} = \beta_1 Y_{i,t,\tau} + \beta_2 \tau_{i,t} + \iota_i + \kappa_i + \lambda_t + \mu_{i,t,\tau} \quad (2)$$

$$S_{i,t+1,\tau+1} = 1[\gamma_1 X_{i,t,\tau} + \gamma_2 \tau_{i,t} + \nu_i + \xi_i + \emptyset_t + \pi_{i,t,\tau}], \quad (3)$$

where $Expost\ performance_{i,t+1,\tau+1}$ is adjusted ROA, adjusted sales growth, or employment growth; $Y_{i,t,\tau}$ is a set of variables (firm size, adjusted asset growth, firm age, adjusted leverage, adjusted Δtotal borrowings, adjusted Δtrade payables, adjusted interest payments in year t, default year dummies, and PD in τ=0); $X_{i,t,\tau}$ is a set of variables (defined in equation (2)); ι_i and ν_i are industry fixed effects; λ_i and ξ_i are region fixed effects; π_t and $\emptyset_t$ are year fixed effects for year t; and $\mu_{i,t,\tau}$ and $\pi_{i,t,\tau}$ are the error terms of firm i in year t. If financial support from banks enhances firm performance after default, the coefficient of Δtotal borrowings will be positive and that of adjusted interest payments will be negative. Similarly, if the support from trade creditors enhances firm performance, the coefficient of adjusted Δtrade payables will be positive. If asset restructuring enhances firm performance after default, the coefficient of adjusted asset growth will be negative. In contrast, if investment in assets enhances firm performance, the coefficient of adjusted asset growth will be positive.

To investigate the effects of real and financial factors using the PCA estimation results, we also estimate the following equation.

$$Expost\ performance_{i,t+1,\tau+1} = \beta_1 Z_{i,t,\tau} + \beta_2 \tau_{i,t} + \iota_i + \kappa_i + \lambda_t + \mu_{i,t,\tau} \quad (4)$$

$$S_{i,t+1,\tau+1} = 1[\gamma_1 W_{i,t,\tau} + \gamma_2 \tau_{i,t} + \nu_i + \xi_i + \emptyset_t + \pi_{i,t,\tau}], \quad (5)$$

where $Expost\ performance_{i,t+1,\tau+1}$ is adjusted ROA, adjusted sales growth, or employment growth; $Z_{i,t,\tau}$ is a set of variables (Comp1, Comp2, Comp3, firm size, firm age, adjusted Δtrade payables in year t, default year dummies, and PD in τ=0); $W_{i,t,\tau}$ is a set of variables (defined in equation (2)).

5.3 Estimation Results

5.3.1 Firm survival

Table 10 shows the summary statistics of the variables used in the econometric analysis. Table shows the estimation results of equation (2). All columns show the marginal effects at the means of the variables. Column (1) shows that all the estimated coefficients, apart from that for leverage and PD, are positive and statistically significant at the 1% level. The estimation results of asset growth show that firms that increase investment are likely to survive after default. This suggests that asset restructuring does not have positive effects on survival. In addition, the estimated effects of ROA and sales growth are positive, suggesting that real factors are significant for firm survival.

Focusing on financial factors, leverage has negative effects. This suggests that capital structure has significant effects, and highly leveraged firms are unlikely to survive. In contrast, the Δtotal borrowings has positive effects on survival, suggesting that additional loans for default firms increase the probability of survival. Interest payments have positive effects on the probability of survival. If the reduction of interest payments increases the probability of survival, the estimated marginal effects are negative. However, the estimated results do not support this prediction, suggesting that the reduction of interest

payments does not have positive effects on survival. In sum, real factors are significant for firm survival after default. Some financial factors are significant, but negative effects of interest payments are observed.

The estimated coefficient of year after default is positive and statistically significant at the 1% level, which shows that the year effects after default are positive. The estimated coefficient of PD is negative and statistically significant at the 1% level. This result suggests that firms with low PD before default are likely to survive after the default. If the default is unpredictable, these firms are likely to survive. Similarly, firms with high financial risk before default are unlikely to survive after the default.

To investigate the effects of the reduction of interest payments and additional borrowings in more detail, we add the interactive variable of adjusted Δtotal borrowings$\times$adjusted interest payments in column (2). Column (2) shows that the estimated marginal effect of adjusted Δtotal borrowings$\times$adjusted interest payments is positive and statistically significant. Additionally, those of adjusted Δtotal borrowings and adjusted interest payments are positive and statistically significant. These estimation results show that the additional borrowings with low interest payments decrease (do not increase) the probability of default. These results also suggest that the reduction of interest payments does not have positive effects on survival.

Column (3) presents the estimation results using Comp1, Comp2, and Comp3, which serve as proxies for real and financial factors. The estimated coefficient for the real-financial factor (Comp1) is positive and statistically significant at the 1% level. This finding suggests that firms are more likely to survive when they increase bank borrowings to finance profitable business opportunities. In contrast, the estimated coefficient for the financial factor (Comp2) is negative and statistically significant at the 1% level. Firms that increase bank borrowings despite poor performance are more likely to exit following default. This implies that forbearance or zombie lending does not positively affect firm survival after default, indicating that financial factors are not crucial in this context. The

estimated coefficient for the real factor (Comp3) is also positive and statistically significant at the 1% level, suggesting that real factors play an important role in firm survival after default.

Column (4) shows the estimation results of industry ROA and sales growth. The estimated coefficient of industry ROA is not statistically significant. The results for sales growth are positive and statistically significant at the 1% level. These results show that the sales growth of a firms' industry has positive effects on firm survival. Column (5) shows the effects of changes of PD from τ=-1 to τ=0, which is ΔPD ($=PD_{\tau=0} - PD_{\tau=-1}$). If ΔPD is high, we interpret that the financial risk is dramatically worsened before the default. The estimated coefficient of ΔPD is positive, but not statistically significant, which suggests that a change of PD does not have a significant effect on survival.

We also estimated whether survival probabilities differ depending on the year in which default occurs. The benchmark year is 2000. The estimated coefficients are negative and statistically significant if the default year is between 2006 and 2009. The global financial crisis occurred in this period, implying that if firms defaulted during this large financial shock, they were unlikely to survive after default.

Column (1) of Table 12 shows the estimated effects of the zombie firm dummy on firm survival after default, instead of interest payments. Following Caballero et al. (2008), the zombie firm dummy equals one if actual interest payments are less than minimum required interest payments, which is prime rate$\times$ the amount of borrowings of the firm. [8] According to Caballero et al. (2008), zombie firms are insolvent and unprofitable firms. They cannot survive without financial support from other parties (for example, banks and the government). Column (1) shows that the estimated marginal effect of the zombie firm dummy is negative and statistically significant. This suggests that zombie firms are unlikely to survive. Additionally, we estimate the effect of the zombie firm dummy$\times$adjusted Δtotal borrowings on firm survival. The estimated marginal effect is not statistically sig-

[8]The data for short- and long-term prime rates are from the website of the Bank of Japan.

nificant, which suggests that the probability of survival of zombie firms does not decrease if they increase their total borrowings.

Column (2) investigates the effect of the existence of successors on firm survival. The estimated marginal effect of successor is positive and statistically significant, suggesting that firms with a successor are more likely to survive after default. Column (3) investigates the effects of the manager's age. The benchmark dummy equals 1 if the manager's age is 59 years or less. The estimated marginal effects of the manager's age dummy are all negative and statistically significant. In addition, the estimated marginal effects are larger if the manager's age is older, suggesting that the manager's age has negative effects on firm survival after default. These results suggest that the characteristics of managers are significant factors determining firm survival after default.

5.3.2 Profitability

Table 13 shows the estimation results for ROA as an independent variable. Column (1) shows the estimated coefficient of Δtotal borrowings is negative and that of interest payments is positive. Both coefficients are statistically significant at the 1% level. These results show that additional borrowings after default reduce firm performance in terms of ROA. Furthermore, the negative coefficients of interest payments suggest that the reduction of interest payments does not enhance (or reduce) firm performance.

In contrast, the estimated coefficient of adjusted Δtrade payables is positive and statistically significant, suggesting that support from trade creditors enhances firm performance. The estimated coefficient of asset growth is positive and statistically significant, suggesting that investment in assets enhances firm performance. Asset restructuring does not enhance firm performance. The estimated coefficient of PD is positive and statistically significant at the 1% level. Even if PD is high before the default, the post-performance in terms of profitability is higher after the default.

Column (2) shows the estimation results of the selection equation, which is similar to

the results of firm survival. The estimated coefficient of PD is negative in column (2) and positive in column (1). These results suggest that firms with high default probability are unlikely to survive, but if they survive, their profitability is high after the default. Columns (3) and (4) show the estimation results of ROA, sales growth, leverage, and cash holdings before the default. Column (3) shows that the estimated coefficients of ROA and leverage are positive and those of sales growth and cash holdings are negative. Firms with high ROA before default are unlikely to survive. However, if they can survive, they are high performing after the default. In contrast, firms with high sales growth before the default are likely to survive, but do not enjoy high ROA after the default.

Columns (5) and (6) present the estimation results for Comp1, Comp2, and Comp3. The estimated coefficients of Comp1 are positive and statistically significant for both firm survival and ROA, implying that real-financial factors positively influence firm survival and ROA. In contrast, the estimated coefficients of Comp2 are negative and statistically significant for both firm survival and ROA, suggesting that financial factors have adverse effects on firm survival and ROA. The estimated coefficients of Comp3 are positive for both firm survival and ROA, but statistically significant only for ROA. This indicates that real factors contribute to improving ROA after default. In sum, real factors, rather than financial factors, play a crucial role in determining firm performance, as proxied by ROA.

Column (1) shows these dummy variables are negative and statistically significant after 2014, after controlling survival bias. These results suggest that the profitability of firms is lower if they default after 2014. The negative effects are larger around 2020, which is the year of the COVID-19 pandemic.

5.3.3 Sales growth

Table 14 shows the estimation results for sales growth as an independent variable. Column (2) shows that the estimated coefficient of Δtotal borrowings is positive and statistically

significant. These results suggest that increases in bank borrowings enhance firm performance in terms of sales growth. However, the estimated coefficient of interest payments is not statistically significant in column (1) after controlling survival bias. Similarly, the estimated coefficient of adjusted Δtrade payables is positive and statistically significant, suggesting that support from trade creditors also enhances sales growth.

The coefficient of asset growth is positive and statistically significant, suggesting that investment in assets enhances sales growth, which is similar to the results of ROA. The estimated coefficients of the dummy variables for the year in which default occurs tend to be not statistically significant.

Columns (3) and (4) show the estimation results of ROA, sales growth, leverage, and cash holdings before default. The estimated coefficients of ROA, sales growth, and cash holdings before the default are positive and statistically significant on firm survival and sales growth. Firms with high ROA, sales growth, and cash holdings before the default are more likely to survive and increase their sales after the default. In contrast, the estimated coefficients of leverage are negative on sales growth, suggesting that highly leveraged firms before the default decrease their sales after the default.

Columns (5) and (6) show the estimation results of Comp1, 2, and 3. The estimated coefficients of Comp1 are positive on firm survival, but negative on sales growth. These suggest that real-financial factors have positive effects on firm survival, but negative effects on sales growth. The estimated coefficients of Comp3 are similar to those of Comp1, which proxy for real factors. As firms with high Comp1 and Comp3 enjoy high ROA, the estimation results suggest that these firms might reduce unprofitable sales. In contrast, the estimated coefficients of Comp2, which proxy for financial factors, are negative on firm survival and positive on sales growth. Firms with high Comp2 maintain sales, but reduce unprofitable sales, which induces a lower ROA.

5.3.4 Employment growth

Table 15 shows the estimation results for employment growth as an independent variable. Column (1) shows that the estimated coefficients of adjusted bank borrowings and interest payments are not statistically significant. These results imply that financial factors are not important for increases in employment after the default. In contrast, the estimated coefficients of asset growth are positive and statistically significant at the 1% level. Similar to the estimation results of ROA and sales growth, increases in assets enhance employment, implying that real factors are significant for employment.

Columns (3) and (4) show the effects of ROA, sales growth, leverage, and cash holdings before default. Column (3) shows the coefficients of these variables are not statistically significant. Columns (5) and (6) show the estimated coefficients of Comp1, Comp2, and Comp3. Similar to the estimation results of columns (5) and (6) of Table 11, the estimated coefficients of Comp1 and Comp3 are positive and statistically significant on firm survival and employment growth. However, the estimated coefficients of Comp2 are negative and statistically significant on firm survival and employment growth. These also imply that real (not financial) factors are important for employment growth.

6 Conclusion

In this paper, we investigate what types of small businesses survive after default of payment on bank loans. In addition, we investigate the determinants of differences in firm performance and activities between default and nondefault firms after default using small business data. We present the following results. First, bank borrowings, ROA, and sales growth after default for default firms are lower than those for nondefault firms. Even 10 years after default, the negative effects are observed if the firm survives. These results imply that the constraints associated with default are economically significant and lead to lower firm performance for long periods. Moreover, firms with weak financial conditions

prior to default are less likely to survive; however, those that do tend to exhibit high ROA.

Second, the increases in asset growth, ROA, and sales growth enhance the probability of survival after default. Furthermore, lower managers' age, and the existence of a successor have positive effects on firm survival after default. These results imply that real factors are important for firm survival after default. Third, additional credit increases the probability of survival of defaulting small businesses. However, the reduction of interest payment decreases (does not increase) the probability of survival. Similarly, additional credit and reduction of interest payments have positive effects on sales growth after default, but negative effects on ROA. In sum, our estimation results imply that real factors (not financial factors) are relatively more important in the rehabilitation of small businesses after default.

This study has several limitations that suggest avenues for future research. First, although we identify real and financial factors through various methods, our analysis relies solely on data derived from firms' financial statements. Future studies could incorporate nonfinancial data, such as survey responses from firms. However, due to data access limitations, we were unable to use survey data in our estimations. Second, we do not rigorously investigate the causal relationships among financial factors, firm survival, and firm performance. Identifying a suitable exogenous event would enable a more accurate examination of these causal links. Furthermore, although we address survival bias using a selection model, the estimation results may still be subject to endogeneity issues. Addressing these concerns remains an important task for future research.

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Table 1: Number of Observations Before and After Default

Year after default	Freq.	Percent	Cum.
$\tau = 0$	129,783	44.49	44.49
$\tau = 1$	33,799	11.59	56.07
$\tau = 2$	23,795	8.16	64.23
$\tau = 3$	19,081	6.54	70.77
$\tau = 4$	15,684	5.38	76.15
$\tau = 5$	13,143	4.51	80.65
$\tau = 6$	11,051	3.79	84.44
$\tau = 7$	9,244	3.17	87.61
$\tau = 8$	7,691	2.64	90.25
$\tau = 9$	6,355	2.18	92.42
$\tau = 10$	5,150	1.77	94.19
$\tau \geq 11$	16,949	5.81	100
Total	291,725	100	
Total after t=1	161,942		

Note: The table presents the number of observations before and after the default.

Table 2: Descriptive Statistics for Firm Performance, Debt, and Assets

	(1) Adjusted ROA				(2) Adjusted Sales growth			
	Mean	p25	p50	p75	Mean	p25	p50	p75
$\tau = 0$	-9.91%	-13.55%	-2.13%	1.55%	-10.83%	-26.41%	-8.04%	5.60%
$\tau = 1$	-6.68%	-9.87%	-1.46%	2.18%	-12.21%	-26.87%	-7.72%	5.27%
$\tau = 2$	-3.28%	-6.52%	-0.40%	3.42%	-6.20%	-19.54%	-3.80%	8.40%
$\tau = 3$	-2.30%	-5.42%	-0.03%	3.94%	-3.95%	-16.25%	-2.60%	9.18%
$\tau = 4$	-1.86%	-4.95%	0.14%	4.23%	-3.11%	-14.57%	-2.05%	9.17%
$\tau = 5$	-1.56%	-4.62%	0.20%	4.31%	-3.11%	-14.16%	-2.03%	8.69%
$\tau = 6$	-1.15%	-4.33%	0.36%	4.48%	-3.01%	-13.81%	-1.87%	9.01%
$\tau = 7$	-1.37%	-4.42%	0.43%	4.66%	-3.02%	-13.78%	-1.78%	8.81%
$\tau = 8$	-1.25%	-4.64%	0.36%	4.62%	-3.58%	-14.32%	-2.02%	8.37%
$\tau = 9$	-1.26%	-4.58%	0.29%	4.50%	-3.20%	-13.54%	-1.82%	9.09%
$\tau = 10$	-1.38%	-4.36%	0.29%	4.46%	-2.90%	-13.49%	-1.52%	8.50%
$\tau \geq 11$	-1.17%	-3.71%	0.43%	4.21%	-2.50%	-12.13%	-1.28%	8.15%
Total	-6.01%	-8.91%	-0.83%	2.60%	-4.05%	-3.08%	0.00%	0.00%

	(3) Adjusted Employment Growth				(4) Adjusted Total Borrowings Growth			
	Mean	p25	p50	p75	Mean	p25	p50	p75
$\tau = 0$	-4.80%	-7.15%	0.00%	0.00%	-7.86%	-31.42%	0.00%	20.62%
$\tau = 1$	-7.59%	-11.78%	0.00%	0.00%	-16.04%	-34.70%	0.00%	15.82%
$\tau = 2$	-4.24%	0.00%	0.00%	0.00%	-8.89%	-28.97%	0.00%	15.53%
$\tau = 3$	-2.31%	0.00%	0.00%	0.00%	-4.40%	-25.11%	0.00%	15.74%
$\tau = 4$	-1.97%	0.00%	0.00%	0.00%	-5.38%	-25.42%	0.00%	15.39%
$\tau = 5$	-1.89%	0.00%	0.00%	0.00%	-3.71%	-24.50%	0.00%	16.92%
$\tau = 6$	-2.23%	0.00%	0.00%	0.00%	-6.07%	-25.76%	0.00%	14.94%
$\tau = 7$	-1.67%	0.00%	0.00%	0.00%	-5.00%	-24.76%	0.00%	17.15%
$\tau = 8$	-2.70%	0.00%	0.00%	0.00%	-4.31%	-26.17%	0.00%	15.94%
$\tau = 9$	-1.72%	0.00%	0.00%	0.00%	-1.91%	-25.85%	0.00%	17.62%
$\tau = 10$	-1.66%	0.00%	0.00%	0.00%	-5.39%	-26.45%	0.00%	17.11%
$\tau \geq 11$	-1.26%	0.00%	0.00%	0.00%	-5.41%	-24.88%	0.00%	17.46%
Total	-4.05%	-3.08%	0.00%	0.00%	-7.78%	-29.12%	0.00%	17.97%

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	(5) Adjusted Trade Payables Growth				(6) Adjusted Interest Payments			
	Mean	p25	p50	p75	Mean	p25	p50	p75
$\tau = 0$	-7.86%	-31.42%	0.00%	20.62%	0.86%	0.03%	0.73%	1.49%
$\tau = 1$	-16.04%	-34.70%	0.00%	15.82%	0.66%	-0.25%	0.53%	1.34%
$\tau = 2$	-8.89%	-28.97%	0.00%	15.53%	0.62%	-0.37%	0.49%	1.35%
$\tau = 3$	-4.40%	-25.11%	0.00%	15.74%	0.61%	-0.38%	0.48%	1.34%
$\tau = 4$	-5.38%	-25.42%	0.00%	15.39%	0.63%	-0.35%	0.50%	1.35%
$\tau = 5$	-3.71%	-24.50%	0.00%	16.92%	0.66%	-0.31%	0.53%	1.38%
$\tau = 6$	-6.07%	-25.76%	0.00%	14.94%	0.67%	-0.30%	0.54%	1.38%
$\tau = 7$	-5.00%	-24.76%	0.00%	17.15%	0.65%	-0.28%	0.52%	1.37%
$\tau = 8$	-4.31%	-26.17%	0.00%	15.94%	0.69%	-0.25%	0.54%	1.38%
$\tau = 9$	-1.91%	-25.85%	0.00%	17.62%	0.70%	-0.24%	0.55%	1.37%
$\tau = 10$	-5.39%	-26.45%	0.00%	17.11%	0.68%	-0.24%	0.52%	1.37%
$\tau \geq 11$	-5.41%	-24.88%	0.00%	17.46%	0.61%	-0.28%	0.43%	1.24%
Total	-7.78%	-29.12%	0.00%	17.97%	0.74%	-0.15%	0.61%	1.42%

	(7) Adjusted Total Assets Growth			
	Mean	p25	p50	p75
$\tau = 0$	-5.46%	-16.51%	-4.10%	4.78%
$\tau = 1$	-8.70%	-16.91%	-4.61%	2.30%
$\tau = 2$	-5.21%	-12.87%	-3.30%	3.48%
$\tau = 3$	-3.28%	-10.88%	-2.46%	4.11%
$\tau = 4$	-2.57%	-10.32%	-2.26%	4.34%
$\tau = 5$	-1.85%	-9.93%	-2.19%	4.61%
$\tau = 6$	-1.57%	-9.41%	-1.94%	5.20%
$\tau = 7$	-1.30%	-9.22%	-1.99%	5.59%
$\tau = 8$	-1.36%	-9.50%	-2.01%	5.41%
$\tau = 9$	-1.57%	-9.82%	-2.23%	5.61%
$\tau = 10$	-0.47%	-8.99%	-1.79%	6.03%
$\tau \geq 11$	-0.59%	-9.02%	-1.79%	6.28%
Total	-4.51%	-13.56%	-3.24%	4.43%

Note: The table presents the 25th percentile, median, and 75th percentile of adjusted ROA, adjusted sales growth, adjusted employment growth, adjusted total borrowings growth, trade payables growth, adjusted interest payments, and adjusted total asset growth. Adjusted ROA is defined as the ratio of a firm's operating incomes and total assets, calculated by subtracting the median value in the medium category in the industrial classification. Adjusted sales growth is defined as ln(a firm's sales in year t) minus ln(a firm's sales in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. Adjusted employment growth is defined as ln(1+a firm's number of employed in year t) minus ln(1+a firm's number of employed in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. Adjusted total borrowings growth is defined as ln(1+a firm's total borrowings in year t) minus ln(1+a firm's total borrowings in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. Adjusted trade payables growth is defined as ln(1+a firm's trade payables in year t) minus ln(1+a firm's trade payables in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. Interest payments represent the ratio of a firm's interest expenses to the sum of its short-term borrowings, long-term borrowings, and discounted bills receivables for year t-1, calculated by subtracting the median value in the medium category in the industrial classification. Adjusted total asset growth is defined as ln(a firm's total assets in year t) minus ln(a firm's total assets in year t-1), calculated by subtracting the median value in the medium category in the industrial classification.

Table 3: Summary Statistics for the Propensity Matching Estimation

Variable	Obs	Mean	Std. Dev.	Min	Max
Survival	12,747,532	0.0090	0.0946	0.0000	1.0000
Size	12,747,532	11.4758	1.5955	2.3026	21.3055
Age	12,747,532	3.2066	0.6486	1.6094	6.8024
ROA	12,747,532	-0.0090	0.1582	-1.6143	0.6243
Sales Growth	12,747,532	-0.0027	0.2667	-1.4668	1.7511
Leverage	12,747,532	1.0471	0.8660	0.0000	11.4365
Interest Payments	12,747,532	0.0190	0.0129	0.0000	0.1235
Cash Holdings	12,747,532	0.2013	0.1725	0.0000	1.0000

Note: The table presents summary statistics for the variables used in the propensity matching estimation.

Table 4: Estimation Results for the Propensity Score Matching Method

	(1) ROA				(2) Sales Growth			
	Treatment	Control	Difference		Treatment	Control	Difference	
$\tau = 1$	-6.96%	-2.19%	-4.77%	***	-14.12%	0.32%	-14.44%	***
$\tau = 2$	-3.49%	-1.61%	-1.88%	***	-6.76%	-1.13%	-5.63%	***
$\tau = 3$	-2.56%	-1.51%	-1.05%	***	-4.23%	-1.32%	-2.91%	***
$\tau = 4$	-2.11%	-1.16%	-0.95%	***	-3.37%	-1.33%	-2.04%	***
$\tau = 5$	-1.85%	-1.24%	-0.61%	***	-3.32%	-1.50%	-1.82%	***
$\tau = 6$	-1.50%	-1.27%	-0.23%		-2.96%	-1.67%	-1.29%	***
$\tau = 7$	-1.72%	-1.45%	-0.28%		-3.14%	-2.09%	-1.05%	***
$\tau = 8$	-1.61%	-1.39%	-0.22%		-3.27%	-1.33%	-1.94%	***
$\tau = 9$	-1.77%	-1.39%	-0.38%		-2.53%	-1.23%	-1.30%	***
$\tau = 10$	-1.72%	-1.36%	-0.36%		-2.24%	-1.36%	-0.88%	**

	(3) Employment Growth				(4) Total Borrowings Growth			
	Treatment	Control	Difference		Treatment	Control	Difference	
$\tau = 1$	-9.46%	-0.98%	-8.47%	***	-3.06%	1.70%	-4.76%	***
$\tau = 2$	-5.35%	-0.89%	-4.46%	***	-3.44%	0.96%	-4.40%	***
$\tau = 3$	-2.65%	-0.31%	-2.34%	***	-1.81%	0.79%	-2.61%	***
$\tau = 4$	-2.35%	-0.39%	-1.96%	***	-0.58%	0.47%	-1.05%	***
$\tau = 5$	-2.31%	-0.42%	-1.89%	***	-0.08%	0.38%	-0.46%	
$\tau = 6$	-2.32%	-0.53%	-1.79%	***	-0.56%	0.51%	-1.06%	***
$\tau = 7$	-1.99%	-0.66%	-1.33%	***	-0.03%	0.49%	-0.52%	
$\tau = 8$	-2.12%	-0.64%	-1.48%	***	-0.93%	0.51%	-1.44%	***
$\tau = 9$	-1.59%	-0.78%	-0.80%		0.99%	1.23%	-0.24%	
$\tau = 10$	-2.13%	-0.59%	-1.54%	***	-0.05%	1.45%	-1.50%	**

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	(5) Interest Payments				(6) Trade Payables Growth			
	Treatment	Control	Difference		Treatment	Control	Difference	
$\tau = 1$	2.35%	2.37%	-0.01%	*	-23.24%	-1.66%	-21.58%	***
$\tau = 2$	2.20%	2.23%	-0.03%	***	-12.38%	-2.82%	-9.55%	***
$\tau = 3$	2.13%	2.14%	-0.01%		-6.59%	-3.32%	-3.27%	***
$\tau = 4$	2.09%	2.07%	0.02%		-7.23%	-3.40%	-3.83%	***
$\tau = 5$	2.07%	2.02%	0.05%	***	-4.16%	-3.69%	-0.47%	
$\tau = 6$	2.04%	1.95%	0.09%	***	-7.45%	-3.93%	-3.52%	**
$\tau = 7$	1.99%	1.89%	0.10%	***	-5.01%	-3.22%	-1.79%	
$\tau = 8$	1.98%	1.84%	0.15%	***	-4.67%	-4.11%	-0.57%	
$\tau = 9$	1.95%	1.79%	0.16%	***	-3.26%	-3.77%	0.51%	
$\tau = 10$	1.92%	1.73%	0.19%	***	-5.66%	-4.06%	-1.60%	

	(7) Total Assets Growth			
	Treatment	Control	Difference	
$\tau = 1$	-14.33%	0.46%	-14.79%	***
$\tau = 2$	-8.61%	-0.05%	-8.56%	***
$\tau = 3$	-5.19%	0.01%	-5.20%	***
$\tau = 4$	-3.80%	0.26%	-4.06%	***
$\tau = 5$	-2.51%	0.20%	-2.71%	***
$\tau = 6$	-2.16%	0.42%	-2.58%	***
$\tau = 7$	-1.59%	0.22%	-1.81%	***
$\tau = 8$	-1.65%	0.58%	-2.23%	***
$\tau = 9$	-1.25%	0.95%	-2.20%	***
$\tau = 10$	-0.11%	1.15%	-1.26%	***

Note: This table provides estimates of the treatment effects on ROA, sales growth, employment growth, total borrowings growth, interest payments, trade payables growth, and total assets growth. ROA is defined as the ratio of a firm's operating income and total assets. Sales growth is defined as ln(a firm's sales in year t) minus ln(a firm's sales in year t-1). Employment growth is defined as ln(1+a firm's number of employed in year t) minus ln(1+a firm's number of employed in year t-1). Total borrowings growth is defined as ln(1+a firm's total borrowings in year t) minus ln(1+a firm's total borrowings in year t-1). Trade payables growth is defined as ln(1+a firm's trade payables in year t) minus ln(1+a firm's trade payables in year t-1). Interest payments represent the ratio of a firm's interest expenses to the sum of its short-term borrowings, long-term borrowings, and discounted bills receivables in year t-1. Total asset growth is defined as ln(a firm's total assets in year t) minus ln(a firm's total assets in year t-1), calculated by subtracting the median value in the medium category in the industrial classification. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Estimation Results for the Propensity Score Matching Method, by Firm Size

	(1) ROA					(2) Sales Growth				
Employee	-5	6-20	21-100	101-	F-test	-5	6-20	21-100	101-	F-test
$\tau = 1$	-4.32%	-5.38%	-5.04%	-4.59%	***	-13.04%	-16.16%	-15.17%	-16.32%	***
$\tau = 2$	-2.08%	-1.68%	-1.68%	-1.57%		-3.41%	-7.01%	-9.53%	-11.99%	***
$\tau = 3$	-1.58%	-0.61%	-0.32%	0.00%	***	-2.39%	-3.09%	-3.83%	-6.11%	**
$\tau = 4$	-1.96%	-0.21%	0.41%	2.23%	***	-1.77%	-2.41%	-2.21%	-1.65%	
$\tau = 5$	-1.98%	0.58%	1.26%	0.71%	***	-1.79%	-1.47%	-2.53%	-2.36%	
$\tau = 6$	-1.61%	0.85%	1.55%	2.28%	***	-0.77%	-1.75%	-1.84%	-2.44%	
$\tau = 7$	-1.64%	0.56%	1.59%	3.33%	***	-1.22%	-1.40%	0.02%	-0.27%	
$\tau = 8$	-1.77%	0.79%	2.08%	1.81%	***	-2.01%	-1.91%	-2.06%	-0.55%	
$\tau = 9$	-2.09%	0.89%	1.77%	1.27%	***	-1.06%	-1.91%	-0.72%	-1.71%	
$\tau = 10$	-2.40%	1.34%	1.66%	1.74%	***	-0.68%	-1.76%	-0.29%	2.60%	

	(3) Employment Growth					(4) Total Borrowings Growth				
Employee	-5	6-20	21-100	101-	F-test	-5	6-20	21-100	101-	F-test
$\tau = 1$	0.94%	-19.04%	-17.14%	-18.38%	***	-4.40%	-4.22%	-5.64%	-13.63%	***
$\tau = 2$	-0.26%	-9.05%	-9.36%	-8.38%	***	-2.85%	-3.87%	-8.88%	-17.55%	***
$\tau = 3$	-0.80%	-4.01%	-3.97%	-4.62%	***	-1.47%	-3.03%	-4.70%	-9.21%	***
$\tau = 4$	-0.70%	-2.68%	-4.51%	-4.23%	***	-0.85%	-1.34%	-1.72%	2.80%	
$\tau = 5$	-0.79%	-3.14%	-3.21%	-0.61%	**	0.09%	-0.36%	-2.47%	-0.75%	
$\tau = 6$	-1.06%	-2.48%	-2.80%	-1.50%		-0.21%	-1.42%	-2.76%	-3.01%	
$\tau = 7$	-0.83%	-1.80%	-1.76%	-2.35%		-1.17%	-0.02%	0.59%	-1.30%	
$\tau = 8$	-0.66%	-2.24%	-1.90%	-4.68%		-1.20%	-1.63%	-1.40%	-3.78%	
$\tau = 9$	-0.74%	-1.04%	-0.31%	-1.99%		1.65%	-2.07%	-2.08%	-0.85%	**
$\tau = 10$	-1.72%	-1.82%	-0.29%	-2.37%		-1.04%	-1.08%	-3.16%	-4.48%	

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	(5) Interest Payments					(6) Trade Payables Growth				
Employee	-5	6-20	21-100	101-	F-test	-5	6-20	21-100	101-	F-test
$\tau = 1$	-0.08%	0.07%	0.03%	-0.02%	***	-22.61%	-19.91%	-20.80%	-26.25%	
$\tau = 2$	-0.06%	0.03%	-0.05%	-0.08%	***	-7.96%	-10.55%	-11.70%	-18.86%	
$\tau = 3$	-0.05%	0.03%	0.04%	0.00%	***	-0.84%	-5.44%	-5.98%	-12.15%	
$\tau = 4$	-0.04%	0.08%	0.09%	0.00%	***	-4.72%	-3.31%	-2.75%	1.88%	
$\tau = 5$	0.01%	0.10%	0.12%	0.03%	***	0.26%	-1.68%	-0.65%	1.21%	
$\tau = 6$	0.02%	0.17%	0.16%	0.06%	***	-4.23%	-1.50%	-4.81%	-6.97%	
$\tau = 7$	0.05%	0.14%	0.17%	0.15%	**	-0.46%	-4.29%	-2.53%	8.25%	
$\tau = 8$	0.08%	0.20%	0.23%	0.14%	***	-5.80%	6.53%	0.53%	2.57%	***
$\tau = 9$	0.10%	0.23%	0.24%	0.10%	***	1.93%	-1.31%	-0.16%	0.97%	
$\tau = 10$	0.11%	0.27%	0.28%	0.07%	***	-4.34%	0.61%	2.05%	-1.86%	

	(7) Total Assets Growth				
Employee	-5	6-20	21-100	101-	F-test
$\tau = 1$	-13.63%	-14.92%	-16.87%	-24.06%	***
$\tau = 2$	-6.89%	-8.66%	-12.68%	-17.83%	***
$\tau = 3$	-4.26%	-4.74%	-8.56%	-10.44%	***
$\tau = 4$	-3.69%	-4.10%	-5.22%	-4.21%	
$\tau = 5$	-2.77%	-1.89%	-3.76%	-5.43%	
$\tau = 6$	-2.69%	-2.18%	-2.98%	-3.04%	
$\tau = 7$	-1.70%	-1.53%	-1.89%	-6.72%	
$\tau = 8$	-3.27%	-1.14%	-1.52%	-0.63%	*
$\tau = 9$	-2.33%	-2.54%	-0.57%	-5.32%	
$\tau = 10$	-1.35%	-0.53%	-2.17%	-2.79%	

Note: This table provides estimates of the treatment effects on ROA, sales growth, employment growth, total borrowings growth, interest payments, trade payables growth, and total assets growth by firm size. The definitions of the variables are in the notes accompanying Table 4. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Estimation Results for the Propensity Score Matching Method, by Pre-GFC, GFC, and Post-GFC

	(1) ROA				(2) Sales Growth			
Default Year	-2006	2007-10	2011-14	F-test	-2006	2007-10	2011-14	F-test
$\tau = 1$	-3.61%	-5.79%	-4.67%	***	-13.92%	-17.22%	-14.48%	***
$\tau = 2$	-1.74%	-2.15%	-1.95%		-6.33%	-6.91%	-4.98%	**
$\tau = 3$	-0.98%	-0.76%	-1.39%		-3.67%	-3.27%	-2.58%	
$\tau = 4$	-0.75%	-0.64%	-1.37%		-3.12%	-3.09%	-1.59%	*
$\tau = 5$	-1.34%	-0.03%	-1.08%	**	-3.41%	-1.86%	-1.36%	**
$\tau = 6$	0.07%	-0.18%	-0.18%		-1.91%	-1.90%	-0.41%	*
$\tau = 7$	-0.38%	-0.15%	-0.34%		-1.01%	-0.94%	-1.58%	
$\tau = 8$	-0.70%	0.34%	-0.45%		-3.85%	-1.62%	-1.75%	**
$\tau = 9$	-1.13%	0.26%	-0.51%	*	-2.18%	-0.91%	-1.27%	
$\tau = 10$	-0.43%	0.35%	-1.13%	*	-0.31%	-0.62%	-1.58%	

	(3) Employment Growth				(4) Total Borrowings Growth			
Default Year	-2006	2007-10	2011-14	F-test	-2006	2007-10	2011-14	F-test
$\tau = 1$	-5.79%	-10.13%	-8.49%	***	-4.81%	-5.83%	-3.04%	***
$\tau = 2$	-4.49%	-5.90%	-4.66%		-5.33%	-5.79%	-2.71%	***
$\tau = 3$	-2.27%	-2.43%	-2.25%		-3.81%	-3.63%	-2.02%	*
$\tau = 4$	-3.17%	-1.56%	-1.93%		-2.01%	-0.90%	-0.24%	
$\tau = 5$	-1.42%	-2.99%	-2.02%		0.56%	0.45%	-0.94%	
$\tau = 6$	-2.77%	-1.72%	-1.38%		-1.39%	-0.76%	-1.24%	
$\tau = 7$	-0.72%	-3.02%	-0.44%	*	-0.20%	0.55%	-1.43%	
$\tau = 8$	-0.73%	-1.91%	-1.76%		-0.18%	-1.01%	-2.88%	*
$\tau = 9$	-1.43%	-0.73%	-0.50%		-0.06%	0.49%	-0.97%	
$\tau = 10$	-0.90%	-0.94%	-2.68%		1.14%	-2.14%	-2.61%	**

[This table continues on the next page.]

	(5) Interest Payment				(6) Trade Payables Growth			
Default Year	-2006	2007-10	2011-14	F-test	-2006	2007-10	2011-14	F-test
$\tau = 1$	-0.02%	-0.09%	-0.07%	*	-20.23%	-22.25%	-22.79%	
$\tau = 2$	-0.06%	-0.08%	-0.10%		-12.19%	-10.39%	-8.69%	
$\tau = 3$	-0.03%	-0.12%	-0.04%	**	-2.06%	-4.53%	-3.22%	
$\tau = 4$	-0.02%	-0.05%	-0.01%		-6.88%	-2.67%	-1.60%	
$\tau = 5$	-0.01%	0.00%	0.03%		-1.21%	-3.16%	-1.58%	
$\tau = 6$	0.02%	0.06%	0.09%		-4.30%	1.63%	-4.20%	
$\tau = 7$	0.03%	0.05%	0.13%	**	-2.92%	-1.54%	-3.62%	
$\tau = 8$	0.06%	0.12%	0.19%	***	-5.88%	0.65%	2.01%	
$\tau = 9$	0.07%	0.16%	0.22%	***	7.99%	-1.83%	-1.24%	*
$\tau = 10$	0.16%	0.17%	0.24%		-0.57%	-0.57%	-3.52%	

	(7) Total Assets Growth			
Default Year	-2006	2007-10	2011-14	F-test
$\tau = 1$	-13.14%	-15.87%	-14.53%	***
$\tau = 2$	-9.90%	-9.72%	-7.57%	***
$\tau = 3$	-5.87%	-6.77%	-4.87%	*
$\tau = 4$	-5.20%	-3.97%	-4.30%	
$\tau = 5$	-3.48%	-3.68%	-2.13%	
$\tau = 6$	-2.37%	-3.17%	-2.71%	
$\tau = 7$	-2.42%	-2.25%	-1.61%	
$\tau = 8$	-1.81%	-2.58%	-2.20%	
$\tau = 9$	-3.04%	-2.15%	-1.96%	
$\tau = 10$	-1.82%	-1.53%	-0.55%	

Note: This table provides estimates of the treatment effects on ROA, sales growth, employment growth, total borrowings growth, interest payments, trade payables growth, and total assets growth by pre-GFC, GFC, and post-GFC. The definitions of the variables are in the notes accompanying Table 4. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Mean and Median for Firm Characteristics, by Predicted Probability of Default

	Mean				Median			
PD	Low	Middle	High	All	Low	Middle	High	All
Firms	Default	Default	Default	All	Default	Default	Default	All
Size	11.1116	11.6328	11.3371	11.4758	11.0186	11.5617	11.2935	11.3504
Age	3.1290	3.2237	3.0407	3.2066	3.2189	3.4012	2.9957	3.2189
ROA	-0.0358	-0.0507	-0.1847	-0.0090	0.0052	-0.0028	-0.0714	0.0127
Sales Growth	0.0565	-0.0788	-0.3045	-0.0027	0.0041	-0.0680	-0.2339	-0.0035
Leverage	1.2835	1.3757	2.1698	1.0471	1.0179	1.0861	1.3936	0.8801
Interest Payments	0.0195	0.0253	0.0327	0.0190	0.0190	0.0251	0.0307	0.0176
Cash Holdings	0.1944	0.0610	0.0431	0.2013	0.1485	0.0388	0.0233	0.1539

Note: This table provides the mean and median of variables used in the probit model. The definitions of the variables are in the notes accompanying Table 4.

Table 8: Estimation Results for the Propensity Score Matching Method, by Predicted Probability of Default

	(1) ROA				(2) Sales Growth			
PD	Low	Middle	High	F-test	Low	Middle	High	F-test
$\tau = 1$	-5.07%	-4.46%	-4.77%		-10.10%	-15.43%	-18.11%	***
$\tau = 2$	-2.65%	-1.99%	-0.81%	***	-2.84%	-7.05%	-7.59%	***
$\tau = 3$	-2.37%	-0.60%	0.25%	***	-1.01%	-3.83%	-4.46%	***
$\tau = 4$	-2.41%	-0.48%	0.59%	***	-0.40%	-3.03%	-3.19%	***
$\tau = 5$	-2.21%	-0.42%	1.55%	***	-0.53%	-2.82%	-2.49%	***
$\tau = 6$	-1.47%	-0.40%	1.88%	***	-0.49%	-2.15%	-1.42%	*
$\tau = 7$	-1.94%	0.23%	1.59%	***	-0.57%	-1.56%	-1.13%	
$\tau = 8$	-1.90%	0.10%	1.88%	***	-1.05%	-3.72%	-1.05%	***
$\tau = 9$	-2.04%	-0.07%	1.65%	***	-0.40%	-2.13%	-1.60%	
$\tau = 10$	-2.11%	0.01%	1.64%	***	-0.44%	-1.25%	-1.04%	

	(3) Employment Growth				(4) Total Borrowings Growth			
PD	Low	Middle	High	F-test	Low	Middle	High	F-test
$\tau = 1$	-7.10%	-7.93%	-10.48%	***	-2.19%	-5.45%	-6.79%	***
$\tau = 2$	-2.91%	-5.93%	-4.83%	***	-2.05%	-6.11%	-5.49%	***
$\tau = 3$	-1.53%	-2.39%	-3.40%	*	-0.18%	-4.38%	-3.90%	***
$\tau = 4$	-1.65%	-2.19%	-2.14%		0.48%	-2.53%	-1.47%	***
$\tau = 5$	-1.07%	-2.31%	-2.60%		1.97%	-1.78%	-2.43%	***
$\tau = 6$	-1.53%	-2.90%	-0.79%		0.69%	-1.59%	-3.03%	***
$\tau = 7$	-2.43%	-0.20%	-1.10%		0.45%	-1.46%	-0.79%	
$\tau = 8$	-0.36%	-3.69%	-0.37%	***	-0.99%	-1.58%	-1.93%	
$\tau = 9$	0.10%	-1.24%	-1.59%		1.77%	-1.16%	-2.02%	**
$\tau = 10$	-2.10%	-0.77%	-1.69%		-2.30%	-0.06%	-2.13%	

[This table continues on the next page.]

	(5) Interest Payment				(6) Trade Payables Growth			
PD	Low	Middle	High	F-test	Low	Middle	High	F-test
$\tau = 1$	0.11%	-0.04%	-0.12%	***	-21.60%	-22.41%	-20.73%	
$\tau = 2$	0.06%	-0.03%	-0.14%	***	-4.16%	-12.88%	-12.69%	***
$\tau = 3$	0.06%	-0.03%	-0.09%	***	-0.43%	-6.59%	-3.33%	*
$\tau = 4$	0.04%	0.06%	-0.07%	***	-1.28%	-6.36%	-4.46%	
$\tau = 5$	0.05%	0.08%	0.03%		2.37%	-2.97%	-1.57%	
$\tau = 6$	0.08%	0.08%	0.12%		-5.16%	-2.32%	-2.60%	
$\tau = 7$	0.06%	0.13%	0.13%	*	-3.00%	-1.35%	-0.54%	
$\tau = 8$	0.11%	0.15%	0.18%		3.48%	-4.81%	-1.22%	*
$\tau = 9$	0.07%	0.20%	0.26%	***	1.27%	1.56%	-1.89%	
$\tau = 10$	0.10%	0.26%	0.24%	***	0.29%	-3.88%	-1.46%	

	(7) Total Assets Growth			
PD	Low	Middle	High	F-test
$\tau = 1$	-11.65%	-15.37%	-17.54%	***
$\tau = 2$	-5.07%	-10.22%	-11.11%	***
$\tau = 3$	-2.66%	-6.72%	-6.93%	***
$\tau = 4$	-2.55%	-4.58%	-5.59%	***
$\tau = 5$	-0.10%	-3.93%	-5.06%	***
$\tau = 6$	-1.48%	-3.36%	-3.25%	**
$\tau = 7$	-0.68%	-2.86%	-2.19%	**
$\tau = 8$	-0.49%	-3.68%	-2.98%	***
$\tau = 9$	-0.54%	-2.75%	-3.92%	***
$\tau = 10$	-1.40%	-1.38%	-0.92%	

Note: This table provides estimates of the treatment effects on ROA, sales growth, employment growth, total borrowings growth, interest payments, trade payables growth, and total assets growth by probability of default. The definitions of the variables are in the notes accompanying Table 4. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9: Estimation Results of PCA

	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
ROA	0.4856	-0.3575	0.2033	-0.1853	0.6634	0.3472
Sales Growth	0.4506	-0.1413	0.5876	0.2261	-0.5993	0.1461
Asset Growth	0.5908	0.2981	-0.0804	0.1061	0.1595	-0.7204
ΔTotal Borrowings	0.2647	0.6523	-0.2772	0.3161	0.0319	0.5716
Interest Payment	0.0410	-0.5297	-0.4082	0.7414	0.0293	-0.0242
Leverage	-0.3747	0.2394	0.6028	0.5036	0.4163	-0.1091
Eigenvalue	1.7279	1.3308	0.9460	0.8464	0.6751	0.4738

Note: The table presents estimation results for PCA.Asset growth, ROA, sales growth, leverage, Δtotal borrowings, and interest payments are calculated by subtracting the median value of each variable in the medium category in the industrial classification.

Table 10: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Survival	161,942	0.8622	0.3447	0.0000	1.0000
Size	161,942	11.4578	1.6609	4.6052	18.5517
Age	161,942	3.3830	0.5586	1.6094	4.9767
ROA	161,942	-0.0288	0.1817	-1.6298	0.6569
Sales Growth	161,942	-0.0551	0.3232	-1.5148	1.7705
Leverage	161,942	0.7036	1.4135	-0.9833	10.6079
ΔTotal Borrowings	161,942	0.0015	0.3750	-6.4139	9.2198
Asset Growth	161,942	-0.0375	0.2889	-3.9192	5.8183
Interest Payment	161,942	0.0064	0.0144	-0.0245	0.1128
PD	161,942	0.0161	0.0172	0.0000	0.4250
ΔTrade Payables	161,942	-0.0771	1.4207	-8.2893	8.6769
Cash Holdings	161,942	-0.0578	0.1497	-0.4328	0.9274
Comp1	161,942	0.0000	1.3145	-13.0244	16.8266
Comp2	161,942	0.0000	1.1536	-14.0392	17.7245
Comp3	161,942	0.0000	0.9726	-9.3587	6.7264
Zombie Firms	161,942	0.1647	0.3709	0.0000	1.0000
Successor	43,630	0.0380	0.1912	0.0000	1.0000
Manager Age: 60-69	78,571	0.0000	0.0000	0.0000	0.0000
Manager Age: 70-79	78,571	0.1469	0.3540	0.0000	1.0000
Manager Age: 80-	78,571	0.1178	0.3224	0.0000	1.0000

Note: The table presents summary statistics for the variables used in the econometric analysis.

Table 11: Estimation Results on Firm Survival after Default

	(1)	(2)	(3)	(4)	(5)
	Survival	Survival	Survival	Survival	Survival
Size	0.00250***	0.00247***	0.00158***	0.00155**	0.00239***
	(0.000620)	(0.000620)	(0.000586)	(0.000618)	(0.000655)
Asset Growth	0.0336***	0.0338***		0.0255***	0.0374***
	(0.00363)	(0.00360)		(0.00373)	(0.00388)
Age	0.00996***	0.00992***	0.00959***	0.0133***	0.00859***
	(0.00162)	(0.00162)	(0.00160)	(0.00162)	(0.00173)
ROA	0.0755***	0.0747***		0.0706***	0.0749***
	(0.00470)	(0.00469)		(0.00476)	(0.00502)
Sales Growth	0.0623***	0.0623***		0.0636***	0.0633***
	(0.00274)	(0.00274)		(0.00273)	(0.00290)
Leverage	-0.00449***	-0.00449***		-0.00998***	-0.00466***
	(0.000708)	(0.000708)		(0.000895)	(0.000772)
ΔTotal Borrowings	0.0134***	0.0107***		0.0146***	0.0142***
	(0.00324)	(0.00309)		(0.00332)	(0.00359)
Interest Payment	0.669***	0.722***		0.540***	0.680***
	(0.0632)	(0.0662)		(0.0620)	(0.0672)
ΔTrade Payables	0.00248***	0.00246***	0.00267***	0.00252***	0.00290***
	(0.000589)	(0.000588)	(0.000587)	(0.000587)	(0.000626)
Cash Holdings	0.142***	0.143***	0.143***	0.129***	0.146***
	(0.00696)	(0.00698)	(0.00700)	(0.00817)	(0.00744)
PD	-0.618***	-0.624***	-0.538***		-0.654***
	(0.0485)	(0.0485)	(0.0447)		(0.0673)
Years after Default	0.0147***	0.0146***	0.0147***	0.0148***	0.0134***
	(0.00114)	(0.00114)	(0.00114)	(0.00114)	(0.00126)
ΔTotal Borrowings		0.428***			
×Interest Payment		(0.133)			
Real-Financial Factors			0.0254***		
(Comp1)			(0.000646)		
Financial Factors			-0.00874***		
(Comp2)			(0.000742)		
Real Factors			0.00466***		
(Comp3)			(0.000888)		
ROA (in $\tau = 0$)				0.0145***	
				(0.00490)	
Sales Growth (in $\tau = 0$)				0.0291***	
				(0.00265)	
Leverage (in $\tau = 0$)				0.00595***	
				(0.00128)	
Cash Holdings (in $\tau = 0$)				0.0394***	
				(0.00860)	
ΔPD					0.0684
					(0.0629)

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Default Year	(1)	(2)	(3)	(4)	(5)
2000	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	
2001	0.0224**	0.0224**	0.0225**	0.0216**	(Benchmark)
	(0.00971)	(0.00970)	(0.00971)	(0.00976)	
2002	0.0239**	0.0239**	0.0243**	0.0241**	-0.00717
	(0.00988)	(0.00987)	(0.00986)	(0.00985)	(0.00909)
2003	-0.00296	-0.00309	-0.00230	-0.00266	-0.0462***
	(0.0118)	(0.0118)	(0.0117)	(0.0117)	(0.0111)
2004	-0.00775	-0.00796	-0.00697	-0.00733	-0.0527***
	(0.0124)	(0.0124)	(0.0123)	(0.0123)	(0.0117)
2005	-0.0180	-0.0181	-0.0172	-0.0176	-0.0645***
	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0128)
2006	-0.0296**	-0.0297**	-0.0284**	-0.0281**	-0.0811***
	(0.0144)	(0.0144)	(0.0143)	(0.0143)	(0.0140)
2007	-0.0256*	-0.0256*	-0.0241*	-0.0245*	-0.0788***
	(0.0144)	(0.0144)	(0.0143)	(0.0143)	(0.0143)
2008	-0.0311**	-0.0312**	-0.0300**	-0.0295*	-0.0864***
	(0.0152)	(0.0152)	(0.0151)	(0.0151)	(0.0153)
2009	-0.0254*	-0.0255*	-0.0246	-0.0242	-0.0828***
	(0.0153)	(0.0153)	(0.0153)	(0.0152)	(0.0159)
2010	-0.0153	-0.0154	-0.0141	-0.0133	-0.0698***
	(0.0153)	(0.0153)	(0.0153)	(0.0152)	(0.0164)
2011	-0.0139	-0.0140	-0.0125	-0.0119	-0.0697***
	(0.0158)	(0.0158)	(0.0157)	(0.0156)	(0.0173)
2012	-0.0122	-0.0123	-0.0107	-0.0101	-0.0700***
	(0.0165)	(0.0165)	(0.0164)	(0.0163)	(0.0186)
2013	-0.00252	-0.00274	-0.00128	-0.000405	-0.0614***
	(0.0165)	(0.0165)	(0.0164)	(0.0163)	(0.0194)
2014	0.0114	0.0112	0.0130	0.0136	-0.0435**
	(0.0160)	(0.0160)	(0.0159)	(0.0158)	(0.0194)
2015	0.00454	0.00432	0.00652	0.00727	-0.0511**
	(0.0174)	(0.0174)	(0.0172)	(0.0171)	(0.0212)
2016	0.0116	0.0115	0.0136	0.0146	-0.0458**
	(0.0174)	(0.0175)	(0.0173)	(0.0171)	(0.0221)
2017	0.0108	0.0106	0.0127	0.0144	-0.0492**
	(0.0183)	(0.0184)	(0.0182)	(0.0180)	(0.0239)
2018	0.0136	0.0134	0.0155	0.0171	-0.0444*
	(0.0189)	(0.0189)	(0.0187)	(0.0184)	(0.0249)
2019	0.0133	0.0131	0.0151	0.0174	-0.0463*
	(0.0197)	(0.0198)	(0.0196)	(0.0192)	(0.0265)
2020	0.0125	0.0124	0.0147	0.0166	-0.0508*
	(0.0209)	(0.0209)	(0.0206)	(0.0203)	(0.0288)
2021	-0.0259	-0.0262	-0.0228	-0.0176	-0.112***
	(0.0288)	(0.0288)	(0.0285)	(0.0277)	(0.0392)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	161,942	161,942	161,942	161,942	145,606
Wald chi2	8630.28	8636.31	8525.44	8606.78	7753.61
p-value	0.0000	0.0000	0.0000	0.0000	0.0000
Log L	-59822.48	-59815.06	-59,882.60	-59795.87	-53353.69

[This table continues on the next page.]

Note: This table presents the estimated marginal effects from the probit regressions with firm survival as the dependent variable. Size is the natural logarithm of total assets in year t. Asset growth is defined as the annual change in total assets [ln(asset in year t) – ln(1+asset in year t–1)]. ROA is defined as the ratio of operating incomes to total assets in year t. Sales growth is defined as the annual change in firm sales [ln(1+sales in year t) – ln(1+sales in year t–1)]. Leverage is defined as the book value of debt divided by the book value of assets in year t. ΔTotal borrowings is defined as the annual change in total borrowings [ln(1+total borrowings in year t) – ln(1+total borrowings in year t–1)]. Interest payments represent the ratio of a firm's interest expenses to the sum of its short-term borrowings, long-term borrowings, and discounted bills receivables in year t-1. ΔTrade payables is defined as the annual change in trade payables [ln(1+trade payables in year t) – ln(1+trade payables in year t–1)]. Cash holding values are normalized by total assets in year t. Asset growth, ROA, sales growth, leverage, cash holdings, Δtotal borrowings, interest payments, and Δtrade payables are calculated by subtracting the median value of each variable in the medium category in the industrial classification. Industry ROA is the mean value of ROA of a firm's industry in year t-1. Industry sales growth is the mean value of sales growth of a firm's industry in year t-1. The estimation results for the constant term are omitted. The estimated standard errors are shown in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 12: Estimation Results of Zombie Firms, Successor, and Manager Age on Firm Survival after Default

	(1)	(2)	(3)	(4)
	Survival	Survival	Survival	Survival
Size	0.00180***	0.00166***	0.0116***	0.00509***
	(0.000607)	(0.000618)	(0.00144)	(0.00103)
Asset Growth	0.0340***	0.0348***	0.0285***	0.0209***
	(0.00363)	(0.00360)	(0.00703)	(0.00522)
Age	0.0109***	0.0107***	0.00355	0.0174***
	(0.00159)	(0.00161)	(0.00318)	(0.00249)
ROA	0.0747***	0.0738***	0.0571***	0.0640***
	(0.00469)	(0.00468)	(0.00899)	(0.00662)
Sales Growth	0.0633***	0.0618***	0.0676***	0.0601***
	(0.00275)	(0.00273)	(0.00533)	(0.00394)
Leverage	-0.00485***	-0.00412***	0.00144	-0.00187*
	(0.000706)	(0.000701)	(0.00136)	(0.000986)
ΔTotal Borrowings	0.0137***	0.0116***	0.0105	0.0186***
	(0.00325)	(0.00422)	(0.00645)	(0.00511)
Interest Payment	0.681***		0.567***	0.521***
	(0.0634)		(0.123)	(0.0902)
ΔTrade Payables	0.00247***	0.00241***	0.00140	0.00261***
	(0.000589)	(0.000587)	(0.00106)	(0.000817)
Cash Holdings	0.134***	0.141***	0.0754***	0.117***
	(0.00676)	(0.00693)	(0.0119)	(0.00942)
PD	-0.592***	-0.599***	-0.581***	-0.509***
	(0.0481)	(0.0476)	(0.0904)	(0.0659)
Years after Default	0.0147***	0.0147***	0.0105***	0.0125***
	(0.00114)	(0.00114)	(0.00197)	(0.00157)
Industry ROA	-0.105			
	(0.0861)			
Industry Sales Growth	0.157***			
	(0.0585)			
Zombie Firms		-0.0382***		
		(0.00199)		
ΔTotal Borrowings		0.00262		
×Zombie Firms		(0.00539)		
Successor			0.0202***	
			(0.00325)	
Manager Age: 60-69				-0.00784***
				(0.00289)
Manager Age: 70-79				-0.0361***
				(0.00389)
Manager Age: 80-				-0.0491***
				(0.00767)

[This table continues on the next page.]

Industry FE	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	161,942	161,942	43,630	78,571
Wald chi2	8475.83	8936.11	1959.95	3399.22
p-value	0.0000	0.0000	0.0000	0.0000
Log L	-59903.19	-59688.88	-16159.13	-29558.55

Note: This table presents the estimated marginal effects from the probit regressions with firm survival as the dependent variable. The zombie firm dummy equals one if actual interest payments are less than the minimum required interest payments, which is prime rate*times* the total borrowings of the firm. Successor is a dummy variable that equals 1 if a firm has a successor. Manager Age: 60–69, 70–79, and over 80 are dummy variables if a manager's age is 60–69, 70–79, and 80 or over, respectively. The definitions of the independent variables are the same as those in Table 11. The estimation results for the constant term are omitted. The estimated standard errors are shown in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 13: Estimation Results on Profitability after Default

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA (t+1)	Survival	ROA (t+1)	Survival	ROA (t+1)	Survival
	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman
Size	0.0098***	-0.0634***	0.0102***	-0.0658***	0.0082***	0.0209***
	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.003)
Asset Growth	0.0176***	-0.0539***	0.0172***	-0.0804***		
	(0.003)	(0.019)	(0.003)	(0.020)		
Age	-0.0006	-0.0246***	-0.0054***	0.0022	0.0078***	0.0566***
	(0.001)	(0.008)	(0.001)	(0.008)	(0.001)	(0.008)
ROA		0.9550***		0.9500***		
		(0.027)		(0.028)		
Sales Growth		0.2036***		0.2082***		
		(0.012)		(0.012)		
Leverage	0.0014*	0.0465***	0.0007	0.0303***		
	(0.001)	(0.005)	(0.001)	(0.006)		
ΔTotal Borrowings	-0.0297***	0.1401***	-0.0288***	0.1418***		
	(0.002)	(0.014)	(0.002)	(0.015)		
Interest Payment	0.6754***	2.2927***	0.6995***	1.8742***		
	(0.041)	(0.297)	(0.039)	(0.291)		
ΔTrade Payables	0.0008*	0.0101***	0.0009*	0.0099***	-0.0004	0.0127***
	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.003)
Cash Holdings		0.7923***		0.7149***		0.6072***
		(0.033)		(0.039)		(0.034)
PD	0.3881***	-2.9221***			0.2397***	-2.9484***
	(0.049)	(0.277)			(0.042)	(0.223)
Years after Default	-0.0043***	0.0519***	-0.0042***	0.0527***	-0.0006	0.0741***
	(0.001)	(0.005)	(0.001)	(0.005)	(0.000)	(0.006)
ROA (in $\tau = 0$)			0.0646***	-0.1810***		
			(0.005)	(0.028)		
Sales Growth (in $\tau = 0$)			-0.0152***	0.1481***		
			(0.002)	(0.013)		
Leverage (in $\tau = 0$)			0.0073***	0.0005		
			(0.001)	(0.008)		
Cash Holdings (in $\tau = 0$)			-0.0445***	0.3247***		
			(0.005)	(0.044)		
Real-Financial Factors					0.0301***	0.1377***
(Comp1)					(0.001)	(0.003)
Financial Factors					-0.0297***	-0.0512***
(Comp2)					(0.001)	(0.004)
Real Factors					0.0091***	0.0020
(Comp3)					(0.001)	(0.004)

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Default Year	(1)	(2)	(3)	(4)	(5)	(6)
2000	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)
2001	0.0112**	0.0741*	0.0127**	0.0654	0.0130**	0.0842*
	(0.006)	(0.044)	(0.006)	(0.044)	(0.006)	(0.045)
2002	0.0075	0.0747*	0.0082	0.0733*	0.0086	0.0938**
	(0.006)	(0.044)	(0.006)	(0.044)	(0.006)	(0.046)
2003	0.0109*	-0.0257	0.0111*	-0.0249	0.0112**	-0.0185
	(0.006)	(0.045)	(0.006)	(0.045)	(0.006)	(0.047)
2004	0.0094	-0.0291	0.0088	-0.0260	0.0092	-0.0169
	(0.006)	(0.046)	(0.006)	(0.047)	(0.006)	(0.048)
2005	0.0018	-0.0556	0.0019	-0.0557	0.0022	-0.0565
	(0.006)	(0.048)	(0.006)	(0.048)	(0.006)	(0.050)
2006	0.0077	-0.0857*	0.0069	-0.0797	0.0071	-0.0741
	(0.006)	(0.049)	(0.006)	(0.050)	(0.006)	(0.051)
2007	0.0088	-0.0713	0.0083	-0.0652	0.0087	-0.0570
	(0.006)	(0.051)	(0.006)	(0.051)	(0.006)	(0.052)
2008	0.0060	-0.1201**	0.0063	-0.1143**	0.0066	-0.1043*
	(0.006)	(0.052)	(0.006)	(0.052)	(0.006)	(0.054)
2009	0.0078	-0.0685	0.0087	-0.0656	0.0094	-0.0441
	(0.006)	(0.054)	(0.006)	(0.054)	(0.006)	(0.056)
2010	0.0054	-0.0428	0.0055	-0.0349	0.0060	-0.0143
	(0.007)	(0.057)	(0.007)	(0.057)	(0.007)	(0.059)
2011	-0.0049	-0.0209	-0.0053	-0.0137	-0.0049	0.0037
	(0.007)	(0.059)	(0.007)	(0.060)	(0.007)	(0.061)
2012	-0.0036	-0.0299	-0.0061	-0.0169	-0.0055	0.0018
	(0.007)	(0.062)	(0.007)	(0.063)	(0.007)	(0.064)
2013	-0.0054	-0.0150	-0.0080	-0.0005	-0.0073	0.0313
	(0.008)	(0.065)	(0.007)	(0.065)	(0.007)	(0.067)
2014	-0.0184**	0.0578	-0.0218***	0.0786	-0.0215***	0.0964
	(0.008)	(0.068)	(0.008)	(0.069)	(0.008)	(0.071)
2015	-0.0144*	0.0433	-0.0183**	0.0654	-0.0177**	0.0915
	(0.008)	(0.072)	(0.008)	(0.072)	(0.008)	(0.074)
2016	-0.0231***	0.0708	-0.0274***	0.0969	-0.0266***	0.1184
	(0.009)	(0.075)	(0.009)	(0.076)	(0.009)	(0.078)
2017	-0.0212**	0.0807	-0.0255***	0.1091	-0.0250***	0.1398*
	(0.009)	(0.079)	(0.009)	(0.080)	(0.009)	(0.082)
2018	-0.0282***	0.0846	-0.0322***	0.1090	-0.0314***	0.1347
	(0.010)	(0.083)	(0.010)	(0.084)	(0.010)	(0.086)
2019	-0.0414***	0.0835	-0.0458***	0.1149	-0.0450***	0.1183
	(0.010)	(0.088)	(0.010)	(0.088)	(0.010)	(0.090)
2020	-0.0506***	0.1117	-0.0561***	0.1458	-0.0555***	0.1428
	(0.012)	(0.094)	(0.012)	(0.095)	(0.012)	(0.097)
2021	-0.0323*	-0.0628	-0.0343**	-0.0289	-0.0320*	-0.0445
	(0.017)	(0.112)	(0.017)	(0.113)	(0.017)	(0.113)
Industry FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	161,942	161,942	161,942	161,942	161,942	161,942
Wald chi2	2532.3	2532.3	2720.8	2720.8	2641.2	2641.2
p-value	0.000	0.000	0.000	0.000	0.000	0.000
Log L	-11343.4	-11343.4	-11044.2	-11044.2	-13376.9	-13376.9

Note: This table presents the estimates from the Heckman sample selection model with profitability as the dependent variable. The definitions of the independent variables are the same as those in Table 11. The estimation results for the constant term are omitted. The estimated standard errors are shown in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 14: Estimation Results on Sales Growth after Default

	(1)	(2)	(3)	(4)	(5)	(6)
	Sales Growth (t+1)	Survival	Sales Growth (t+1)	Survival	Sales Growth (t+1)	Survival
	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman
Size	-0.0008	0.0092***	-0.0014**	0.0042	-0.0028***	0.0031
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Asset Growth	0.0974***	0.1821***	0.0983***	0.1412***		
	(0.005)	(0.019)	(0.005)	(0.019)		
Age	-0.0185***	0.0620***	-0.0148***	0.0790***	-0.0175***	0.0622***
	(0.002)	(0.008)	(0.002)	(0.008)	(0.002)	(0.008)
ROA		0.4574***		0.4295***		
		(0.023)		(0.024)		
Sales Growth		0.3303***		0.3384***		
		(0.015)		(0.015)		
Leverage	0.0005	-0.0263***	0.0016	-0.0547***		
	(0.001)	(0.003)	(0.001)	(0.004)		
ΔTotal Borrowings	0.0102***	0.0595***	0.0086***	0.0657***		
	(0.003)	(0.016)	(0.003)	(0.016)		
Interest Payment	-0.0866	3.3981***	-0.1453**	2.7295***		
	(0.066)	(0.313)	(0.064)	(0.307)		
ΔTrade Payables	0.0086***	0.0246***	0.0086***	0.0247***	0.0117***	0.0261***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Cash Holdings		0.6036***		0.5540***		0.6319***
		(0.034)		(0.040)		(0.034)
PD	-0.4907***	-3.2511***			-0.1732***	-2.8111***
	(0.065)	(0.242)			(0.060)	(0.222)
Years after Default	0.0046***	0.0710***	0.0045***	0.0718***	0.0043***	0.0724***
	(0.001)	(0.006)	(0.001)	(0.006)	(0.001)	(0.006)
ROA (in $\tau = 0$)			0.0113*	0.0872***		
			(0.006)	(0.024)		
Sales Growth (in $\tau = 0$)			0.0111***	0.1518***		
			(0.004)	(0.013)		
Leverage (in $\tau = 0$)			-0.0050***	0.0313***		
			(0.001)	(0.006)		
Cash Holdings (in $\tau = 0$)			0.0626***	0.1766***		
			(0.007)	(0.042)		
Real-Financial Factors					-0.0017*	0.1388***
(Comp1)					(0.001)	(0.003)
Financial Factors					0.0210***	-0.0499***
(Comp2)					(0.001)	(0.004)
Real Factors					-0.0316***	0.0201***
(Comp3)					(0.001)	(0.004)

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Default Year	(1)	(2)	(3)	(4)	(5)	(6)
2000	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)
2001	0.0243**	0.1295**	0.0244**	0.1248**	0.0258**	0.1269**
	(0.011)	(0.055)	(0.011)	(0.055)	(0.011)	(0.055)
2002	0.0202*	0.1300**	0.0207*	0.1312**	0.0217*	0.1272**
	(0.011)	(0.056)	(0.011)	(0.056)	(0.011)	(0.056)
2003	0.0091	-0.0158	0.0093	-0.0144	0.0099	-0.0172
	(0.011)	(0.057)	(0.011)	(0.057)	(0.011)	(0.057)
2004	0.0050	-0.0372	0.0063	-0.0350	0.0070	-0.0384
	(0.011)	(0.059)	(0.011)	(0.059)	(0.011)	(0.059)
2005	0.0027	-0.1030*	0.0038	-0.1007*	0.0043	-0.1040*
	(0.012)	(0.060)	(0.012)	(0.060)	(0.012)	(0.060)
2006	0.0016	-0.1512**	0.0036	-0.1439**	0.0054	-0.1501**
	(0.012)	(0.062)	(0.012)	(0.062)	(0.012)	(0.062)
2007	0.0101	-0.1138*	0.0114	-0.1087*	0.0131	-0.1111*
	(0.012)	(0.063)	(0.012)	(0.063)	(0.012)	(0.063)
2008	0.0000	-0.1524**	0.0016	-0.1450**	0.0032	-0.1517**
	(0.012)	(0.065)	(0.012)	(0.065)	(0.012)	(0.065)
2009	0.0042	-0.1221*	0.0058	-0.1161*	0.0066	-0.1221*
	(0.012)	(0.067)	(0.012)	(0.067)	(0.012)	(0.067)
2010	0.0111	-0.0816	0.0138	-0.0718	0.0137	-0.0791
	(0.012)	(0.070)	(0.012)	(0.070)	(0.012)	(0.070)
2011	0.0097	-0.0842	0.0127	-0.0739	0.0136	-0.0805
	(0.013)	(0.073)	(0.013)	(0.073)	(0.013)	(0.073)
2012	0.0065	-0.0797	0.0100	-0.0691	0.0103	-0.0760
	(0.013)	(0.076)	(0.013)	(0.076)	(0.013)	(0.077)
2013	0.0150	-0.0282	0.0191	-0.0175	0.0195	-0.0249
	(0.013)	(0.080)	(0.013)	(0.080)	(0.013)	(0.080)
2014	0.0135	0.0182	0.0182	0.0303	0.0172	0.0245
	(0.014)	(0.083)	(0.014)	(0.083)	(0.014)	(0.084)
2015	0.0145	0.0161	0.0197	0.0306	0.0186	0.0248
	(0.014)	(0.087)	(0.014)	(0.087)	(0.014)	(0.088)
2016	0.0137	0.0319	0.0191	0.0481	0.0173	0.0409
	(0.015)	(0.091)	(0.015)	(0.092)	(0.015)	(0.092)
2017	0.0219	0.0191	0.0276*	0.0389	0.0271*	0.0295
	(0.016)	(0.096)	(0.016)	(0.096)	(0.016)	(0.096)
2018	0.0100	0.0367	0.0159	0.0568	0.0146	0.0474
	(0.016)	(0.100)	(0.017)	(0.100)	(0.016)	(0.101)
2019	0.0039	0.0248	0.0104	0.0486	0.0073	0.0344
	(0.017)	(0.105)	(0.017)	(0.105)	(0.017)	(0.105)
2020	0.0244	-0.0008	0.0315	0.0223	0.0270	0.0111
	(0.019)	(0.111)	(0.019)	(0.111)	(0.019)	(0.111)
2021	0.0019	-0.2280*	0.0089	-0.1900	0.0089	-0.2158*
	(0.028)	(0.124)	(0.028)	(0.124)	(0.028)	(0.124)
Industry FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	161,942	161,942	161,942	161,942	161,942	161,942
Wald chi2	1649.7	1649.7	1649.7	1731.9	1905.8	1905.8
p-value	0.000	0.000	0.000	0.000	0.000	0.000
Log L	-93030.4	-93030.4	-93030.4	-92958.4	-92607.4	-92607.4

Note: This table presents the estimates from the Heckman sample selection model with sales growth as the dependent variable. The definitions of the independent variables are the same as those in Table 11. The estimation results for the constant term are omitted. The estimated standard errors are shown in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 15: Estimation Results on Employment Growth after Default

	(1)	(2)	(3)	(4)	(5)	(6)
	Emp. Growth (t+1)	Survival	Emp. Growth (t+1)	Survival	Emp. Growth (t+1)	Survival
	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman
Size	-0.0026***	-0.0035	-0.0023***	-0.0081***	-0.0028***	-0.0064**
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Asset Growth	0.0256***	0.1631***	0.0236***	0.1244***		
	(0.005)	(0.018)	(0.005)	(0.019)		
Age	-0.0107***	0.0557***	-0.0104***	0.0716***	-0.0103***	0.0544***
	(0.002)	(0.008)	(0.002)	(0.008)	(0.002)	(0.008)
ROA		0.3897***		0.3653***		
		(0.023)		(0.024)		
Sales Growth		0.3027***		0.3095***		
		(0.014)		(0.014)		
Leverage	-0.0029***	-0.0253***	-0.0040***	-0.0521***		
	(0.001)	(0.004)	(0.001)	(0.004)		
ΔTotal Borrowings	0.0003	0.0601***	0.0006	0.0660***		
	(0.004)	(0.016)	(0.004)	(0.016)		
Interest Payment	0.0719	3.1381***	0.0830	2.5236***		
	(0.085)	(0.310)	(0.084)	(0.305)		
ΔTrade Payables	0.0021**	0.0130***	0.0021**	0.0132***	0.0016	0.0138***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Cash Holdings		0.6732***		0.6156***		0.6701***
		(0.034)		(0.040)		(0.035)
PD	-0.0035	-2.9522***			-0.0974	-2.6317***
	(0.081)	(0.240)			(0.075)	(0.222)
Years after Default	0.0022*	0.0747***	0.0022*	0.0754***	0.0031**	0.0752***
	(0.001)	(0.006)	(0.001)	(0.006)	(0.001)	(0.006)
ROA (in $\tau = 0$)			0.0056	0.0689***		
			(0.007)	(0.024)		
Sales Growth (in $\tau = 0$)			0.0049	0.1430***		
			(0.004)	(0.013)		
Leverage (in $\tau = 0$)			0.0029	0.0294***		
			(0.002)	(0.006)		
Cash Holdings (in $\tau = 0$)			0.0145	0.1687***		
			(0.010)	(0.042)		
Real-Financial Factors					0.0135***	0.1258***
(Comp1)					(0.001)	(0.003)
Financial Factors					-0.0030***	-0.0444***
(Comp2)					(0.001)	(0.004)
Real Factors					0.0053***	0.0199***
(Comp3)					(0.001)	(0.004)

[This table continues on the next page.]

Default Year	(1)	(2)	(3)	(4)	(5)	(6)
2000	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)	(Benchmark)
2001	0.0000	0.1119**	-0.0002	0.1069*	0.0008	0.1126**
	(0.015)	(0.055)	(0.015)	(0.055)	(0.015)	(0.055)
2002	0.0071	0.1247**	0.0073	0.1253**	0.0079	0.1247**
	(0.015)	(0.056)	(0.015)	(0.056)	(0.015)	(0.056)
2003	-0.0042	-0.0063	-0.0039	-0.0058	-0.0044	-0.0049
	(0.015)	(0.057)	(0.015)	(0.057)	(0.015)	(0.057)
2004	-0.0053	-0.0237	-0.0049	-0.0227	-0.0060	-0.0221
	(0.016)	(0.059)	(0.016)	(0.059)	(0.015)	(0.059)
2005	-0.0088	-0.0633	-0.0083	-0.0624	-0.0095	-0.0615
	(0.016)	(0.060)	(0.016)	(0.060)	(0.016)	(0.060)
2006	-0.0047	-0.1211**	-0.0041	-0.1156*	-0.0067	-0.1180*
	(0.016)	(0.062)	(0.016)	(0.062)	(0.016)	(0.062)
2007	0.0002	-0.0917	0.0008	-0.0878	-0.0011	-0.0869
	(0.016)	(0.063)	(0.016)	(0.063)	(0.016)	(0.063)
2008	-0.0037	-0.1208*	-0.0027	-0.1150*	-0.0051	-0.1184*
	(0.016)	(0.065)	(0.016)	(0.065)	(0.016)	(0.065)
2009	-0.0067	-0.0844	-0.0057	-0.0799	-0.0074	-0.0817
	(0.016)	(0.067)	(0.016)	(0.067)	(0.016)	(0.067)
2010	-0.0070	-0.0376	-0.0057	-0.0294	-0.0072	-0.0329
	(0.017)	(0.070)	(0.017)	(0.070)	(0.017)	(0.070)
2011	-0.0050	-0.0267	-0.0040	-0.0185	-0.0048	-0.0219
	(0.017)	(0.072)	(0.017)	(0.072)	(0.017)	(0.072)
2012	0.0015	-0.0276	0.0024	-0.0188	0.0016	-0.0230
	(0.018)	(0.076)	(0.018)	(0.076)	(0.018)	(0.076)
2013	0.0032	0.0305	0.0039	0.0399	0.0040	0.0349
	(0.019)	(0.079)	(0.019)	(0.079)	(0.019)	(0.079)
2014	-0.0019	0.1051	-0.0011	0.1156	0.0004	0.1113
	(0.019)	(0.083)	(0.019)	(0.083)	(0.019)	(0.083)
2015	0.0014	0.0779	0.0024	0.0907	0.0031	0.0860
	(0.020)	(0.087)	(0.020)	(0.087)	(0.020)	(0.087)
2016	0.0040	0.1041	0.0051	0.1186	0.0063	0.1126
	(0.021)	(0.091)	(0.021)	(0.091)	(0.021)	(0.091)
2017	0.0056	0.1142	0.0067	0.1319	0.0079	0.1222
	(0.022)	(0.095)	(0.022)	(0.095)	(0.022)	(0.095)
2018	0.0020	0.1294	0.0032	0.1470	0.0044	0.1364
	(0.023)	(0.100)	(0.023)	(0.100)	(0.023)	(0.100)
2019	0.0019	0.1285	0.0032	0.1491	0.0049	0.1356
	(0.024)	(0.104)	(0.024)	(0.104)	(0.024)	(0.104)
2020	-0.0034	0.1267	-0.0022	0.1470	0.0005	0.1358
	(0.026)	(0.110)	(0.026)	(0.110)	(0.026)	(0.110)
2021	-0.0228	-0.0742	-0.0210	-0.0402	-0.0238	-0.0639
	(0.034)	(0.123)	(0.034)	(0.123)	(0.034)	(0.123)
Industry FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	161,942	161,942	161,942	161,942	161,942	161,942
Wald chi2	239.1	239.1	245.5	245.5	400.6	400.6
p-value	0.000	0.000	0.000	0.000	0.000	0.000
Log L	-143143.0	-143143.0	-143109.0	-143109.0	-143131.0	-143131.0

Note: This table presents the estimates from the Heckman sample selection model with employment growth as the dependent variable. The definitions of the independent variables are the same as those in Table 11. The estimation results for the constant term are omitted. The estimated standard errors are shown in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.