Personal Guarantees on Bank Loans and SMEs' CEO Succession

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Using loan- and firm-level data from more than 18,000 small and medium enterprises (SMEs) in Japan, this paper examines the relationship between personal guarantee agreements on bank loans by SMEs' CEOs and CEO succession. Looking at the period after the implementation of the Japanese policy change in 2014, which asks banks not to impose personal guarantees on loans to SMEs, we find that receiving loans without personal guarantees increases SMEs' CEO succession likelihood. We find that the reduced reliance on personal guarantees in loan contracts facilitated succession more for those firms with CEOs older than the retirement age and firms with good credit ratings. Combined with SMEs' ownership data, we also find that the effect of reducing personal guarantee usage on succession is weaker for owner-managed firms. We conducted a survey and found that the causality between borrowing without personal guarantees and succession runs in both directions. Some firms took out loans without personal guarantees for the purpose of facilitating CEO succession, but even when CEO succession was not a primary purpose of borrowing without personal guarantees, many firms believe that their CEO succession was eased by receiving loans without personal guarantees.

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1. Introduction

Recent studies have confirmed the importance of CEO succession for post-succession firm performance (Lee et al. 2003, Pérez-González 2006, Cucculelli and Micucci 2008, Mehrotra et al. 2013). Moreover, CEO succession influences the age of CEOs, which is often identified as an important driver of firm performance (Cannella et al. 2009, Serfling 2014 , Belenzon et al. 2019). Although the literature has shown that several factors can influence a firm's CEO succession process, such as CEOs' family structure (Bennedsen et al. (2007)), CEO ability (Boeker 1992), and legal protection for stakeholders (La Porta et al. 1999, Claessens et al. 2000), little is known about the relationship between corporate financial contracts and CEO succession.

In parallel, the corporate finance literature has documented that a firm's financial contracting affects various corporate strategies, such as investment decisions (Nini et al. 2009, Nini et al. 2012, Roberts and Sufi 2009), operational flexibility (Benmelech et al. 2020), and innovative activities (Chava et al. 2017, Hochberg et al. 2018, Mann 2018, Ma et al. 2022). This paper bridges those two area of research by examining the relationship between a firm's financial contracts and the CEO succession process.[1] Specifically, we look at a particular property of corporate loan contracts that is prevalent among SMEs, personal guarantees by SME managers, and examine how personal guarantees affect CEO succession.

A personal guarantee in a loan contract that requires an individual to personally repay a loan if the company is unable to do so. A personal guarantee increases the cost of default for the borrower and mitigates moral hazard, as collateral would. For small and medium enterprises (SMEs) that do not have many physical assets that could serve as collateral, personal guarantees provide an effective mechanism to limit moral hazard (Thakor and Udell 1991, Bester 1994). In many countries, financial institutions rely heavily on personal guarantees when lending to SMEs. For example, in 2014, more than 80% of newly issued loans to SMEs by Japanese banks included personal guarantees.[2]

Although a personal guarantee may facilitate lending by mitigating moral hazard, it can also impose an enormous burden on CEOs and their families. When a business gets into trouble, a personal guarantee can cause personal catastrophe (e.g., forfeiting houses and cars), as the majority of such guarantees exceed the total amount of CEOs' personal assets.[3] For example, in our sample

[1] There are only a few papers documenting the relationship between firms' financing strategy and CEO succession. Wasserman (2003), for example, found that the need for a new round of financing can be a force behind succession.

[2] See `https://www.fsa.go.jp/policy/hoshou_jirei/index.html` for the numbers.

[3] According to a survey of SME personal guarantee practices in 2013, more than 68% of personal guarantees exceeded the amount that could be repaid with CEOs' personal assets, including financial assets and real estate. The survey report (in Japanese) is available at `https://dl.ndl.go.jp/info:ndljp/pid/11252876`. Consistent with this, the majority of managers of failed SMEs file for personal bankruptcies, as discussed in a report (in Japanese) by Tokyo Shoko Research (TSR): `https://www.tsr-net.co.jp/data/detail/1190849_1527.html`

period, the average outstanding loans with CEOs' personal guarantee responsibilities amounted to 154 million JPY (approximately 1.4 million USD). Furthermore, when the CEO of a company changes, it used to be a customary in Japan for a financial institution to require a personal guarantee from the new CEO, may have discouraged a potential successor from taking over the business for fear of the downside financial risk.[4,5]

To address concerns about the dark side of personal guarantees, the Japan Bankers Association and Japan Chamber of Commerce developed the Guidelines for Personal Guarantees Provided by Business Managers in December 2013, which took effect on February 1, 2014.[6] The guidelines recommend that SMEs properly separate business from personal assets and banks not to require personal guarantees from SMEs that follow the guidelines. Using data from a government financial institution that dramatically reduced the practice of requiring CEOs to provide personal guarantees after the guidelines were issued, we examine whether firms that took loans without personal guarantees by CEOs showed higher CEO succession rates than those that continue to borrow with personal guarantees even after the implementation of the guidelines.

Our empirical analysis shows that receiving a loan without a personal guarantee is associated with a higher rate of CEO succession in the following periods. In addition, several factors are found to strengthen or weaken this relationship. The impact of having loans without personal guarantees is stronger for firms with CEOs older than the mandatory retirement age and for firms with better credit ratings. We also find that owner-managed firms' CEO succession likelihood does not depend as much on whether their loans come with personal guarantees compared to non-owner-managed firms.

We focus on Japan to examine the relationship between personal guarantees and CEO succession for several reasons. First, Japan has been experiencing the fastest population aging among G20 countries (Rouzet et al. 2019), and the average age of CEOs has also been rising.[7] CEO aging raises a serious issue for the future performance of Japanese business, because firm performance is often found to decline rapidly after a CEO passes the prime age (typically estimated to be between

[4] Many surveys have found the negative impact of personal guarantees on CEO succession in Japan. According to the Survey of SME Support, JAPAN, 59.8% of appointed successor CEOs who refused to take over businesses did so purely because of personal guarantee responsibilities for previously issued loans (`https://www.chusho.meti.go.jp/kinyu/hosyoukaijo/2020/200204kaijo02.pdf`). Furthermore, the Survey of SME Business Succession in 2009 showed that the personal guarantee requirements for new CEOs were among the main obstacles of SME CEO succession. See `https://www.jfc.go.jp/n/findings/pdf/sme_findings091216.pdf` for more detail on the survey.

[5] A small amount of research has examined the relationship between directors' personal risk and the likelihood of taking a director position. For example, Naaraayanan and Nielsen (2021) found that increasing personal liability in case of corporate malfeasance deters individuals from taking independent director roles.

[6] The guidelines (only in Japanese) can be accessed from the Financial Services Agency (FSA) website (`https://www.fsa.go.jp/news/25/ginkou/20131209-1.html`).

[7] The average age of CEOs in Japanese companies increased from 54.0 years in 1990 to 60.1 years in 2020 (see `https://www.tdb.co.jp/report/watching/press/p210202.html` for more detail).

40 and 60d). Japan's Ministry of Economy, Trade, and Industry (METI) projected that by 2025, around 630,000 *viable* businesses could close due to the difficulty in finding successors, costing the economy 165 billion UDS in sales and as many as 6.5 million jobs. The New York Times (2023) referred to this issue as "one of the most potentially devastating economic impacts of Japan's aging society."

Second, a Japanese policy reform in 2014, which is detailed below, allowed many SME managers to borrow without pledging personal guarantees for the first time. This policy reform allows us to compare firms that have borrowed with and without personal guarantees and how they differ in CEO succession likelihood in subsequent periods.

Finally, although we focus on the Japanese situation, there could be valuable lessons for other OECD countries, including the United States According to Statistica, the average age of CEOs across industries in the U.S. was 54.1 in 2018, a stark increase from the average age of 45.9 in 2005.[8] Furthermore, the use of personal guarantees is also quite common with SME business loans in the U.S. According to a Small Business Credit Survey conducted by the Federal Reserve, 59% of small businesses relied on personal guarantees to secure funding.[9]

The primary dataset we analyze contains proprietary information from the SME Unit of the Japan Finance Corporation (JFC), a government-owned financial institution specializing in policy-based lending to SMEs. We analyze loan- and firm-level information on SMEs that received new financing from the SME Unit of the JFC between February 2014 and March 2016. The loan-level data contain information for each loan, including whether it was issued with personal guarantees by managers. The firm-level data include firms' financial information, industry classification, and managers' attributes, such as dates of birth and shareholdings.

A potentially concerning aspect of our analysis is the extent to which the firms' selection (on borrowing without personal guarantees) could influence our results. Firms that want to replace their CEOs may be more likely to take out loans without personal guarantees. In this paper, we seek to address the issue by applying three approaches. First, we exclude firms that borrowed specifically for the purpose of CEO succession from our sample. The JFC offers various loan programs depending on borrowing purpose, and some of these explicitly target SMEs that borrow to finance their CEO succession. Second, we control for factors affecting both CEO succession and borrowing without personal guarantees in the estimation, such as firm performance measures and CEO age.

[8] Statistica data is available at `https://www.statista.com/statistics/1097551/average-age-at-hire-of-ceos-and-cfos-in-the-united-states/`.

[9] The survey is available at `https://www.fedsmallbusiness.org/-/media/project/smallbizcredittenant/fedsmallbusinesssite/fedsmallbusiness/files/2020/2020-sbcs-employer-firms-report.pdf`.

Finally, we conducted a survey of Japanese SMEs and directly asked the firms whether they borrowed without personal guarantees primarily to facilitate an already planned CEO succession. The survey showed that 40% of firms that had borrowed without personal guarantees and experienced CEO succession during our sample period chose to borrow without personal guarantees primarily for succession purposes. Even among those companies that had borrowed without personal guarantees but not primarily for succession purposes however, more than 60% answered that borrowing without personal guarantees facilitated their succession process. The findings indicate that our result partly reflects self-selection, but that is not the only driver of the results.

Our paper makes three main contributions. First, it is one of the first to document the connection between a firm's loan contract specification and its CEO succession decision. We find that taking out loans without a personal guarantee increases the probability of CEO succession in the subsequent four years by about 2.7%. Given that the overall share of firms that experienced CEO succession during our sample period was approximately 13.7%, 2.7% is substantial.[10]

Second, we analyze whether the policy reform induced *good* succession. Specifically, we check whether the reduced usage of personal guarantees (1) facilitated succession for firms with older CEOs that need to be replaced and (2) facilitated succession of viable businesses. We find that the increase in propensity to have CEO succession after receiving a loan without a personal guarantee is larger for firms with CEOs older than 65, the legal retirement age in Japan. In our sample, on average, new CEOs were 24 years younger than the previous CEOs for firms with CEOs older than 65. Taken together, the results confirm that reducing reliance on personal guarantees induced the replacement of older CEOs that were well past what is considered prime age and may have been viewed as needing to be replaced with younger people. We also find that the relationship between personal guarantees and succession is stronger for firms with better credit ratings, which suggests that the reduced reliance on personal guarantees effectively facilitated the succession of viable businesses.

Although we found supporting evidence for the policy reform's effectiveness, we also found a factor that might weaken the effect of removing personal guarantees on CEO succession. The increase in propensity to undertake CEO succession after receiving a loan without a personal guarantee is weaker for owner-managed firms. Succession in owner-managed firms involves more factors than that in non-owner-managed firms, including inheritance taxes and the CEO's emotional attachment to the firm, which may weaken the effect of personal guarantees on succession. This

[10] Yanaoka (2019) analyzes whether CEO succession likelihood differs between firms with successor candidates and those without using Japanese data and finds that the likelihood of CEO succession is 4.9 percentage points higher for those with successor candidates. Taken together with our result, the increase in the probability of CEO succession due to taking out loans without a personal guarantee explains more than half of the difference in CEO succession likelihood between firms with and without successor candidates.

result suggests that the effectiveness of the policy change on CEO succession depends on the firm's characteristics, including its ownership structure.

Finally, we deal with the potential problem caused by firms' self-selection. Self-selection bias is a major issue when identifying causal relationships between financial choices and corporate strategy because firms make joint decisions on their financial structure and corporate strategy (Parsons and Titman 2008). We exclude those firms that borrowed from the JFC to finance the expenses associated with CEO succession. We also control for variables that affect both CEO succession likelihood and borrowing without personal guarantees in our estimation. Moreover, we conducted an original survey to study whether firms borrow without personal guarantees to ease already planned CEO succession or firms that borrow without personal guarantees end up finding such loans also ease CEO succession. We find that both cases are observed.

The remainder of the paper is organized as follows. Section 2 explains the Japanese institutional background and the policy reform of 2014 that we exploit in our empirical strategy. Section 3 describes our data and discusses our estimation procedures. Section 4 presents our empirical results. Section 5 shows our survey method and results. Section 6 concludes our study.

2. Japanese Institutional Background and the 2014 Policy Reform

2.1. Institutional background

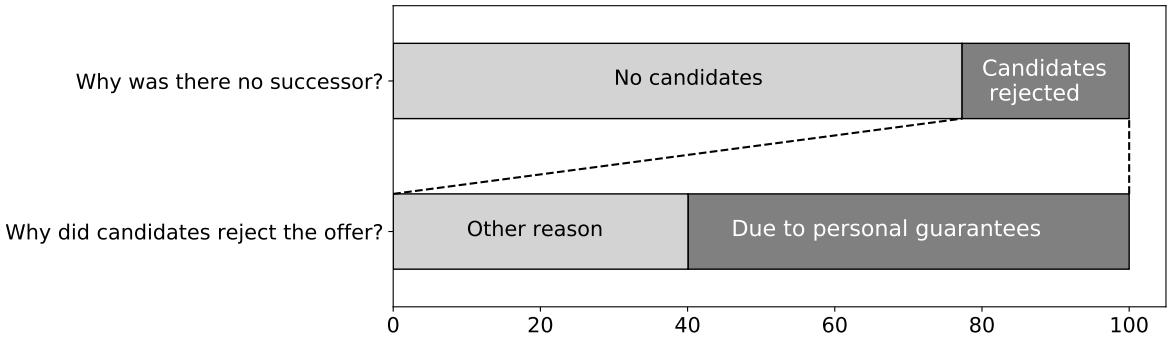
Imposing personal guarantees on SME lending became customary in Japan toward the end of the country's period of high economic growth (the mid-1970s). Japanese banks started to seek more SME customers as the demand for loans from large and established firms (their traditional customers) showed signs of waning. In order to reduce the default risk of loans to new SME borrowers, many of which did not have ample physical assets that could serve as collateral, Japanese banks began relying on personal guarantees pledged by managers or by third parties (friends and families of the managers).

Although personal guarantees have mitigated moral hazard and facilitated SME lending, they have also imposed significant personal burdens on CEOs (and their families and friends) when companies default. Without personal guarantees, even when the CEO owns a substantial portion of the business, the liability would be limited to the ownership. Offering personal guarantees, however, put the CEO's (and other co-guarantors') personal assets at risk in the event of loan default. Furthermore, when the guaranteed amount exceeds a CEO's personal assets, that CEO may be forced to file for personal bankruptcy. According to a TSR survey, among the 5552 firms that went bankrupt in Japan in 2020, 3789 CEOs (68.2%) personally went bankrupt due to their personal guarantee responsibilities.[11]

[11] See `https://www.tsr-net.co.jp/news/analysis/20210816_01.html` for more detail.

The significant financial risk of personal guarantees has been considered one of the main obstacles to CEO succession in Japan. According to the Organization for Small & Medium Enterprises and Regional Innovation (SMERI), which surveyed 9045 Japanese SMEs that canceled or postponed their CEO succession plans in 2018, the most common reason was the absence of a successor (35% of the surveyed firms listed it as the main reason). Among those that cited the absence of a successor as the main reason for canceling or postponing succession, a substantial number of them (23%) answered that although they had candidate successors, those candidates refused to take over. As the primary reason for rejection by the candidates, the majority (60%) blamed the requirement of personal guarantees (see Figure 1).

Figure 1: Reasons for the Absence of Candidate CEOs in Japanese SMEs



Note: This graph summarizes the answers of 9045 SMEs in the Personal Guarantees Provided by Business Managers Survey by the Organization for Small & Medium Enterprises and Regional Innovation in 2018. The horizontal axis shows the share of answers (%). The first survey question was asked of companies that answered that the primary reason for canceling or postponing their CEO succession was due to the absence of successors and asked "Why was the successor absent?" The second survey question was asked of firms that responded that the absence of successors was because candidate successors rejected the CEO job offers and asked "Why did the candidates reject the CEO job offer?" Multiple answers to these questions were not allowed. The original survey is available in Japanese at: `https://www.smrj.go.jp/doc/research_case/keieisha_question2017.pdf`.

Older CEOs face refusal by potential successors more often than younger ones. According to a 2011 SMERI survey that asked 1173 Japanese SMEs the reason for not having successors lined up, only 0.3% of firms with current CEOs in their 30s listed refusal by candidates, while 11.3% of firms with current CEOs in their 60s cited candidate refusal.[12] METI estimated that approximately 2.5 million SMEs will have CEOs older than 70 by 2025, with half of those firms not expected not to find successor CEOs and thus be forced to close.[13]

[12] The survey is available here: `https://www.smrj.go.jp/doc/research_case/jittaichousa_houkokusho.pdf`.

[13] The estimate by the METI is available in Japanese at: `https://www.chusho.meti.go.jp/koukai/kenkyukai/hikitugigl/2019/191107hikitugigl03_1.pdf`.

Mitigating the difficulty of finding and convincing successor CEOs for SMEs with older CEOs is an important motivation behind the Japanese government's efforts to discourage the usage of personal guarantees in SME lending in the last couple of decades.[14] The Civil Code Amendment 2004 (effective April 1, 2005) required all guaranteed contracts to be explicitly in writing and with terms of no more than five years. In 2006, the government prohibited government financial institutions from requiring personal guarantees by third parties (typically friends and family of the CEO). The FSA also asked private sector financial institutions to stop seeking personal guarantees from third parties.

The government's efforts to reduce the practice of Japanese banks requiring personal guarantees from business managers was intensified under the Abe administration (2012–2020), which viewed the practice as a major impediment to business risk-taking in Japan, a chronic challenge to CEO succession, and a source of long-lasting stagnation of the Japanese economy. In December 2013, with the encouragement of and pressure from the FSA and the METI's Small and Medium Enterprises Agency, the Japan Bankers Association and Japan Chamber of Commerce developed the Guidelines for Personal Guarantees Provided by Business Managers.[15] The guidelines encourage SMEs to separate business from personal assets and strongly recommend banks not to require personal guarantees from SMEs that follow the guidelines.[16] The guidelines became effective on February 1, 2014.

2.2. The 2014 Guidelines for Personal Guarantee Provided by Business Managers

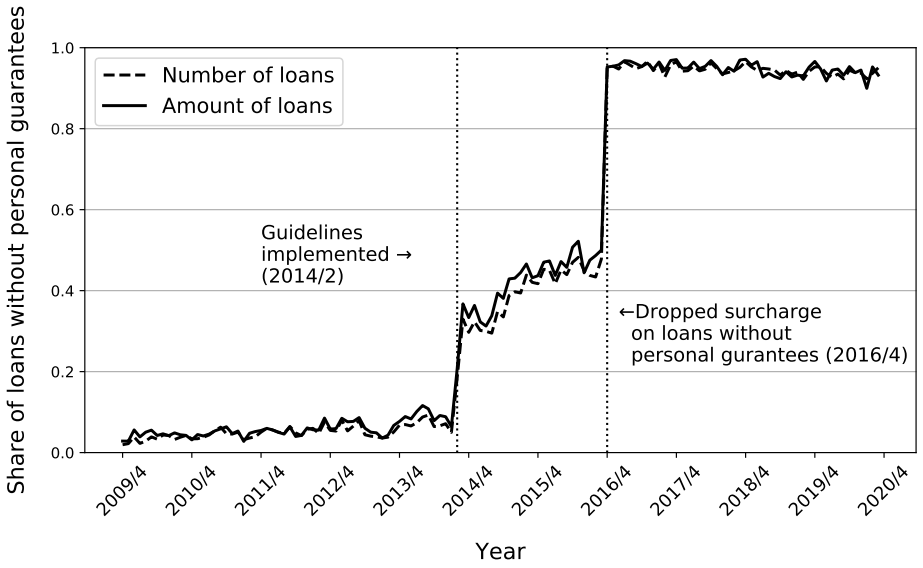
Since the guidelines were guiding principles and not mandatory, Japanese banks did not stop requiring personal guarantees for SME managers immediately, but their practices did begin to change. The proportion of new loans without personal guarantees gradually increased after the introduction of the guidelines. The proportion of new loans issued without personal guarantees increased from 20% in 2013 to about 40% in 2021 for government financial institutions and from 12% to about 20% for private sector banks. Figure S1 in the Supplementary Information Section S.1 shows the time series of the share of loans without personal guarantees issued by government-owned financial institutions and private sector banks.

[14] The Japanese government has also been working on this problem by facilitating M&As for companies that cannot conduct CEO succession. Due to the government effort, the number of CEO succession through M&As in Japan has increased from 184 cases in 2012 to 544 in 2018, but it has only a negligible effect on this problem so far. For more detail on the government effort to facilitate M&As, please see `https://www.chusho.meti.go.jp/koukai/kenkyukai/hikitugigl/2019/191107hikitugigl03_1.pdf`.

[15] The guidelines (in Japanese) can be accessed from the FSA website: `https://www.fsa.go.jp/news/25/ginkou/20131209-1.html`.

[16] The guidelines also specify procedures for renegotiating or removing existing guarantees. However, the guidelines had very little effect for existing loans in practice. For example, the guidelines were used to dissolve personal guarantees in only 207 cases by private financial institutions and in 61 cases by government-owned financial institutions in fiscal year 2015. See `https://www.fsa.go.jp/policy/hoshou_jirei/index.html` for details.

Figure 2: JFC Loans Issued without Personal Guarantees



Note: This graph contains the monthly share of newly issued loans by the JFC SME Unit from April 2009 to April 2020. *Number of loans* measures the monthly share of newly issued loans without personal guarantees in the JFC SME Unit. *Amount of loans* measures the monthly share of the total amount of newly issued loans without personal guarantees in the JFC SME Unit. Both numbers come from JFC the SME Unit's anonymized loan-level data.

The change was more dramatic for the SME Unit of the JFC, the largest government-owned financial institution for SME lending in Japan, as shown in Figure 2", which presents the monthly proportion of newly issued loans without personal guarantees. The share (in terms of number and amount of loans) jumped to more than 30% in February 2014 from less than 10% prior to that month. Between February 2014 and March 2016, the SME Unit advanced approximately 40% of new loans without personal guarantees, while the rest still carried personal guarantees.

During the period between February 2014 and March 2016, all companies that applied to the SME Unit for new loans were given the option of borrowing without personal guarantees, provided that they satisfied the conditions spelled out in the guidelines, such as a clear separation of company assets from the owner's personal assets and timely disclosure of financial information and business conditions. The JFC also imposed an interest surcharge of between 0.0% and 0.4% (depending on JFC's internal credit rating) on loans issued without personal guarantees. Faced with the choice between a loan with a personal guarantee but without a surcharge and one without a personal guarantee but with a surcharge, some borrowers continued to choose traditional loans with personal guarantees.

After April 2016, the JFC stopped requiring the surcharge on loans without personal guarantees, following which almost all new loans issued by the JFC SME Unit did not carry personal guarantees.

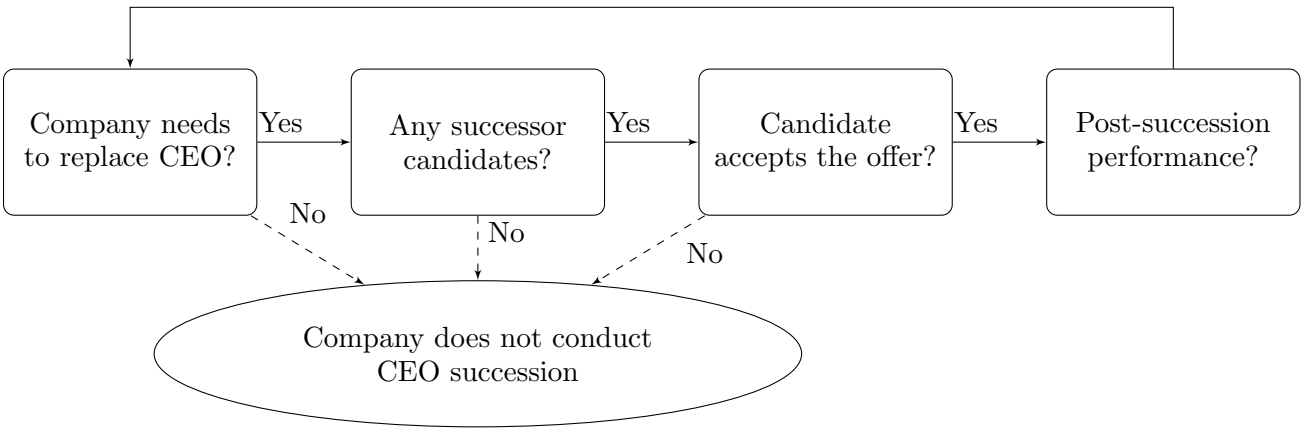
Figure 2 clearly shows that more than 90% of loans issued after April 2016 by the unit were without personal guarantees. The dramatic change after April 2016 suggests that loans without personal guarantees were an obvious choice without interest surcharges.

2.3. Anticipated Impacts of the 2014 Policy Reform

If the 2014 policy reform effectively reduced the use of personal guarantees in SME lending, how should that have changed the CEO succession at SMEs? Figure 3 is a stylized flowchart of the CEO succession process. Any CEO succession starts from a judgment that the current CEO needs to be replaced (first rectangle). The judgement can be made by the board of directors, the controlling shareholder, the CEO, or other influential stakeholders, given the governance structure. If one finalist is selected at this stage, then an offer is made to the candidate to become the next CEO (second rectangle). Then, the final candidate decides whether to accept the offer (third rectangle). Once the candidate accepts the offer, the company completes the CEO succession process.

Reducing reliance on personal guarantees in SME lending is likely to influence a candidate CEO's decision on whether or not to accept the offer. Given that the financial burden of personal guarantees is the main reason CEO candidates reject the job offers, as shown in Figure 1, the likelihood of a successor CEO accepting an offer is expected to increase if the company is less dependent on personal guarantees in its existing loans. Thus, we expect the likelihood of CEO succession to increase for those companies that took advantage of the 2014 guidelines and borrowed without personal guarantees.

Figure 3: CEO Succession Process



Note: This flowchart was created by the authors with reference to Berns and Klarner (2017).

To test this prediction on the relationship between personal guarantees and CEO succession, our analysis exploits the heterogeneity of firms' use of personal guarantee contracts in JFC lending between February 2014 and March 2016. During this period, some SMEs continued to borrow

from the JFC with personal guarantees, while others borrowed without such guarantees. We compare those two groups and examine how personal guarantees in loan contracts affected the CEO succession after April 2016.

The two groups we compare are not chosen randomly and are the results of choices made by various borrowers and JFC, the lender. Thus, we need to examine carefully how the self-selection nature of our grouping could introduce biases in our analysis. For example, one might wonder whether JFC suggested loans without personal guarantees only to high-performing firms so that they can achieve the policy goal of increasing the number and amount of loans without personal guarantees without increasing the actual credit risk.

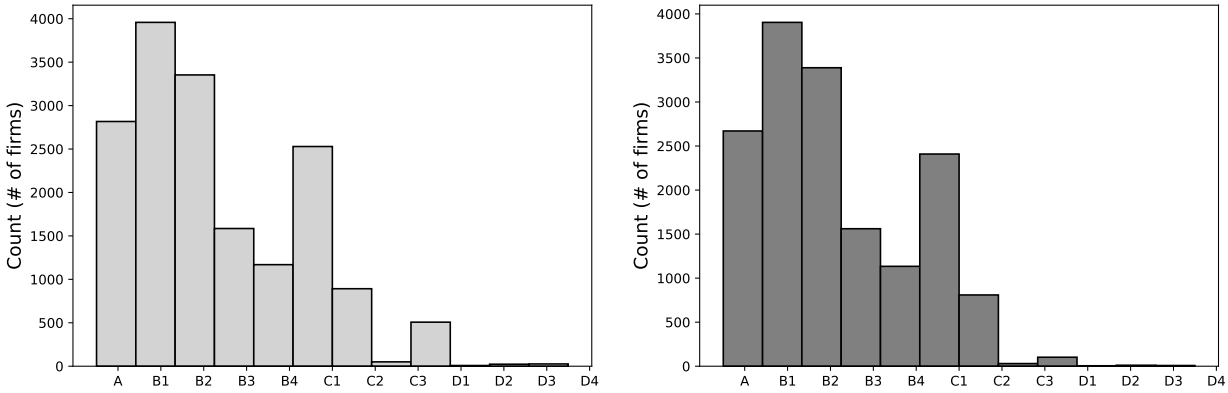
However, our interviews with some JFC employees responsible for SME lending at the time suggest that JFC did not try to limit the availability of loans without personal guarantees only to high-performance companies. JFC did not change its loan qualification standards. Perhaps more importantly, they were instructed to tell all qualified customers about the availability of loans without personal guarantees (but with interest surcharges), in addition to traditional loans with personal guarantees. This approach enabled the customer to choose its preferred approach.

To ensure that loan standards did not change after the guidelines were implemented, we compared the distributions of internal credit ratings before and after the 2014 policy reform. Figure 4 shows the distributions of credit ratings for firms that borrowed from the JFC SME Unit in the year before the policy change (02/2013-01/2014) and in the year after the policy change (02/2014-01/2015). The figure confirms that the composition of the firms in terms of their credit ratings did not change. We exclude those firms that borrow for the first time from the JFC SME Unit after February 2014 and found that our result does not change.

Since a borrower gas the final say on which type of loan contract it signs, a self-selection problem may emerge. Firms with a strong desire for CEO succession might be more likely to borrow without personal guarantees. To deal with this self-selection problem, we adopted three approaches. First, we use the detailed loan program information available at the JFC. The JFC offers different loan programs depending on the purpose of the loans, and one of its programs aims at financing the implementation of CEO succession that are already planned. We exclude those firms that borrowed under this program and re-estimate our regressions. Second, we control for variables that are likely to correlate with both use of personal guarantees and CEO succession, such as a firm's credit rating determining the interest surcharge when borrowing without personal guarantees. Finally, we conduct an original survey to directly identify the direction of causality between personal guarantees and CEO succession.

We also study what kind of succession was facilitated by the reduced reliance on personal guarantees. One of the ultimate objectives of introducing the guidelines was to promote succession for

Figure 4: Distribution of Firms' Credit Ratings before and after the Policy Reform



(a) Before the policy change (02/2013-01/2014) **(b)** After the policy change (02/2014-01/2015)

Note: This graph contains the distributions of firms' credit ratings one year before and one year after the introduction of the guidelines in February 2014. Panel (a) shows the distribution of credit ratings for firms that took out loans from the JFC SME Unit between February 2013 and January 2014. Panel (b) shows the distribution of credit ratings for firms that took out loans from the JFC SME Unit between February 2014 and January 2015. Credit ratings vary from A to D4. The vertical axis measures the number of firms, and the horizontal axis measures the credit rating.

viable firms, especially those with older CEOs. However, there was no guarantee that removing personal guarantees would facilitate succession for those companies. It is possible that the policy ended up encouraging CEO succession at the "wrong" firms; that is, those are not considered viable. Therefore, we check whether reducing the use of personal guarantees facilitated succession for firms with older CEOs and firms with better credit ratings. In addition, we check whether owner-managed firms and non-owner-managed firms exhibit different relationships between personal guarantees and succession.

3. Data and Empirical Specification

3.1. Data summary

We use an anonymized version of proprietary data from the JFC SME Unit to analyze the relationship between personal guarantees on business loans and CEO succession. The JFC is a government-affiliated financial institution, and its SME Unit mainly issues long-term loans (i.e., more than seven years) for Japanese SMEs.[17,18]

[17] The JFC consists of three units—the SME, national life, and agricultural and fishery units. The national life unit covers small loans (on average, 7 million yen ≈ 70,000 USD) for households and self-employed workers.

[18] The definition of SMEs depends on a firm's industry. For example, SMEs in the manufacturing sector are defined as companies with fewer than 300 employees or equity below 300 million yen (≈3 million USD). Please see `https://www.jfc.go.jp/n/finance/search/pdf/chusho_chouki.pdf` for more detail about the definition of SMEs at the JFC.

The dataset contains three types of information—information on individual loans, accounting information on SME borrowers, and information on the executives of the SMEs. The loan-level data comprise firm identifier, loan amount, loan contract date, maturity, interest rate, borrowing purpose (loan program), and other loan attributes, such as whether a loan comes with a personal guarantee.

The firm-level accounting data include the firm's financial statement information, from which we use total debt, total equity, profits, sales, and employment to control for firms' financial performance and size in our estimation. The accounting information is available every fiscal year, ending in March for many Japanese firms.

The executive data include the firm identifier, an indicator for whether the executive is a representative director or not, whether the executive is the president or not, the executive's demographic information (birth date, gender), and company shares held by each executive. The executive data do not identify the CEOs of the companies, so we define a company's CEO by the following the procedure. First, if an executive is a representative director and also a president, that executive is considered the CEO. Second, if the executive is the only representative director of the company, that executive is considered to be the CEO even when (s)he is not the president. This two-step procedure allows us to identify unique CEO for every firm in our sample. The executive data are available every fiscal year ending in March starting from 2015 fiscal year (March, 2016).

We combine the loan and executive data through unique firm identifiers and analyze the relationship between personal guarantees on loans and CEO succession after April 2016. We restrict our sample to firms that borrowed from the JFC SME Unit between February 2014 and March 2016. We combine the loan-level data and the executive data for fiscal year 2015 (ending in March 2016) to 2020 (ending in March 2021) to see whether firms that borrowed without personal guarantees before March 2016 had higher succession rates after April 2016.[19] Our sample includes 18,246 Japanese firms that borrowed from the JFC SME Unit between February 2014 and March 2016 and have executive information in the database for every fiscal year from 2015 to 2020. In addition to the main analysis, we construct CEO shareholding using the JFC executive data and examine whether the difference in CEO shareholding matters for the relationship between personal guarantee and CEO succession.

We remove firms that borrowed under the loan programs designated for firms that need financing for already planned CEO succession. When firms receive financing under these programs, they only use the proceeds for succession-related expenses. In our sample of firms that borrowed from the JFC SME Unit between February 2014 and March 2016, 62 firms borrowed under these programs, and thus, our final sample includes 18,184 Japanese firms after removing those 62 firms.

[19] We detect CEO succession as the change in CEO birthday in our executive data.

Table 1 summarizes the basic statistics of key variables in our analysis. The size of loans issued with personal guarantees is striking. In March 2016, our sample firms had total JFC outstanding loans of 210 million JPY (about 1.9 million USD) on average and had total JFC outstanding loans *with* personal guarantees of 154 million JPY (about 1.4 million USD). The number implies that the outstanding loans with personal guarantees, for which a CEO is personally liable if a company is unable to repay, are sizable enough to become financial and mental burdens on CEOs.

The average share of outstanding JFC loans *without* personal guarantees held by firms in the sample was 32%. The average firm had 22 million JPY in assets, generated 19 million JPY in sales, and had 60 employees.[20] The average CEO's age was 57.3 years, and the average firm's age was 41.6 years. The average debt-to-equity ratio was 33.7%. The average credit rating was 3.4, on a scale of 1 to 12, where a lower value indicates a better rating. Finally, CEO shareholding was 38% on average for firms in the sample. Table S2 in Section S.3 gives a correlation matrix.

Table 2 presents the distribution of firm characteristics by firms' shares of loans without personal guarantees. The second and third rows show no clear connection between firm or CEO age and the share of loans without personal guarantees. As for firm size variables, the columns for total assets, sales, and employment show that firms with all loans issued with personal guarantees (Share No PG = 0) were, on average smaller than other firms. We also see that firms with all loans issued with personal guarantees had a lower firm performance as of March 2016 in terms of profit-to-sales ratio, credit rating, and debt-to-equity ratio.

Table 3 presents the number of firms, the average share of JFC loans without personal guarantees in March 2016, and the share of firms that experienced CEO succession between March 2016 and March 2020 broken down by industry. We aggregate the four-digit JSIC codes into 16 broader classifications for ease of presentation. Firms in our sample are drawn from a wide industry distribution. The top three industries in terms of the share of firms are manufacturing, wholesale and retail, and construction. The average portion of firms that experienced a change in CEO between March 2016 and March 2020 across all industries is 13.7%. The top three industries in terms of the highest CEO succession rates are finance and insurance (20%), scientific research (17.6%), and transport and postal services (17.5%).

The top three industries in terms of a higher share of loans without personal guarantees are information and communication (45.7%), mining (41.3%), and services (36.0%). The manufacturing industry, the largest in our sample, also has a relatively high share of loans without personal guarantees (35.4%). The average share of firms with all JFC loans issued *with* personal guarantees as of March 2016 was 56.1%, while the average share of firms with all JFC loans *without* personal guarantees was 15.9%.

[20] As of March 2016, 1 USD ≈ 112 JPY, which means that the average firm in our sample had 0.2 million USD in assets and generated 0.14 million USD in sales.

Table 1: Summary Statistics

	# of firms	Mean	SD	10th	50th	90th
Level of outstanding loans (ten thousand JPY)	18,246	21,438.8	29190.5	1625.0	10500.0	54693.4
Level of outstanding loans *with* PG (ten thousand JPY)	18,246	15485.1	25082.3	0.0	6100.0	41903.0
Share of outstanding loans *without* PG	18,246	0.323	0.395	0.000	0.000	1.000
Firm age	18,246	41.6	19.7	13.0	44.0	66.0
CEO age	18,246	57.3	11.3	42.0	58.0	72.0
Assets (ten thousand JPY)	18,246	2206.8	3745.3	262.9	1126.6	4913.7
Sales (ten thousand JPY)	18,246	1906.4	3267.4	183.1	927.9	4374.2
Employment	18,246	59.9	107.4	4.0	32.0	136.0
Debt-to-equity ratio	18,246	0.337	0.110	0.177	0.359	0.455
Profit-to-sales ratio	18,246	0.0085	0.0956	-0.0284	0.0100	0.0632
Credit rating (scale of 1 to 12)	18,246	3.4	2.0	1	3	6
CEO shareholding	18,246	0.380	0.318	0.000	0.330	0.900

Note: This table provides summary statistics for the main firm-level variables used in the econometric analysis. The unit of observation is the firm. *Level of outstanding loans* is the total outstanding JFC loans for firms in our sample. *Level of outstanding loans with PG* is the level of outstanding JFC loans with personal guarantee responsibility. *Share of outstanding loans without personal guarantees* is calculated as each firm's share of outstanding loans without personal guarantees. *Firm age* is the number of years since the firm was established.. *CEO age* is the CEO's age in years. *Assets* and *Sales* are the book value of total assets and sales, respectively, in units of ten thousand Japanese yen. *Debt-to-equity ratio* is the book value of total loans from financial institutions over total equity. *Credit rating* is JFC's internal credit rating for the company on a scale of 1 to 12, where a lower number indicates a better rating. *CEO Shareholding* refers to company shares held by its CEO. All the values are calculated as of March 2016.

Figure 5 shows the average share of JFC loans without personal guarantees as of March 2016, and the share of firms that experienced CEO succession between March 2016 and March 2020 by prefecture. We can see the variations in the reliance of personal guarantees and CEO succession rates across prefectures. The top five prefectures in terms of the highest CEO succession rates are Akita (23.1%), Ishikawa (21.3%), Tokushima (20.5%), Gifu (19.1%), and Mie (18.9%). The prefectures with high CEO succession rates are those that have been experiencing rapid population aging and need to encourage CEO succession to younger generations. The top five prefectures in terms of a higher share of loans without personal guarantees are Fukushima (39.9%), Ishikawa (38.8%), Nagano (37.4%), Hyogo (37.3%), and Tokyo (35.7%). The complete table of the average share of JFC loans without personal guarantees and the share of firms that experienced CEO succession by prefecture is available in Table S1 in Supplemental Information Section S.2. To control

Table 2: Distribution of Average Firm Characteristics by Share of Loans without Personal Guarantees

	Share NoPG = 0	0 < **Share NoPG** ≤ 0.5	0.5 < **Share NoPG** < 1	**Share NoPG** = 1
Number of firms	12054	4146	4096	3643
Firm age	39.9	45.9	44.4	39.3
CEO age	57.1	57.9	57.7	57.0
Assets (ten thousand JPY)	1753.1	2851.0	2740.2	2375.1
Sales (ten thousand JPY)	1562.5	2313.8	2347.9	2084.6
Employment	47.8	80.5	75.1	60.4
Debt-to-equity ratio	0.357	0.352	0.316	0.277
Profit-to-sales ratio	0.003	0.015	0.013	0.014
Credit rating (scale from 1 to 12)	3.9	3.1	2.7	2.8
CEO shareholding	0.410	0.362	0.353	0.342

Note: This table provides distribution of the average firm characteristics by different range of share of existing JFC loans without personal guarantees. *Share NoPG* is the share of JFC loans without personal guarantees. All the other variable definitions follow Table 1.

for industry- and prefecture-specific effects, we included industry and prefecture fixed effects in our regression analysis.

3.2. Empirical specification

Our primary question is whether receiving loans without personal guarantees is associated with higher CEO succession rates. We estimate the following regression model to examine the relationship:

$$CEO_Change_{f,i,r} = \alpha_1 Share_NoPG_{f,i,r} + \alpha_2 Control_{f,i,r} + \phi_i + \varphi_r + \epsilon_{f,i,r}, \quad (1)$$

where subscript f denotes a firm, i denotes a JSIC 4-digit industry, and r denotes a prefecture.[21] $CEO_Change_{f,i,r}$ is a dummy variable that equals one if firm f in industry i in prefectuer r changed its CEO between April 2016 and March 2020, and zero otherwise. $Share_NoPG_{f,i,r}$ is firm f's share of outstanding JFC loans without personal guarantees as of March 2016 (see expression (2) below). If a higher share of loans without personal guarantees is associated with a higher CEO succession rate, we expect the coefficient on $Share_NoPG_{f,i,r}$, α_1, to be positive.

We control for variables that may affect firms' succession decisions and may correlate with firms' share of loans without personal guarantees. First, we control for CEO age and (the log of) firm age, both calculated as of March 2016, which are known to be important determinants of CEO

[21] Japan is divided into 47 prefectures, which are similar to states of the United States and form the country's top level of jurisdiction and administrative divisions.

Table 3: Firms' Share of Loans without Personal Guarantees and CEO Succession Rates by Industry

			Share of firms with		
Industry	**Share of firms**	**Avg. Share NoPG**	**(Share NoPG = 0)**	**(Share NoPG = 1)**	**CEO change**
Accommodations	0.037	0.271	0.532	0.117	0.128
Agriculture, fisheries, and forestry	0.001	0.069	0.900	0.050	0.062
Construction	0.077	0.241	0.654	0.138	0.147
Education	0.006	0.320	0.484	0.176	0.112
Electricity, gas, heat supply, and water	0.017	0.254	0.661	0.147	0.123
Finance and insurance	0.000	0.296	0.600	0.100	0.200
Information and communications	0.021	0.457	0.441	0.274	0.144
Personal services and entertainment	0.017	0.296	0.537	0.157	0.140
Manufacturing	0.418	0.354	0.436	0.148	0.149
Medical and health care	0.005	0.265	0.625	0.143	0.086
Mining	0.002	0.413	0.488	0.195	0.118
Real estate	0.061	0.282	0.582	0.149	0.131
Scientific research	0.016	0.411	0.465	0.235	0.176
Services	0.030	0.360	0.505	0.213	0.157
Transport and postal services	0.071	0.307	0.517	0.149	0.175
Wholesale and retail	0.216	0.305	0.555	0.159	0.146
All	1.00	0.306	0.561	0.159	0.137

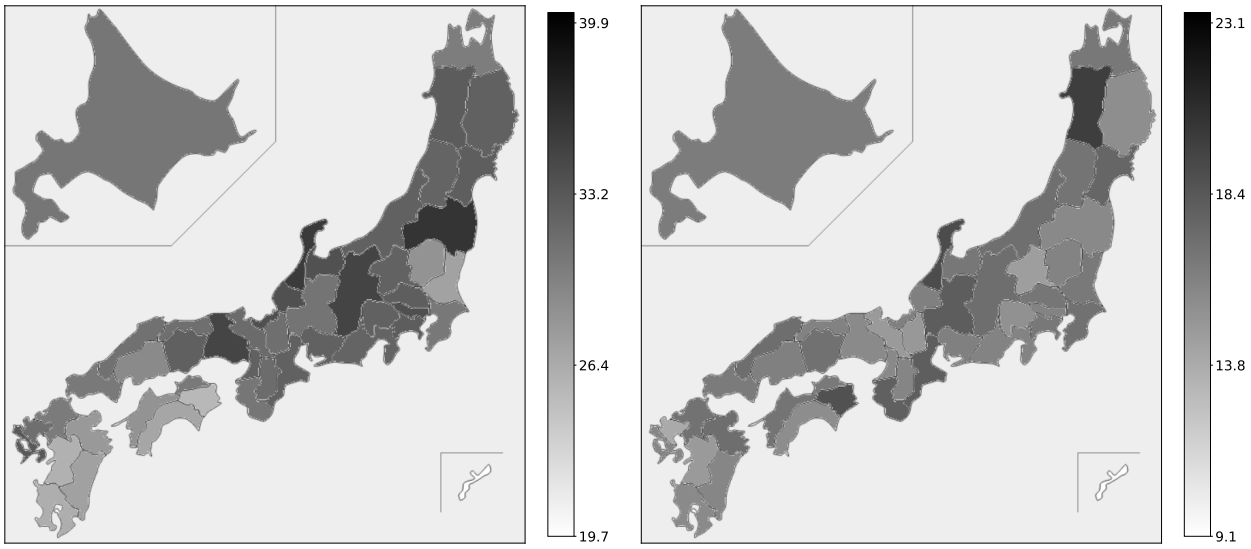
Note: The table presents the distribution of share of loans without personal guarantees and CEO change by industry. In the JFC data, firms are classified into four-digit JSIC codes, which we aggregate into 16 broader divisions for ease of presentation. *Avg. Share NoPG* is the average share of JFC loans without personal guarantees for firms in each industry. A share of firms with *Share NoPG* = 0 is the portion of firms whose share of JFC loans without personal guarantees = 0; i.e., all the outstanding JFC loans included personal guarantees. A share of firms with *Share NoPG* = 1 is the portion of firms whose share of JFC loans without personal guarantees = 1, i.e., all their outstanding JFC loans were without personal guarantees. A share of firms with *CEO change* refers to the portion of firms that experienced a CEO change between April 2016 and March 2020. All variables except the share of firms with CEO change were measured in March 2016.

succession.[22] Second, we control for debt-to-equity ratio. If a company has a large debt, a potential successor may hesitate to take it over, regardless of the presence or absence of personal guarantees. Debt-to-equity ratio is calculated as total debt (including loans from financial institutions other than the JFC) over total equity as of March 2016.

Finally, we control for firm performance and size. To control for firm performance, we include the internal credit rating of the firm by the JFC and the profit-to-sales ratio in the regression. We need to control for these variables because highly rated firms or high-performing firms, which faced lower interest surcharges for loans without personal guarantees, may have been more likely to choose

[22] We do not take the log of CEO age in control variable because taking the log discounts the effect of a higher age more, which might not suit to control for the analysis. For example, the difference between ages 65 and 70 is much greater than the difference between 30 and 35 in terms of how CEO age affects succession likelihood.

Figure 5: Firms' Share of Loans without Personal Guarantees and CEO Succession Rates by Prefecture



(a) Share of loans without personal guarantees (%) **(b)** Share of firms conducted CEO succession (%)

Note: The figure presents (a) firms' share of loans without personal guarantees as of March 2016, averaged within each prefecture, and (b) the share of firms that had conducted CEO succession between April 2016 and March 2020 in each prefecture. The shading bar on the right shows the correspondence between a level of shading and the share. The darker the shading, the higher the share. The shading bar uses percentage as its unit.

loans without personal guarantees and able to find successors. The internal rating classifies firms into 12 categories. The rating variable takes 1 for the firms in the highest rated category and 12 for those in the lowest rated categories. To control for firm size, we include the log of the number of employment as of March 2016.[23] In addition, we control for industry-specific variations by including the industry dummies ϕ_i, and for prefecture-specific variations by including the prefecture dummies φ_r in the regression.

In an alternative specification of the model, we replace $Share_NoPG$ with two dummy variables; namely, $Some_NoPG$ and All_NoPG. $Some_NoPG$ equals one if the firm has at least one outstanding JFC loan without personal guarantees and zero if all outstanding JFC loans include personal guarantees (see expression (3)) as of March 2016. The coefficient on $Some_NoPG$ measures how much more likely a firm with at least one outstanding JFC loan without personal guarantees is to experience CEO succession, compared with firms with no JFC loans without personal guarantees.

All_NoPG equals one if all outstanding JFC loans are without personal guarantees outstanding JFCMarch 2016, and zero otherwise (see expression (4)). The coefficient for All_NoPG measures how much more likely a firm with all outstanding JFC loans without personal guarantees is to

[23] Controlling firm size by including sales or total assets does not change our results.

experience a CEO succession, compared with other firms. We expect the coefficients on these two dummy variables to be positive.

$$Share_NoPG = \frac{(\text{JFC outstanding loans without PG in 2016/3})}{(\text{Total JFC outstanding loans in 2016/3})}, \tag{2}$$

$$Some_NoPG = \begin{cases} 1 & \text{if } Share_NoPG > 0 \\ 0 & \text{if } Share_NoPG = 0 \end{cases}, \tag{3}$$

$$All_NoPG = \begin{cases} 1 & \text{if } Share_NoPG = 1 \\ 0 & \text{if } Share_NoPG < 1 \end{cases}. \tag{4}$$

One caveat of our estimation strategy is that we can distinguish loans with and without personal guarantees only for JFC loans, while firms in our sample typically also borrow from non-JFC lenders. If a firm borrowed from JFC without personal guarantee but took out a new loan from a non-JFC lender with personal guarantees at the same time, $Share_NoPG$ defined by expression (2) would underestimate the CEO's exposure to personal guarantees. In Supplementary Information Section S.4, we examine if firms that borrowed from JFC without personal guarantees tended to increase borrowings from non-JFC lenders by regressing the change in JFC loan ratio, which was calculated as the JFC loan divided by total loans including non-JFC loans, onto the share of the JFC loans without personal guarantees as of March 2016. We find that the firms that took out JFC loans without personal guarantees did not increase borrowing from non-JFC financial institutions.

4. Estimation Results

4.1. Personal guarantees and CEO succession

We start by investigating the effects of personal guarantees on CEO succession. Table 4 presents the estimation results for the variants of the regressions specified by expression (1). The dependent variable is a dummy variable that represents CEO changes. The regressions in Columns 1–3 include all the firms in our sample, and the regressions in Column 4-6 include only those firms that had borrowed from the JFC SME Unit even before February 2014, which we call incumbent firms. We conduct separate regressions for incumbent firms because it is reasonable to wonder whether the policy change might have changed the compositions of the firms that borrowed from the JFC SME Unit. We try to remove the potential composition effect by looking only at the incumbent firms.

In all specifications, the coefficients on the share or dummies for loans without personal guarantees ($Share_NoPG$, $Some_NoPG$, and All_NoPG) are positive and significant, suggesting that firms relying less on personal guarantees are more likely to experience CEO succession. The coefficients are larger for incumbent firms. The signs of the coefficients on control variables are as expected: Positive coefficients on CEO age imply that firms with older CEOs are more likely to

experience CEO succession. Negative coefficients on the profit-to-sales ratio suggests that firms that previously performed worse are more likely to undertake CEO succession in the subsequent period. Negative coefficients on the rating suggest that firms with better credit ratings (thus, lower values of credit rating score) are more likely to undertake succession.

The coefficient estimate on *Share_NoPG* in column 1 is 0.027 (with a standard error of 0.008), indicating that firms whose JFC loans all have no personal guarantees are 2.7 percentage points more likely to change CEOs in the following four years when compared with firms with no JFC loans without personal guarantees. Given that the total succession rate in those four years is 13.7% in our sample, the difference in the share of loans without personal guarantees can explain more than 20% of the variation in CEO succession at the extreme.

Columns 2 and 3 use *Some_NoPG* and *All_NoPG*, respectively, in place of *Share_NoPG*. The estimated coefficients on those dummies are 0.019 and 0.021, respectively, with standard errors of 0.005 and 0.010. The positive coefficient on *Some_NoPG* indicates that if a firm has some loans without personal guarantees, it is more likely to carry out CEO succession, compared with firms with no loans without personal guarantees. The positive coefficient on *All_NoPG* indicates that if all of a firm's JFC loans are without personal guarantees, it is more likely to experience CEO succession.

4.2. Analysis of interaction with CEO age

The policy of introducing the Guidelines in 2014 tried to encourage CEO succession at viable firms with older CEOs by reducing the financial burden of personal guarantees for potential younger successors. This and the next sections examine if the policy had that intended effect. This section investigates whether older CEOs were more likely to be replaced when firms borrow without personal guarantees, and the next section checks if the CEO succession of viable firms were indeed encouraged. To check if the firms with older CEOs were especially encouraged by the policy, we run regression with an interaction term between No PG variable and dummy variable for firms with CEOs that are above 65, the mandatory retirement age in Japan.

Table 5 shows the regression results with the indicator variable of *CEO Age* >65 and its interaction term with No PG variables. Indicator variable takes the value of one if the CEO was above 65 as of March 2016, and zero otherwise. The coefficient estimates on No PG variables and the indicator of CEO age >65 are both positive. Moreover, the coefficient on the interaction terms between No PG variable and the indicator of CEO age above 65 is also estimated to be positive and significant, implying that the effect of personal guarantee on CEO succession is larger for firms with CEOs older than 65. These results suggest that the 2014 Guidelines had an intended effect of easing CEO succession of the SMEs with older CEOs.

Table 4: Personal Guarantees and CEO Succession

	Dependent variable: CEO Change					
	Whole sample			Incumbent firms		
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Share No PG	0.0274			0.0328		
	(0.00811)			(0.00962)		
Some No PG		0.0190			0.0214	
		(0.00533)			(0.00599)	
All No PG			0.0217			0.0247
			(0.0104)			(0.0136)
[1em] CEO Age	0.00971	0.00971	0.00971	0.0101	0.0101	0.0101
	(0.000297)	(0.000296)	(0.000299)	(0.000342)	(0.000343)	(0.000348)
ln(Firm Age)	-0.0141	-0.0150	-0.0142	-0.00480	-0.00566	-0.00558
	(0.00529)	(0.00534)	(0.00521)	(0.00719)	(0.00714)	(0.00715)
Rating	-0.00607	-0.00599	-0.00681	-0.00621	-0.00615	-0.00722
	(0.00127)	(0.00132)	(0.00128)	(0.00142)	(0.00148)	(0.00131)
Debt-to-equity Ratio	-0.00415	-0.0183	-0.00766	0.00637	-0.0117	-0.00121
	(0.0289)	(0.0261)	(0.0313)	(0.0232)	(0.0220)	(0.0287)
Profit-to-sales Ratio	-0.0873	-0.0894	-0.0889	-0.0879	-0.0910	-0.0907
	(0.0200)	(0.0203)	(0.0203)	(0.0313)	(0.0311)	(0.0316)
ln(Employment)	0.00874	0.00821	0.00937	0.00867	0.00821	0.00936
	(0.00237)	(0.00243)	(0.00236)	(0.00274)	(0.00284)	(0.00269)
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
JSIC 4-digit FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18184	18184	18184	15058	15058	15058
R^2	0.142	0.142	0.142	0.154	0.153	0.153

Standard errors in parentheses

Notes: This table presents the results of OLS regressions examining how firms' share of loans without personal guarantees are related to CEO succession. We exclude firms that took out loans under succession programs from our sample. Independent variables are dummies for CEO change during whole sample and for firms that borrowed from the JFC SME Unit before the sample peiod; i.e., incumbent firms. *Share_NoPG* is each firm's share of JFC loans without personal guarantees. *Some_NoPG* is a dummy for firms with a positive share of JFC loans without personal guarantees. *All_NoPG* is a dummy for firms whose JGC loans are all without personal guarantees. *CEO Age* is CEO age. *ln(Firm Age)* is the natural log of firm age calculated from the establishment year. *Debt-equity Ratio* is calculated as total debt over total equity. *Profit-to-sales Ratio* is calculated as the profit over sales during the fiscal year ending March 2016. *Rating* is JFC's internal credit rating for the company on a scale of 1 to 12, where lower number indicates a better rating. Standard errors (in brackets) are robust to arbitrary heteroscedasticity and clustered across JSIC industries and prefectures. All the independent variables were measured in March 2016. The level of analysis is at the firm level.

However, a question remains regarding whether these older CEOs were replaced by younger ones, which would be consistent with the policy goal. In our sample, there are 6675 firms that carried out CEO succession. For those that carried out CEO succession, new CEOs were younger by 17.4 years old on average. For those firms whose CEOs before succession were over 65, new CEOs were 24.0 years younger than their predecessors. For those firms whose CEOs before succession were younger than 65, the new CEOs were only 5.5 years younger than. These results suggest that the reduced reliance on personal guarantees facilitated the replacement of older CEOs with younger ones.

4.3. Analysis of the interaction with credit rating

This section examines if the introduction of the Guidelines indeed encouraged the succession of viable businesses as opposed to extending the lives of non-viable businesses. We do this by including interaction terms between No PG variables and credit ratings in our baseline regression.

Table 6 shows the result of the regression with the interaction terms. Variable *Rating (1)*, for example, is a dummy variable that equals one if the firm's credit rating score as of March 2016 is 1, which corresponds to rating A. The baseline rating category is omitted in the regression for firms with credit rating score 6 or higher (credit rating of C1 or below). Thus, the coefficients on the rating dummy variable and its interaction term with No PG variables are relative to the firms with credit rating of C1 or below. We use different No PG variables across columns; the first and fourth columns use $Share_NoPG$, the second and fifth use $Some_NoPG$, and the third and sixth use All_NoPG. The first three columns use the whole sample of the firms, and the last three columns restrict the samples to incumbent firms.

For regressions with $Share_NoPG$ and All_NoPG, the coefficients on the interaction terms between the rating dummy variables and No PG variables are positive and significant for ratings scores 1, 2, and 3 (A, B1, and B2) and insignificant for rating scores 4 and 5 (B3 and B4), which suggests that the positive effect of removing personal guarantees on CEO succession is larger for firms with better credit ratings. The result indicates that the reduction in the personal guarantees usage due to the guideline implementation facilitated succession for relatively good firms, as the policy intended. The coefficients on the interaction terms between the rating dummy variables and $Some_NoPG$ are insignificant.

The coefficients on other variables are similar to the baseline regression. The coefficients on the rating dummy variables are positive and significant for rating scores 1, 2, and 3, and not significant for rating scores 4 and 5, which means that, on average, firms with better ratings were more likely to carry out succession. The coefficient on CEO age is positive, while the coefficient on the log of firm age is negative. The coefficient on the profit-to-sales ratio is negative and significant, implying that firms that experienced poorer performance are more likely to conduct CEO succession in the subsequent period.

Table 5: Interaction between Personal Guarantees and CEO Age on CEO Succession

	Dependent variable: CEO Change					
	Whole sample			Incumbent firms		
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
CEO Age > 65	0.102	0.0946	0.117	0.0891	0.0829	0.108
	(0.0128)	(0.0107)	(0.0135)	(0.0140)	(0.0126)	(0.0146)
Share No PG	0.0126			0.0107		
	(0.00774)			(0.0103)		
× CEO Age > 65	0.0514			0.0738		
	(0.0138)			(0.0190)		
Some No PG		0.00549			0.00473	
		(0.00612)			(0.00712)	
× CEO Age > 65		0.0456			0.0537	
		(0.0102)			(0.0132)	
All No PG			0.0189			0.0168
			(0.00866)			(0.0119)
× CEO Age > 65			0.0126			0.0336
			(0.0246)			(0.0281)
CEO Age	0.00595	0.00595	0.00595	0.00644	0.00644	0.00645
	(0.000368)	(0.000367)	(0.000367)	(0.000341)	(0.000342)	(0.000341)
ln(Firm Age)	-0.0119	-0.0125	-0.0121	-0.00358	-0.00430	-0.00461
	(0.00530)	(0.00534)	(0.00519)	(0.00723)	(0.00717)	(0.00715)
Rating	-0.00612	-0.00603	-0.00687	-0.00627	-0.00622	-0.00731
	(0.00127)	(0.00132)	(0.00129)	(0.00144)	(0.00149)	(0.00133)
Debt-to-equity Ratio	-0.00116	-0.0154	-0.00542	0.00915	-0.00977	0.00217
	(0.0278)	(0.0250)	(0.0301)	(0.0226)	(0.0215)	(0.0282)
Profit-to-sales Ratio	-0.0879	-0.0901	-0.0882	-0.0895	-0.0926	-0.0901
	(0.0214)	(0.0220)	(0.0211)	(0.0312)	(0.0314)	(0.0314)
ln(Employment)	0.00854	0.00791	0.00920	0.00842	0.00786	0.00919
	(0.00235)	(0.00242)	(0.00234)	(0.00276)	(0.00287)	(0.00271)
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
JSIC 4-digit FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18184	18184	18184	15058	15058	15058
R^2	0.152	0.152	0.151	0.163	0.163	0.161

Standard errors in parentheses

Notes: The table presents the results of OLS regressions examining how the relationship between firms' share of loans without personal guarantees and CEO succession interacts with CEO age. We exclude firms that took out the loans for business succession programs from our sample. *CEO Age* > 65 is a dummy variable that equals one if the company's CEO was older than 65 as of March 2016. Other independent variables follow definitions in the footnote of Table 4. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and clustered across JSIC industries and prefectures. The level of analysis is at the firm level.

Table 6: Interaction between Personal Guarantees and Credit Rating on CEO Succession

	Dependent variable: CEO Change					
	Whole sample			Incumbent firms		
	(Share No PG)	(Some No PG)	(All No PG)	(Share No PG)	(Some No PG)	(All No PG)
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
No PG Variable	-0.00408	0.00870	-0.0136	-0.0130	0.00870	-0.0576
	(0.0172)	(0.0119)	(0.0206)	(0.0229)	(0.0135)	(0.0376)
× Rating (1)	0.0224	0.00621	0.0398	0.0318	0.00715	0.0893
	(0.0230)	(0.0181)	(0.0250)	(0.0288)	(0.0201)	(0.0415)
× Rating (2)	0.0484	0.0171	0.0499	0.0633	0.0222	0.0904
	(0.0220)	(0.0164)	(0.0250)	(0.0278)	(0.0182)	(0.0417)
× Rating (3)	0.0402	0.0185	0.0258	0.0736	0.0274	0.106
	(0.0232)	(0.0166)	(0.0280)	(0.0294)	(0.0185)	(0.0456)
× Rating (4)	0.0162	-0.00579	0.0148	0.0170	-0.00561	-0.00182
	(0.0305)	(0.0216)	(0.0369)	(0.0391)	(0.0243)	(0.0611)
× Rating (5)	0.0690	0.0181	0.0837	0.0427	-0.00481	0.133
	(0.0363)	(0.0246)	(0.0438)	(0.0509)	(0.0284)	(0.0870)
Rating (1)	0.0241	0.0242	0.0265	0.0258	0.0253	0.0291
	(0.0128)	(0.0148)	(0.0105)	(0.0140)	(0.0164)	(0.0113)
Rating (2)	0.0202	0.0247	0.0326	0.0172	0.0201	0.0339
	(0.0107)	(0.0121)	(0.00889)	(0.0118)	(0.0135)	(0.00959)
Rating (3)	0.0114	0.0126	0.0189	0.00662	0.0101	0.0184
	(0.00984)	(0.0106)	(0.00872)	(0.0110)	(0.0119)	(0.00952)
Rating (4)	0.0114	0.0163	0.0130	0.00616	0.0104	0.00906
	(0.0119)	(0.0126)	(0.0108)	(0.0133)	(0.0142)	(0.0119)
Rating (5)	-0.00255	0.00365	0.00279	0.000155	0.00761	0.00261
	(0.0132)	(0.0140)	(0.0120)	(0.0151)	(0.0162)	(0.0135)
CEO Age	0.00972	0.00972	0.00972	0.0101	0.0101	0.0101
	(0.000235)	(0.000235)	(0.000235)	(0.000260)	(0.000260)	(0.000260)
ln(Firm Age)	-0.0146	-0.0154	-0.0146	-0.00586	-0.00628	-0.00638
	(0.00505)	(0.00504)	(0.00505)	(0.00644)	(0.00643)	(0.00643)
Debt-to-equity Ratio	-0.0111	-0.0268	-0.0114	0.000308	-0.0185	-0.00394
	(0.0303)	(0.0299)	(0.0306)	(0.0347)	(0.0342)	(0.0351)
Profit-to-sales Ratio	-0.0847	-0.0860	-0.0844	-0.0865	-0.0858	-0.0877
	(0.0328)	(0.0328)	(0.0328)	(0.0422)	(0.0422)	(0.0422)
ln(Employment)	0.00867	0.00828	0.00928	0.00878	0.00837	0.00932
	(0.00270)	(0.00271)	(0.00270)	(0.00307)	(0.00309)	(0.00306)
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
JSIC 4-digit FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18184	18184	18184	15058	15058	15058
R^2	0.142	0.142	0.142	0.154	0.154	0.154

Standard errors in parentheses

Notes: This table presents the results of OLS regressions examining how the relationship between firms' share of loans without personal guarantees and CEO succession interacts with firm credit rating. We exclude firms that took out the loans for succession programs from our sample. *Rating (XX)* is a dummy variable that equals one if the company's credit rating score is XX as of March 2016. The omitted category is Rating 6 or higher, which is a dummy variable for firms with credit ratings below C1. Other independent variables follow definitions in the note to Table 4. No PG Variables vary across columns and are specified in the parenthesis of each columns. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and clustered across JSIC industries and prefectures. The level of analysis is at the firm level.

4.4. Analysis of Owner-managed firms

Owner-managed firms account for a large share of SMEs in Japan. In our sample, for example, 35% of the firms had CEOs who owned more than 50% of the company's shares.[24] As owner-managed firms encounter more practical and emotional hurdles when replacing CEOs than non-owner-managed firms, reducing reliance on personal guarantees may have a smaller effect on owner-managed firms' succession.

Columns 1–6 in Table 7 present the regression results of CEO change on the firm's reliance on personal guarantees for firms with different ownership structures. Columns 1–3 present the regression results for the sample of firms in which CEOs hold more than half the shares, and columns 4–6 report the results for the sample of firms in which CEOs hold less than half the shares. Consistent with the baseline regressions, we find that the share of firms' loans without personal guarantees positively correlates with CEO succession. We also find that the effect of reducing reliance on personal guarantees for CEO succession is less pronounced for firms with greater CEO ownership. The coefficients of $Share_NoPG$, $Some_NoPG$, and All_NoPG are all smaller for firms in which CEOs hold more than half the shares. For example, the coefficient estimate of the share of loans without personal guarantees of the sample of firms in which CEOs hold more than half the shares is 0.016 (with a standard error of 0.011), while the estimate for the sample of firms in which CEOs hold less than half the shares is 0.031 (with a standard error of 0.010).

Columns 7–9 further confirm this point by adding the interaction terms of the No PG variables and CEO shareholding to the estimation. Most importantly, the coefficients of the interaction terms between NoPG variables and CEO shareholding are all negative and significant, which indicates that the effect of reducing personal guarantees on CEO succession is smaller for firms with higher levels of CEO ownership. The coefficients on CEO shareholding are negative, suggesting that firms higher levels of CEO ownership are on average less likely to undertake CEO succession. This may be because CEO succession of an owner-managed firm generally has more hurdles, including the CEO's emotional attachment to the company or inheritance tax if they need to transfer ownership holdings to the new CEOs.

5. Survey Evidence

The results in Section 4 suggest that taking out bank loans without personal guarantees is associated with a higher subsequent likelihood of CEO succession. The analysis, however, cannot identify the direction of causality. There are two potential directions. The first is that SMEs that were

[24] There are various definitions of owner-managed firms in the literature. Some papers use a lower cutoff for CEO shareholdings than the 50% level we choose. For a robustness check, we conducted the same analysis with a different cutoff for CEO ownership (30%); the results are listed in Supplementary Information Section S.5.

Table 7: Personal Guarantees and Owner-Managed Firms

	Dependent variable: CEO Change								
	Firms with CEO shareholding ≥ 50%			Firms with CEO shareholding < 50%			Whole sample		
Independent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
CEO Shareholding							-0.0823	-0.0825	-0.0911
							(0.0110)	(0.0117)	(0.0103)
Share No PG	0.0163			0.0312			0.0386		
	(0.0113)			(0.0107)			(0.0115)		
× CEO Shareholding							-0.0362		
							(0.0180)		
Some No PG		0.0144			0.0213			0.0261	
		(0.00819)			(0.00789)			(0.00863)	
× CEO Shareholding								-0.0229	
								(0.0145)	
All No PG			0.0101			0.0239			0.0260
			(0.0159)			(0.0123)			(0.0155)
× CEO Shareholding									-0.0196
									(0.0273)
CEO Age	0.00820	0.00820	0.00821	0.0105	0.0105	0.0105	0.00983	0.00983	0.00983
	(0.000550)	(0.000549)	(0.000549)	(0.000440)	(0.000438)	(0.000444)	(0.000296)	(0.000295)	(0.000299)
ln(Firm Age)	-0.0145	-0.0150	-0.0147	-0.0156	-0.0166	-0.0158	-0.0200	-0.0208	-0.0202
	(0.00631)	(0.00619)	(0.00649)	(0.00756)	(0.00757)	(0.00749)	(0.00543)	(0.00545)	(0.00539)
Rating	-0.00883	-0.00865	-0.00923	-0.00486	-0.00479	-0.00576	-0.00579	-0.00569	-0.00647
	(0.00179)	(0.00184)	(0.00180)	(0.00162)	(0.00165)	(0.00158)	(0.00120)	(0.00126)	(0.00122)
Debt-to-equity Ratio	0.0587	0.0533	0.0551	0.0000674	-0.0176	-0.00486	0.0315	0.0171	0.0265
	(0.0482)	(0.0460)	(0.0491)	(0.0293)	(0.0259)	(0.0314)	(0.0276)	(0.0252)	(0.0302)
Profit-to-sales Ratio	-0.0972	-0.0982	-0.0982	-0.0747	-0.0771	-0.0763	-0.0726	-0.0748	-0.0741
	(0.0346)	(0.0342)	(0.0346)	(0.0335)	(0.0338)	(0.0340)	(0.0206)	(0.0209)	(0.0208)
ln(Employment)	-0.00157	-0.00215	-0.00125	0.00974	0.00925	0.0105	0.00514	0.00467	0.00573
	(0.00320)	(0.00314)	(0.00327)	(0.00318)	(0.00330)	(0.00315)	(0.00260)	(0.00266)	(0.00260)
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
JSIC 4-digit FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6274	6274	6274	11714	11714	11714	18184	18184	18184
R^2	0.181	0.181	0.181	0.168	0.168	0.168	0.148	0.148	0.147

Standard errors in parentheses

Notes: The table presents the result of OLS regressions examining how the relationship between firms' share of loans without personal guarantees and CEO succession differs across different levels of CEO ownership. We exclude firms that took out the loans for succession programs from our sample. The dependent variable is the dummy for CEO change between 04/2016 and 03/2020. Columns 1–3 include the sample of firms whose CEOs held more than 50% of the shares, and Columns 4–6 include the sample of firms whose CEOs held less than 50% of the shares. *CEO Shareholding* is the share of CEO shareholding in the company. Other independent variables follow the definitions in the note to Table 4. All independent variables were measured in March 2016. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and clustered across JSIC industries and prefectures. The level of analysis is at the firm level.

about to undertake CEO succession were more likely to borrow without personal guarantees. The second is that taking out loans without personal guarantees encourages business owners to leave their companies to their successors.

To analyze the direction of causality, we conducted a survey of Japanese SMEs in September 2022 in cooperation with TSR. We sent online questionnaires to firms had signed up to receive TSR publications. We targeted firms that carried out CEO succession between April 2016 and March 2021, which corresponds to the sample period of our regression analysis. We gathered responses from a total of 601 firms; which is approximately 3% of all the firms that subscribed to TSR publications and experienced CEO succession during the period.

The survey asked the firms whether they had taken out bank loans without personal guarantees between April 2014 and March 2016 and, if so, had done so primarily to ease a CEO succession process. If a company answered yes to both questions, it confirms the first direction of causality (CEO succession to receiving loans without personal guarantee).

For those firms that borrowed without personal guarantees primarily for reasons other than CEO succession, we asked if borrowing without personal guarantees ended up in facilitating their succession. If a company answered that borrowing without personal guarantees indeed facilitated the succession, even though succession was not the primary reason for borrowing without personal guarantee, this confirms the second direction of causality (loan without personal guarantee to business succession).

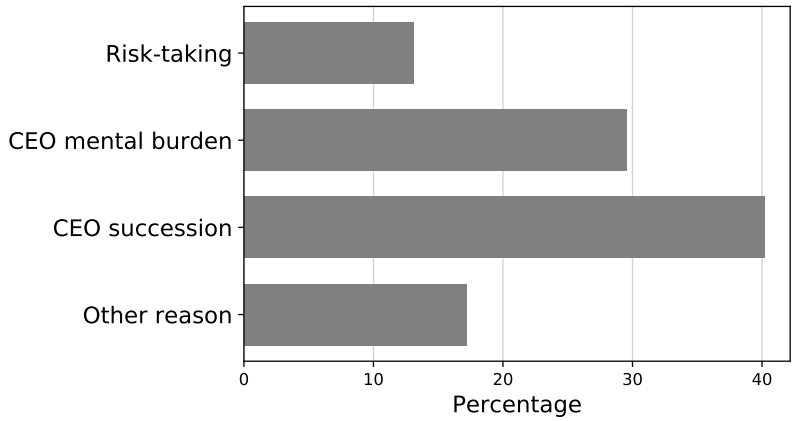
We found that 28.5% of the surveyed firms had received bank loans without personal guar- antees between February 2014 and March 2016. Of those, 23.3% had borrowed from the JFC, 12.0% from other government financial institutions, and 81.2% from private-sector banks (multiple responses were allowed in this question).

Figure 6 summarizes the responses to the question about the primary reason for taking out loans without personal guarantees. Approximately 40% of the firms answered that the primary reason was to ease CEO succession. For these firms, causality thus appears to run from CEO succession to loan without personal guarantees. Approximately 13% of the firms answered that they had borrowed without personal guarantees to finance more risky projects than hey had previously undertaken, and 29% answered that they had aimed to reduce the psychological burden onr their CEOs. Some firms responded that their relationship lenders did not require personal guarantees while others simply detailed the use of the loans, such as financing working capital and purchasing equipment. These responses have been classified as "other reasons."

Figure 7 shows the responses to the question whether loans without personal guarantees in turn facilitated CEO succession. The table shows the results separately for the firms that had borrowed mainly to ease CEO succession and those that had other primary purposes.[25] More than 80% of the firms that had borrowed primarily for CEO succession stated that the lack of personal

[25] Other primary purposes include risk-taking, reduction of psychological burden, and others.

Figure 6: Primary reasons for borrowing without personal guarantees



Note: The graph summarizes the answers of 133 surveyed SMEs that took out bank loans without personal guarantees between 02/2014 and 03/2016 and conducted CEO succession between 04/2016 and 03/2020. The survey question was "What was the reason for borrowing without personal guarantees? Please choose the closest reason." *Risk-taking* applies to firms that took out loans without personal guarantees primarily because doing so would help them take more risky strategic decisions. *CEO mental burden* applies to firms that took out loans without personal guarantees primarily because doing so would help ease their CEOs' mental burden. *CEO succession* applies to firms that took out loans without personal guarantees primarily because doing so would help them conduct CEO succession in the foreseeable future. *Other reason* applies to firms that specified different primary reasons. Multiple answers were not allowed for this question.

guarantees had indeed facilitated succession. Even for firms that had borrowed for purposes other than succession, 60% said that borrowing without personal guarantees facilitated succession. This latter result supports the argument that there exists a causal effect of borrowing without personal guarantees on CEO succession.

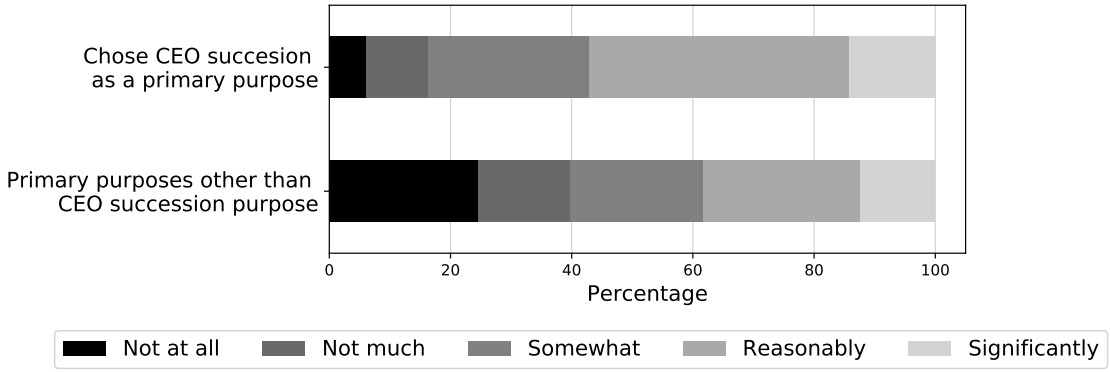
In summary, the survey results suggest that causality runs both ways. Some firms took out loans without personal guarantees to facilitate CEO succession that they had already planned, while others borrowed without personal guarantees for purposes other than CEO succession but found *ex-post* that their CEO succession was made easier because of the absence of personal guarantees.

6. Conclusion

Securing a smooth succession in viable businesses is important for economic growth. The practice of Japanese banks requiring SME managers to pledge personal guarantees for business loans has been blamed as a serious impediment to CEO succession. Removing the impediment was one of the aims of the 2014 Guidelines for Personal Guarantee Provided by Business Managers, which asks lenders not to rely on personal guarantees.

Using SME loan data from a government financial institution in Japan, this paper has examined the relationship between personal guarantees on bank loans by SME managers and their CEO

Figure 7: Did borrowing without personal guarantees facilitate CEO succession?



Note: This graph summarizes the answers of 133 surveyed SMEs that took out bank loans without personal guarantees between 2014/2 and 2016/3 and conducted CEO succession between 2016/4 and 2020/3. The survey question was "How much did borrowing without personal guarantees facilitate the subsequent CEO succession?" Multiple answers were not allowed for this question. The first bar shows the distribution of answers by SMEs that had borrowed without personal guarantees primarily for succession. The second bar shows the distribution of answers for those that had a primary reason other than CEO succession. Other primary purposes included risk-taking, reduction of psychological burden, and others.

succession. We found that receiving a loan without personal guarantee increases the likelihood of CEO succession at SMEs. In addition, the impact of personal guarantees on CEO succession is stronger for firms with CEOs above 65 years old and firms with better credit Ratings. Thus, the guidelines seem to have achieved the policy goal of facilitating succession in viable businesses especially with old CEOs. We also find that the impact of reducing personal guarantee use on CEO succession is weaker for owner-managed firms, which may be due to the various hurdles in CEO succession other than personal guarantees.

We conducted a survey that asked for the primary reasons for borrowing without personal guarantees and whether such borrowing had facilitated CEO succession. The survey results suggest that the causality between borrowing without personal guarantees and CEO succession runs both ways. Some firms took out loans without personal guarantees to facilitate CEO succession, and others found that succession were made easier by receiving loans without personal guarantees.

Overall, our findings confirm that the common practice of requiring SME owners to pledge personal guarantees tends to inhibit smooth CEO succession. This has implications not only for Japan but also for the United States and other countries where small businesses rely heavily on personal guarantees in securing their financing.

Facilitating the smooth succession of viable SMEs was one of the important rationales for establishing the Japanese guidelines, but it was not the only one. Another concern for the practice of

requiring personal guarantees was that it discourages entrepreneurial risk-taking and prevents the development of a dynamic economy. We leave the analysis of the relationship between corporate risk-taking and personal guarantees and other potential impacts of requiring personal guarantees by SME owners on their corporate strategies for future research.

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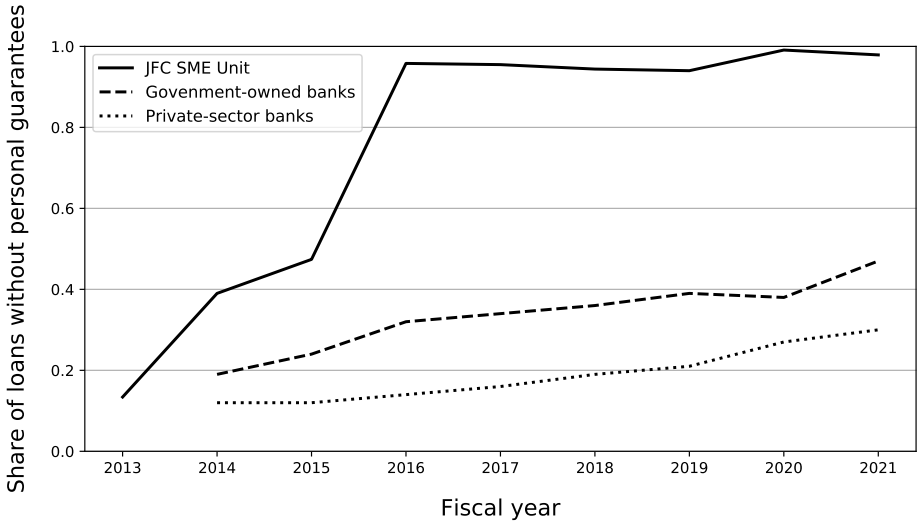
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Supplementary Information

S.1. Share of newly-issued loans without personal guarantees by different financial institutions

Figure S1: Loans without personal guarantees after implementation of the guidelines



Note: This graph contains the proportion of new loans issued without personal guarantees by the JFC SME Unit, private-sector banks, and government-owned banks in Japan between the fiscal years of 2013 and 2021. Fiscal years start in April and end in March. The numbers for private-sector and government-owned banks come from the Small and Medium Enterprise Agency (`https://www.chusho.meti.go.jp/kinyu/keieihosyou`) and are only available from the 2014 fiscal year onwards. The numbers for the JFC SME unit are from the JFC (`https://www.jfc.go.jp/n/company/sme/pdf/2022jfs.pdf`).

S.2. Distribution of firm's share of loans without personal guarantees and CEO succession rate by prefecture

Table S1: CEO succession and firms' share of loans without personal guarantees by prefectures

			Share of firms with		
Prefecture	**# of firms**	**Avg. Share NoPG**	**(Share NoPG = 0)**	**(Share NoPG = 1)**	**CEO change**
Hokkaido	943	0.298	0.536	0.151	0.150
Aomori	239	0.287	0.523	0.121	0.156
Iwate	232	0.330	0.414	0.112	0.127
Miyagi	500	0.335	0.456	0.134	0.179
Akita	208	0.337	0.514	0.183	0.231
Yamagata	284	0.325	0.514	0.187	0.161
Fukushima	309	0.399	0.405	0.197	0.134
Ibaraki	292	0.230	0.616	0.092	0.155
Tochigi	285	0.251	0.600	0.119	0.141
Gunma	389	0.326	0.512	0.183	0.107
Saitama	749	0.334	0.470	0.143	0.158
Chiba	352	0.295	0.565	0.159	0.164
Tokyo	4417	0.357	0.486	0.166	0.142
Kanagawa	934	0.336	0.512	0.173	0.156
Niigata	613	0.328	0.501	0.153	0.167
Toyama	365	0.353	0.427	0.164	0.157
Ishikawa	328	0.388	0.430	0.216	0.213
Fukui	259	0.356	0.421	0.158	0.145
Yamanashi	186	0.328	0.478	0.145	0.124
Nagano	416	0.374	0.404	0.142	0.168
Gifu	235	0.300	0.519	0.153	0.191
Shizuoka	614	0.325	0.510	0.174	0.142
Aichi	1194	0.330	0.508	0.157	0.146
Mie	237	0.329	0.489	0.143	0.189
Shiga	147	0.309	0.544	0.184	0.114
Kyoto	315	0.315	0.511	0.152	0.112
Osaka	3367	0.329	0.501	0.153	0.134
Hyogo	1024	0.373	0.452	0.176	0.132
Nara	212	0.313	0.509	0.179	0.139
Wakayama	189	0.298	0.593	0.164	0.187
Tottori	154	0.309	0.500	0.143	0.143
Shimane	188	0.305	0.505	0.144	0.169
Okayama	425	0.331	0.489	0.172	0.164
Hiroshima	499	0.267	0.559	0.124	0.146
Yamaguchi	385	0.292	0.535	0.156	0.152
Tokushima	152	0.197	0.658	0.086	0.205
Kagawa	246	0.291	0.585	0.130	0.155
Ehime	274	0.253	0.613	0.128	0.161
Kochi	156	0.224	0.654	0.115	0.129
Fukuoka	972	0.290	0.544	0.158	0.162
Saga	188	0.308	0.484	0.149	0.091
Nagasaki	223	0.341	0.471	0.188	0.137
Kumamoto	296	0.207	0.662	0.105	0.112
Oita	233	0.244	0.571	0.116	0.169
Miyazaki	210	0.232	0.619	0.100	0.138
Kagoshima	242	0.212	0.649	0.079	0.133

S.3. Correlation matrix

Table S2: Correlation matrix of independent variables

Variable Name	Variable #	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share No PG	(1)	1									
Firm Age	(2)	0.0171	1								
CEO Age	(3)	0.0035	0.1298	1							
Assets	(4)	0.0902	0.1973	0.021	1						
Sales	(5)	0.0804	0.1545	0.0036	0.7428	1					
Employment	(6)	0.0734	0.1504	0.0008	0.4692	0.5398	1				
Debt-equity Ratio	(7)	-0.2823	-0.1895	-0.0284	-0.0971	-0.1403	-0.0626	1			
profit-to-sales Ratio	(8)	0.0466	0.0583	0.023	0.0663	0.0285	0.0134	-0.146	1		
Rating	(9)	-0.2666	-0.1204	-0.0165	-0.089	-0.0655	-0.0676	0.4387	-0.2067	1	
CEO Shareholding	(10)	-0.0842	-0.2436	-0.0107	-0.1472	-0.1304	-0.1162	0.1821	-0.0024	0.1235	1

S.4. Relationship between the share of loans from the JFC and Share NoPG

	Dependent Variable								
	Δ (JFC Loan Ratio) 2017			Δ (JFC Loan Ratio) 2018			Δ (JFC Loan Ratio) 2019		
Independent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Share No PG	0.00127			0.00219			0.00579		
	(0.00144)			(0.00200)			(0.00215)		
Some No PG		-0.00103			-0.00169			-0.00132	
		(0.00109)			(0.00150)			(0.00162)	
All No PG			0.00408			0.00587			0.0124
			(0.00164)			(0.00233)			(0.00248)
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
JSIC 4-digit FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15812	15812	15812	13586	13586	13586	14005	14005	14005
R^2	0.056	0.056	0.057	0.062	0.062	0.062	0.060	0.060	0.061

Standard errors in parentheses

Notes: This table presents the results of a robustness check in which we regressed the change in JFC loan ratio onto No PG variables.The JFC loan ratio is calculated as the outstanding JFC loan divided by total loans (the JFC loans + non-JFC loans). Δ *(JFC Loan Ratio) 2017* is the change in JFC loan ratio from March 2016 to March 2017. Δ *(JFC Loan Ratio) 2018* is the change in JFC loan ratio from March 2016 to March 2018. Δ *(JFC Loan Ratio) 2019* is the change in JFC loan ratio from March 2016 to March 2019. The other variable definitions follow Table 4. The level of analysis is at the firm level.

S.5. Different cutoff for owner-managed firms

Table S3: Personal guarantees and owner-managed firms

	Dependent variable: CEO Change (2016/4–2020/3)					
	Firms with its CEO shareholding ≥ 30%			**Firms with its CEO shareholding < 30%**		
Independent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Share No PG	0.0120			0.0367		
	(0.00998)			(0.00984)		
Some No PG		0.0128			0.0235	
		(0.00649)			(0.00737)	
All No PG			0.0100			0.0233
			(0.0124)			(0.0142)
CEO Age	0.00905	0.00905	0.00906	0.0107	0.0107	0.0107
	(0.000406)	(0.000406)	(0.000405)	(0.000545)	(0.000543)	(0.000549)
ln(Firm Age)	-0.0146	-0.0149	-0.0147	-0.0154	-0.0167	-0.0156
	(0.00570)	(0.00564)	(0.00576)	(0.00812)	(0.00816)	(0.00797)
Rating	-0.00738	-0.00711	-0.00769	-0.00466	-0.00474	-0.00575
	(0.00174)	(0.00177)	(0.00177)	(0.00208)	(0.00212)	(0.00198)
Debt-to-equity Ratio	0.0290	0.0253	0.0276	0.0243	0.00274	0.0148
	(0.0413)	(0.0409)	(0.0421)	(0.0378)	(0.0349)	(0.0417)
Profit-to-sales Ratio	-0.0815	-0.0819	-0.0824	-0.0811	-0.0843	-0.0822
	(0.0217)	(0.0215)	(0.0217)	(0.0465)	(0.0469)	(0.0468)
ln(Employment)	0.000681	0.000182	0.000930	0.0104	0.00985	0.0112
	(0.00256)	(0.00258)	(0.00255)	(0.00419)	(0.00428)	(0.00421)
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
JSIC 4-digit FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9668	9668	9668	8330	8330	8330
R^2	0.161	0.162	0.161	0.191	0.191	0.190

Standard errors in parentheses

Notes: This table presents the result of OLS regressions examining how the relationship between firms' share of loans without personal guarantees and CEO succession differs across different degrees of CEO ownership. We exclude firms that took out the loans for CEO succession programs from our sample. The dependent variable is the dummy for CEO change between 2016/4 and 2020/3. Columns 1–3 include the sample of firms with CEOs holding more than 30% shareholding, and Columns 4–6 include the sample of of firms with CEOs holding less than 30% shareholding. *CEO Shareholding* is the share of CEO shareholding in the company. Other independent variables follow definitions in the footnote of Table 4. All the independent variables were measured in March 2016. Standard errors (in brackets) are robust to arbitrary heteroscedasticity and clustered across JSIC industries and prefectures. The level of analysis is at the firm level.