Impacts of Bank Mergers on Zombie Firms: Evidence from Japan[*]

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Abstract

This study examines the effects of bank mergers on financing activities and bank relationships for small and medium enterprises (SMEs) in Japan, with a specific focus on zombie SMEs. Using a comprehensive dataset that covers all the bank mergers during the period 2005-2018 and SMEs that used to transact with these merged banks and those that did not, we find the following. First, bank mergers during the period generally result in lower interest rates and higher loan ratios for SMEs that used to transact with either one or both of the merged banks. However, SMEs' loan terms and conditions become more stringent when the newly merged banks they transacted with were large or financially healthy, suggesting the importance of banks' local market power and financial health in determining loan terms. Second, mergers between healthy banks are likely to result in the termination of relationships with zombie SMEs, while mergers involving at least one unhealthy bank tend to result in continued relationships and increased lending to zombie SMEs. The effects of bank mergers on SMEs are in contrast with those on publicly listed firms in several respects. First, the impact of bank mergers on borrowers' loan terms and conditions is significantly stronger for SMEs than for listed firms. Second, the adverse impact of bank mergers on listed zombie firms, if any, appears in stricter borrowing terms but not in the termination of bank-firm relationships.

JEL classification: G21; G32; G34.

Keywords: Bank mergers; Banking competition; Firm financing; Bank-firm relationship; Zombie lending

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1. Introduction

In most economies, small and medium enterprises (SMEs) represent a large fraction of all firms and contribute considerably to employment and economic growth. According to the statistics of the 2019 White Paper on SMEs, as of 2016,[1] 99.7% of all enterprises in Japan were SMEs, which accounted for about 70% of the country's labor force and 53% of the added value. Considering such relevance of SMEs, there has been a growing academic interest in SME financing, and our understanding of small business lending has improved substantially. In particular, SMEs are often considered to be opaque and risky, thus having very limited access to capital. Unable to borrow from the public market as listed companies, SMEs tend to rely more heavily on two primary sources of external finance, namely bank loans and trade credit (e.g., Berger and Udell, 1998).

With this in mind, it should also be noted that firm financing and capital structure choices depend not only on firms' demand for outside financing but also on the capital supply conditions (Graham and Leary, 2011). Bank mergers can be considered as a source of shock to the supply side, since the mergers likely affect the availability of bank credit and borrowing conditions for their client SMEs through bank-firm relationships and changes in banking competition, which in turn may affect firm performance and investment activities.

Being motivated by such interaction between the supply conditions, bank-firm relationship, and SME financing, this study examines the impact of Japanese bank mergers on the financing activities and bank relationships of SMEs that used to transact with the merging banks. The effect on the financing of listed firms will also be investigated, so that relevant comparisons could be made. There are several unique features in this study in relation to the existing literature on bank mergers.

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[1] See: https://www.chusho.meti.go.jp/pamflet/hakusyo/2019/PDF/2019hakusyosummary_eng.pdf.

First, this study offers new insights into how bank mergers affect the borrowing conditions of firms that transacted with merged banks and complements the previous literature, which has provided mixed results. For instance, Sapienza (2002) investigates the impact of Italian bank mergers on the interest rates paid by continuing SME borrowers. She shows that in-market mergers, which involve banks that previously operated in the same geographical area, benefit borrowers if the merging banks have small market shares. Erel (2011) analyzes the effect of bank mergers in the U.S. on loan prices, showing that on average, acquiring banks reduce spreads on their new extensions of C&I loans after a merger. Uchino and Uesugi (2022), on the other hand, focus on a particular megabank merger between the Bank of Tokyo Mitsubishi (BTM) and the United Financial of Japan (UFJ) in 2005. They find that this megabank merger negatively affects client firms: the firms' borrowing costs increase due to the reduction in the number of bank-firm relationships, changes in the organizational structure, and the loss of soft information. In contrast to these studies, this current study tries to provide a unified framework that considers how varying degrees of banking competition and bank-firm relationships affect the heterogeneous impact of bank mergers on borrowing conditions.

Second, this study sheds new light on the role of merging banks' financial health, considering that banks with different health statuses may have varying incentives to merge. For instance, as suggested by Berger et al. (1999), a healthy bank might merge with an unhealthy bank to spread its management skills, expertise, or operating policies, thereby enhancing the efficiency of the merged entity. Meanwhile, two unhealthy banks may have an incentive to merge to improve their financial health, or to take advantage of a "too-big-to-fail" (TBTF) policy or government bailouts (see Berger et al., 1999; Hosono et al., 2007; Kobayashi and Bremer, 2022). Various motives of bank mergers may result in differential impacts on loan terms for borrowers.

Third, this study examines how bank mergers affect non-viable zombie firms. As indicated by Peek and Rosengren (2005) about the credit misallocation in Japan during the 1990s, financially weak banks have an incentive to extend credit to impaired borrowers to avoid the realization of losses on their balance sheets. As a result of such forbearance lending practice, the zombie ratio – the percentage of zombie firms among the Japanese listed firms – increased rapidly during the 1990s and reached a remarkably high level in the early 2000s. Against this backdrop, one of the motives of bank mergers since the 2000s could be to resolve the problem of non-performing loans. Thus, zombie firms, which would hardly survive without the financial assistance of banks, are likely to have been affected in some way. However, almost no study has directly addressed this potential causal relationship between bank mergers and zombie borrowers.

I introduce several hypotheses to examine the above issues. In the first set of hypotheses, the study not only focuses on the balance between the efficiency improvement and the increase in market power caused by mergers (as suggested by Williamson, 1968) but also takes into account the impact of the financial health of the merged banks. Competition in the banking industry in Japan has gradually increased in recent years (e.g., see Kawamoto et al., 2020), so if the cost savings and competition among banks are sufficiently high, mergers may generally lead to favorable borrowing conditions. However, when the merged banks are large or financially healthy, their market power may become more considerable and may dominate efficiency gains, leading to more stringent borrowing conditions. Hence, merger size and bank financial health may play important roles in determining the sign and magnitude of the impacts on borrowers' loan terms and conditions.

In the second set of hypotheses for zombie firms, I examine which one of the two hypotheses hold true. On the one hand, a merger may adversely affect zombie firms' borrowing activities if it improves banks' screening ability and risk assessment (see Panetta et al., 2009), enabling

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banks to identify low-quality borrowers and cut off transaction relationships with them. Another possibility is that the newly merged banks may become financially healthy enough to get rid of forbearance lending, and/or cleanse all negative net present value projects (e.g., as suggested by Alessandrini et al., 2008). On the other hand, mergers may benefit zombie firms if they improve banks' consultation capacity and ability to monitor borrowers, or enhance banks' risk-taking capacity and risk tolerance. In this case, zombie client firms of the merged banks may not face more stringent borrowing conditions and might even be offered more favorable terms.

To empirically examine these hypotheses, I employ several data sources. The first primary data is the Japanese bank merger data covering the period from 2005 to 2018. This dataset includes information on mergers between banks, which may belong to different bank groups, i.e., city banks, regional banks, trust banks, shinkin banks, and credit cooperatives. The second key data is firm data, including listing information, corporate attribute, balance sheet data, and bank-firm relationship information from the Teikoku Databank (TDB) database. From this dataset, the local bank share variable – a proxy for merger size is constructed. In addition, to control for bank characteristics and market concentration, bank financial statement data from Nikkei NEEDS Financial Quest (Nikkei FQ) and Financial Book Consultants, as well as data on the Herfindahl-Hirschman Index (HHI) of the loan market at the year-prefecture level are also employed. The coupon rates on convertible corporate bonds from Nikkei FQ and the short and long-term prime rates from the Bank of Japan (BOJ) website are also obtained for the purpose of identifying zombie firms.

Using this comprehensive dataset, I begin by classifying borrowers into private SMEs and publicly listed firms. These groups of firms differ in terms of the closeness of relationship with merging banks, financial constraint level, and bargaining power. Compared to SMEs, public firms are less likely to be affected by the loss of soft information and may have alternative financing options. For each group, I then apply the fixed effects regression method to examine

the effects of bank mergers on the loan interest rates and the amount of bank loans received by continuing borrowers, namely, firms that had the main bank relationship with the merging bank (the target or the acquirer) before the merger and maintained this relationship with the newly merged bank after the merger. I also investigate how the impact of bank mergers varies over time, or differs depending on (i) the size of the merger, (ii) merging banks' financial health,[2] and (iii) whether the firm belongs to the zombie group. Finally, to determine the characteristics of borrowers whose relationships with the merged banks are terminated, I study the impact of mergers on the probability of lending relationship discontinuation by applying a logit model.

The results first show that, for continuing SME borrowers, bank mergers during the period generally reduce interest rates and increase the loan ratio. These favorable impacts on loan terms of SME borrowers persist over time, but it takes at least four years to be realized. In addition, the positive effects on continuing SMEs' finance become weaker as the merger size (measured by the local market share of the newly merged banks) or the HHI of the loan market increases and could turn in the opposite direction if the merger size is sufficiently large, suggesting that in this case, the market power effect likely dominates the efficiency gains.

Second, banks' financial health plays an important role in determining borrowers' loan terms. Following a merger between healthy banks, continuing SME borrowers tend to face more stringent borrowing conditions or do not receive more favorable ones, regardless of their zombie status. In contrast, following a merger involving at least one unhealthy bank (i.e., mergers between two unhealthy banks or between a healthy acquirer and an unhealthy target), these SME borrowers tend to receive more loans. Additionally, mergers between healthy banks are likely to result in the termination of relationships with zombie SMEs, while mergers involving at least one unhealthy bank tend to result in continued relationships and increased lending to zombie SMEs. However, despite the continuation of relationships and improved borrowing

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[2] Due to data limitations, the analysis of the role of bank health could only be performed on the SME sample.

conditions, the performance of these zombie SMEs, as measured by ROA and ROS, has not improved.

Third, the results show that the effects of bank mergers on publicly listed firms are in contrast with those on SMEs in several respects. First, the impact on borrowers' loan terms and conditions is significantly weaker for listed firms. Presumably, since listed firms' borrowing costs before the merger may have already been low, the merged banks may have been unable to decrease further the loan rates offered to this group of firms. Besides, most of the treatment firms in the listed firm sample are clients of banks involved in large mergers such as the BTM-UFJ merger. Second, the adverse impact of bank mergers on listed zombie firms, if any, appears in stricter borrowing terms (higher interest rates) but not in the termination of bank-firm relationships. The only exception is that, in the long term (one or more than one year after the merger), listed zombie firms whose main bank was the target are likely to have their lending relationship discontinued.

The remainder of the paper is organized as follows. Section 2 provides a review of the literature. Section 3 presents an overview of the banking system and bank mergers activity in Japan over the last few decades. Next, Section 4 describes the hypotheses, data used, and empirical approach. Section 5 reports summary statistics and the empirical results. Finally, Section 6 concludes.

2. Literature Review

There are four major approaches that previous studies have taken to investigate the effect of bank mergers on client firms. The first strand focuses on the trade-off between efficiency gains and market power. Starting with traditional studies on horizontal mergers, the literature has indicated that the major incentives of mergers are to achieve efficiencies and reduce costs, or increase market power. Williamson (1968) was the first to show that the net effect of a merger

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on total surplus could be positive or negative, depending on the difference between the welfare gains from cost synergies and the welfare losses associated with market power. A subsequent study by Farrell and Shapiro (1990) further stipulated that without cost synergies, mergers in a Cournot equilibrium will always raise price.

For mergers in the banking industry, the increase in the bank's efficiency could stem from cost and profit efficiency, as well as economies of scale and scope. Houston et al. (2001) found that the primary source of merger gains is cost reduction, which could be achieved through the elimination of redundant managerial positions and headquarters facilities, or the closure of overlapping bank branches. Akhavein et al. (1997) argued that megabank mergers produce a substantial improvement in profit efficiency rather than cost efficiency, owing to better diversification of loan portfolios across geographic areas and industries. In contrast, several studies emphasized that the key motivation for mergers is the exertion of market power. Prager and Hannan (1998) examined the impact of US bank mergers on deposit rates and concluded that the market power effect outweighs the efficiency gains. Focarelli and Panetta (2003) obtained similar results for bank mergers in Italy in the short run, but it is the efficiency gain that dominates in the long run.

More recent studies empirically test which of these two effects dominates by taking into account various merger characteristics. Sapienza (2002) classifies mergers into "in-market" and "out-of-market" mergers, and highlights that if the merging banks have small market shares, in-market mergers decrease the interest rates charged to continuing SME borrowers more than out-of-market mergers. However, if in-market mergers involve a large merging bank, interest rates increase, and the efficiency effect is offset by monopoly power. Erel (2011) uses loan-level data for U.S. commercial banks to analyze the effect on loan prices. She concludes that on average, bank mergers decrease loan spreads, and there is a nonmonotonic relation between spreads and the extent of the market overlap. Meanwhile, Fraisse et al (2018) look into a merger between

two large European banks and find that the merger led to a reduction in lending and higher firm exit, implying that market power is a dominant issue in modern megabank mergers. Also focusing on megamergers, Carow et al. (2006) show that the increased market power and relative bargaining powers of the merged megabanks adversely affect the stock prices of customers of the target banks, and such impact is most severe for credit-constrained firms.

Finally, evidence by Montgomery and Takahashi (2020) suggests that while Japanese bank mergers generally improve the welfare (the abnormal returns) of publicly listed firms having transaction relationships with the merging banks, client firms of banks involved in megabank mergers, zombie client firms or firms transacted with unhealthy banks experience no increase or suffer losses. Note that my analysis of the effect on zombie borrowers is more in-depth than Montgomery and Takahashi (2020) in that it investigates how mergers affect the financing of continuing zombie borrowers, covering both publicly listed and private zombie firms. The present study further addresses how bank mergers disrupt the lending relationship and provides hypotheses concerning the underlying mechanism.

Turning to the second approach, a number of studies investigate the role bank-firm lending relationship plays in explaining the effects of bank mergers. Following the merger, banks reassess their portfolios and may terminate their relationships with certain firms, which negatively affects them. For instance, Bonaccorsi di Patti and Gobbi (2007) show that relationship termination has a temporary adverse impact on credit volumes. Karceski et al. (2005) and Montoriol-Garriga (2008) both find that mergers disrupt lending relationships, with borrowers of target banks suffering the most, although these papers focus on different groups of client firms – publicly listed firms and SMEs. Their results imply that bank mergers may affect borrowers of target and acquiring banks asymmetrically. However, on the positive side, Montoriol-Garriga (2008) documents a significant reduction in loan spreads of borrowers that continue the lending relationship with the merged banks, and such reduction is larger for

borrowers of target banks than borrowers of acquiring banks.

Furthermore, Degryse et al. (2011) examine the heterogeneous effects of mergers more comprehensively by distinguishing between single versus multiple-banking-relationship borrowers and the three choices when the merger occurs: staying, dropping, and switching of relationships. In line with Karceski et al. (2005) and Montoriol-Garriga (2008), they conclude that dropped borrowers having a single relationship with target banks are worse off after the merger. On the other hand, examining a Japanese megabank merger, Uchino and Uesugi (2022) document no differential impact on loan terms of the acquiring bank and target bank toward their client firms. Their research points to another important finding, that is, firms that had borrowed from both merged banks were subjected to more stringent borrowing conditions than firms borrowed from only one of them due to a decrease in the number of lending relationships.

The third strand suggests that bank mergers affect borrowers through organizational changes. In particular, major changes in organizational structure post-merger which include the increase in organizational complexity, turnover of loan officers, restructuring and closure of bank branches can lead to a deterioration or destruction of valuable soft information, on which SME lending relies heavily on. Consistent with this prediction, Ogura and Uchida (2014) find that mergers negatively affect soft information acquisition due to higher bank complexity following the merger, however, this effect is observed only for mergers between small banks. Several studies including the theoretical work of Stein (2002) further point out that larger and more complex banking organizations may favor lending based on hard information and be less inclined to provide loans to small, informationally opaque borrowers. Panetta et al. (2009) find evidence supporting Stein (2002), that is, merged banks depend more on hard information when pricing their loans. The authors also highlight that the informational benefits of mergers, which is the improvement in banks' ability to screen and assess the default risk of borrowers, result in higher interest rates for risky borrowers. In contrast, Peek and Rosengren (1998) explain that because consolidated bank

tends to resemble the pre-merger loan portfolio and lending behavior of the acquirer bank, mergers can enhance lending to small businesses, especially if the acquirer specialized in small business lending before the merger.

Finally, the literature has analyzed the importance of market structure (e.g., local market concentration and market share) and banking competition in determining loan terms of borrowers after mergers. To begin with, while mergers often increase market concentration, there are two opposing views regarding how concentration affects prices. Many studies suggest that higher banking concentration is associated with lower deposit rates (e.g., Berger and Hannan, 1989, Focarelli and Panetta, 2003) and higher loan rates (e.g., Hannan, 1991). Alternatively, the increase in concentration and market share could generate favorable effects on prices if more efficient banks expand and thus gain higher market shares (Demsetz, 1973; Peltzman, 1977).

Moreover, it is worth noting that mergers do not always result in anticompetitive effects. For instance, Adams et al. (2009) show that in markets where mergers significantly increase concentration levels, the HHI later decreases and the number of banks increases, implying that the potential anticompetitive effects of a merger may be mitigated by market forces such as new entry. Meanwhile, according to Cerasi et al. (2019), a merger could be either procompetitive or anticompetitive. On one hand, a merger may improve competition if it creates a new entity being large enough to compete with the incumbent banks. On the other hand, a merger may have an anticompetitive effect if it reduces the number of large competitors, thereby reinforcing the local market power of the newly merged banks. Therefore, bank mergers likely affect lending activity through banking competition. Indeed, Fraisse et al. (2018) suggest that as the size of the merging banks grows larger, anti-competitive effects become more considerable and adversely affect credit availability. Last but not least, when examining the impact of out-of-market mergers, Erel (2011) documents evidence of a strategic price cut: acquirers strategically offer lower rates in

short-term to compete with existing incumbents and gain more market share if they enter new markets dominated by large banks.

In sum, the literature provides mixed evidence on the effects of bank mergers on merging banks' borrowers. However, it is safe to say that such effects likely depend on the characteristics of mergers, banks, firms, and the relationship between them, as well as the local market conditions. To the best of my knowledge, this study is the first to conduct a comprehensive analysis of how Japanese bank mergers affect firm financing activities using firm and bank-level data. The next section provides an overview of bank merger activities in Japan that have taken place in recent decades. Understanding the motives of mergers will be helpful to make more precise interpretations regarding the effects of mergers.

3. Background Information

This section starts with a brief description of the banking system in Japan. It then provides an overview of the Japanese bank merger activities over the past few decades.

3.1. Banking system in Japan

In Japan, the banking system comprises several bank categories, namely city banks, trust banks, regional banks, second-tier regional banks, shinkin banks, and credit cooperatives. City banks, being the largest in terms of size, operate nationwide and also internationally. These banks have branches in many regions across the country, providing diverse banking services to both large, medium, and small enterprises. Trust banks, on the other hand, offer traditional banking services as well as investment-related services such as real estate brokerages, asset management, and securities investment services primarily to large corporate customers.

Regional banks (also referred to as first-tier regional banks) are medium-sized banks whose banking operations and markets are strongly tied to the local prefectures. Similar to regional banks, second-tier regional banks also operate regionally and provide loans mainly to local

SMEs within the same geographical areas, though their sizes tend to be smaller than regional banks. Typically, in each prefecture in Japan, there is a (first-tier) regional bank and some smaller second-tier regional banks (e.g., see Hosono et al., 2007). Last but not least, shinkin banks and credit cooperatives are both non-profit cooperatives operating in specific geographic areas. These financial institutions are smaller than city banks and regional banks, specializing in lending to their member SMEs and individuals.

[Figure 1]

Figure 1 shows the number of banks in Japan by each type since the 1980s. In the 1980s, the number of banks in each of the six groups was relatively stable, except for the credit cooperatives, whose number decreased from 476 in 1980 to 415 in 1989. However, from the 1990s until the early 2000s, the number of banks declined sharply due to a surge in bank consolidation as well as bank failures. It continues to trend down to this day, albeit at a slower pace. As a result, the number of city banks decreased by more than half – from 12 in the 1990s to 5 in 2020; whereas the number of shinkin banks and credit cooperatives dropped from 451 and 408 to 254 and 145, respectively, during the same period. The number of second-tier regional banks also reduced from 68 to 38 in the period 1990–2020, while that of first-tier regional banks remained more or less unchanged. The next subsection will focus on the country's background which leads to such changes in the banking systems.

3.2. Bank merger activities in Japan

As shown in Figure 1, only a small number of bank mergers occurred in the 1980s – the period when the Japanese economy was at its peak. The stability in the number of banks stemmed from the "convoy system", in which the government ensured the soundness of the financial system by protecting all financial institutions against failure, including the most inefficient ones, and strictly restricting competition among banks (e.g., see Hoshi and Kashyap,

2001). Specifically, measures to discourage banking competition include the interest rate controls, the restrictions on opening new branches, and the separation of business lines.

However, financial liberalization and deregulation that began in the 1980s continued to progress in the 1990s, making the convoy system difficult to be sustained. The implementation of Basel I in 1992 forced banks to maintain the minimum risk-based capital requirements, thereby increasing weak banks' incentive to survive through mergers. Moreover, also starting from the 1990s, Japan entered a lost decade with the collapse of the real estate and stock price bubbles. Consequently, many banks suffered from an excessive level of non-performing loans, which resulted in the 1997 banking crisis. The combination of these factors triggered a wave of bank mergers during the late 1990s and early 2000s that were mentioned in the preceding subsection.

Against this background, the BOJ sharply lowered its policy rate after the burst of asset price bubble, but the economy did not achieve a full-fledged recovery. With conventional monetary policy becoming ineffective, the BOJ started to adopt unconventional monetary policies, namely the zero-interest rate policy from February 1999 to August 2000, and quantitative easing from March 2001 to March 2006. Even in the post-crisis period, unconventional monetary policies keep evolving, leading to the introduction of Comprehensive Monetary Easing (October 2010 – April 2013) and the Quantitative and Qualitative Easing since April 2013.

Such implementation of unconventional monetary policy in Japan has contributed to a prolonged low interest rate environment. At the same time, the problem of population aging along with the decline in the number of companies in Japan (see Figure 2) have caused a persistent reduction in the demand for loans. As a result, the competition among financial institutions has steadily become more severe in the recent decades, and this in turn has led to certain difficulties in maintaining banks' profitability and strengthening their financial

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intermediation function, especially for small-scale regional banks. Under these circumstances, banking consolidation and the establishment of bank holding companies can be the solutions for banks to overcome the existential crisis. On November 10, 2020, the BOJ announced that it would encourage regional banks and shinkin banks to merge or integrate their businesses with others to improve their business foundations by paying extra interest on the current account balances that these banks hold at the BOJ.[3]

[Figure 2]

Given the importance of bank mergers for the operations and business environment of the banks themselves, as well as for the financing activities of their client firms, this study conducts a comprehensive analysis of the impacts of Japanese bank mergers on firm financing to better understand the impetus of bank mergers in Japan and the role of bank-firm relationship. The next section will present the hypotheses, and describe the methodology and data used.

4. Methodology and Data

4.1. Hypotheses

First, mergers may increase bank efficiency due to operational cost reduction achieved through the closure of overlapping bank branches, better diversification of risk, and the utilization of economies of scale and scope. These efficiency gains could be passed on to borrowers, resulting in a lower interest rate and higher loan ratio. On the other hand, the anticompetitive behavior and the exercise of market power by merged banks, as well as the destruction of soft information resulting from organizational structure changes may lead to an increase in the interest rate and a reduction in the loan ratio. The impact of bank mergers on lending outcomes thus depends on which effect dominates. However, as discussed in the preceding section, the Japanese banking sector has faced numerous challenges over the last

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[3] Details are available at: https://www.boj.or.jp/en/announcements/release_2020/rel201110a.pdf.

decade, including a significant decrease in loan demand and high competition under a low interest rate environment. It is likely that the incentive of recent mergers is to cut costs and improve competitiveness. Therefore, on average, the interest rate paid by borrowers may have decreased and the loan amount may have increased following the mergers. The first hypothesis is stated as follows:

Hypothesis 1: *Bank mergers can positively affect lending outcomes through the efficiency effect, but can also have a negative effect on borrowers, e.g., due to the exercise of market power and the loss of soft information. For recent Japanese mergers, the overall effect on borrowers' loan terms is likely to be positive.*

Second, the merger size (e.g., measured by the local market share of the newly merged banks) and the HHI of the loan market – a proxy for local market concentration – could affect the direction and extent of the impacts on borrowers. The positive effects of mergers on firm financing, if exist, can become weaker as the merger size or the degree of local market concentration increases, and can turn in the opposite direction if the merger size is large enough. In the case of large mergers, the market power effect and/or the deterioration of valuable soft information likely dominate efficiency gains, and the impact on borrowers' financing activities may have been negative. I construct the following hypothesis:

Hypothesis 2: *The local market structure (i.e., the size of the merger and local market concentration) may play a role in determining the sign and magnitude of the impacts on borrowers.*

Third, banks with different health statuses may have dissimilar motivations for merging, which can affect their lending attitudes post-merger. Healthy banks may seek mergers to increase market power and bargaining power in setting prices. Meanwhile, Berger et al. (1999) argue that an efficient bank tends to merge with an inefficient bank to transfer its superior management skills, expertise, or operating policies. Consequently, a healthy bank is likely to

merge with an unhealthy bank to enhance the overall efficiency of the newly merged bank. On the other hand, Hosono et al. (2007) point out that weak banks have incentives to merge with each other to enhance their access to the government's financial safety net, or if they anticipate potential bailouts or the implementation of TBTF policies (also see Berger et al., 1999; Kobayashi and Bremer, 2022). Weak banks may also merge to improve financial health and solve non-performing loan problems. Thus, I hypothesize the following:

Hypothesis 3: *The impact of a merger on borrowers may largely depend on the financial health of the banks involved in the merger.*

Fourth, there are contrasting predictions regarding how bank mergers affect zombie client firms. Mergers may negatively affect zombie borrowers through the improvement in banks' abilities to screen and assess the default risk of their borrowers, thereby allowing the merged banks to discriminate between risky borrowers and high-quality borrowers, as suggested by the "informational improvements" hypothesis proposed by Panetta et al. (2009). Moreover, mergers may have strengthened bank health and financial soundness, as well as induced banks to be well-capitalized (e.g., see Kobayashi and Bremer (2022) for the Japanese case). By becoming bigger and healthier, merged banks may become less likely to engage in evergreen lending to zombie firms, and may implement a balance sheet cleansing and eliminate all unprofitable projects.

In contrast, bank mergers may positively affect zombie client firms if the merged banks achieve managerial efficiency by improving their consultation capacity and ability to monitor borrowers. Mergers may also benefit zombie firms if strengthened financial health allows banks to increase their risk-taking capacity and risk tolerance, or if banks merge due to their beliefs in TBTF or local market stabilization policies. In these scenarios, zombie client firms of the merged banks may not face more stringent borrowing conditions or even be granted larger loans

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or charged lower interest rates than those of non-merging banks. The following hypotheses are investigated:

Hypothesis 4:

• H4A: *Following the mergers, zombie client firms transacted with the merging banks may suffer from a higher probability of being dropped and/or face more stringent borrowing conditions.*

• H4B: *Alternatively, zombie firms transacted with the merging banks may not experience a higher probability of being dropped and/or receive more favorable loan terms.*

Note that the impact of bank mergers may diverge between private SMEs and publicly listed firms, since these groups of firms differ in terms of the closeness of relationship with merging banks, financial constraint level, and bargaining power. From banks' perspective, while lending to SMEs often depends on soft information, loan provision to large, listed firms is mainly based on hard information. The adverse effect of merger size may be stronger for SME borrowers than publicly listed borrowers, as these firms suffer more from soft information loss, and the merged banks can exercise market power based on the information advantage they have over the firms. Meanwhile, publicly listed borrowers are less likely to suffer from the destruction of soft information and could have more alternative financing options.

Last but not least, zombie SMEs and publicly listed zombie firms transacting with the merging banks may be treated unequally, as listed zombie firms are typically larger and have stronger bargaining power. If the merged banks terminate their relationship with these large zombies, the losses they incur and the damage to their balance sheet health will be more severe than when they terminate the relationship with smaller zombie SMEs.

4.2. Data and variables

Several datasets are utilized to examine the impact of the recent Japanese bank merger on borrowers' financing. The primary data is the Japanese bank merger data spanning from 2005

to 2018, which includes information on mergers of banks belonging to all major categories, i.e., city banks, regional banks, trust banks, shinkin banks, and credit cooperatives. It contains information on the merger date and the identities of the target and acquiring banks involved in each merger. Considering that it would be difficult to precisely gauge the effects of mergers if a bank is involved in multiple mergers, this study focuses only on mergers in which each merging bank is engaged in one merger event during the analysis period. As a result, the sample covers 50 mergers, of which 3, 8, 1, 27, and 11 mergers are between city banks, regional banks, trust banks, shinkin banks, and credit cooperatives, respectively.[4] During the analysis period, there are two mega-mergers, which are the merger between the BTM and the UFJ in 2005 and the internal merger between the former Mizuho Bank and Mizuho Corporate Bank in 2013, with the total assets of the newly merged banks both exceeding 150 trillion yen at the time of the mergers.[5] In addition, while bank mergers in Europe or the US are usually divided into in-market and out-of-market mergers, most of the Japanese bank mergers during 2005-2018 are in-market, i.e., the target and acquirer banks operated in at least one common prefecture before the merger.

The second key data source is the TDB database, from which firm data, namely, listing information, location, date of establishment, firm industry, number of employees, and financial statement data on an annual basis are obtained for the period 2004-2019 (i.e., one year before the first merger to one year after the last merger in the dataset). Moreover, the TDB database provides the names of up to ten banks with which firms have transaction relationships. This bank-firm lending relationship information is indispensable to identify continuing, terminated

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[4] Table A.1 of the Appendix shows the number of mergers occurring by year and by bank group during the analysis period. In case a merger involves banks of different types, it is recorded in the category of the larger bank. As can be seen, more mergers occurred in the first half of the period than in the latter half, and many of them were between shinkin banks.

[5] Tables A.2 and A.3 in the Appendix provide information on the largest mergers based on total assets or local market share. While mergers between city banks are the largest in terms of assets, mergers between regional banks increase the market share of newly merged banks most significantly.

and new borrowers of the merging banks as well as borrowers of the non-merging banks, and to calculate the proxy for merger size – the market shares of the newly merged banks in each prefecture at the time of the merger. From this database, I exclude financial and insurance firms using the industry group information, then distinguish SMEs (private firms with less than 300 employees) and public firms using data on the listing status and the number of employees. This firm panel dataset is unbalanced, covering 371,865 SMEs, and 3994 publicly listed firms.

Furthermore, annual data on the HHI of the loan market at the year-prefecture level is also employed to control for the local market concentration. This unique dataset is constructed by Uesugi et al. (2022) using the information on the total loan outstanding amount of all bank branches across the country from the Financial Services Agency. I also collect financial statement data for banks of all groups from two data sources. The first source is Nikkei FQ, which covers data of 135 regional, city, and trust banks. Meanwhile, the financial statement data of 326 shinkin banks and 190 credit cooperatives are from a publication series called the "Nationwide Financial Statements of Shinkin Banks" and the "Nationwide Financial Statements of Credit Cooperatives," created by Financial Book Consultants, Ltd. (Kinyu Tosho Consultant Sha) based on the non-consolidated business reports of such banks in Japan. However, due to limited access to the latter data source, the dataset of bank financial statements starts in 2005 and ends in 2014. Finally, to detect zombie firms following Caballero et al. (2008), the coupon rates on convertible corporate bonds and the short and long-term prime rates for the period from 1999 to 2018 are collected from Nikkei FQ and the BOJ website, respectively.

Table 1 shows the definition of the key variables used for the analysis. Two dependent variables – the *Interest rate* and *Loan ratio* are used to investigate the impacts of mergers on client firms' financing activities. These variables are obtained based on the firm annual financial statements, thus reflecting the average interest rate a firm has to pay to its lenders and the ratio of total loans from all lenders. The *Discontinued* is a dummy variable used to analyze how

mergers affect the probability of relationship termination. Next, except for the *Bank share*, all independent variables related to mergers are dummy variables and are calculated using information on mergers and main bank-firm relationship, considering that most of a firm's bank loans come from its most important main bank. Meanwhile, the *Bank share* variable is computed at the prefecture-level by dividing the total number of borrowers of each merged bank in each prefecture at the time of the merger by the total number of firms based in that prefecture in the same year, thus all bank-firm relationship information is fully utilized. In the analysis, I employ a set of control variables, which consists of the prefecture-level HHI of loan market, firm and bank-specific characteristics. Note that because the *Interest rate* and *Loan ratio* contain some extreme values, they are winsorized at 99 percent to remove outliers.

[Table 1]

4.3. Methodology

4.3.1. The effects of bank mergers on continuing borrowers – The baseline models

To test the first and second hypotheses constructed in subsection 4.1, this study first focuses on the impact of bank mergers on the loan terms of continuing borrowers, which are firms that had the main bank relationship with the merging bank before the merger and maintained this relationship with the newly merged bank after the merger. The following regression model is estimated:

$$Y_{i,t} = \alpha_0 + \alpha_1 Merger_{k,t} + \alpha_2 (Merger_{k,t} \times Bank\ share_{k,r}) + \alpha_3 HHI_{r,t} + \beta X_{i,t-1}$$
$$+ \gamma Z_{k,t} + d_t + f_i + \varepsilon_{ikt} \tag{1}$$

where the dependent variable, $Y_{i,t}$, is either the *Interest rate*; or the *Loan ratio* of firm i in year t. The key independent variable, $Merger_{k,t}$, is a dummy variable that equals one for all years (one or more than one year) after the main bank k of firm i involved in a merger,[6] and zero

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[6] As also mentioned in section 4.2, because a firm are likely to be most affected when its main bank is engaged in the merger, the present study focuses on this firm-main bank relationship. However, this will cause some firms

otherwise. $Bank\ share_{k,r}$ is equal to the market share of the newly merged bank k in prefecture r at the time of the merger, and zero otherwise. Thus, the interaction term $Merger_{k,t} \times Bank\ share_{k,r}$ proxies for the size of the merger. For the control variables, $HHI_{r,t}$ is the HHI of the loan market in prefecture r and year t; $X_{i,t-1}$ is a vector of firm characteristics consisting of the *Ln Age*, the *Size*, the *Profitability*, and the *Tangibility* of firm i at time $t-1$; and $Z_{k,t}$ is a vector of bank k characteristics, i.e., *Bank size*, *Bank equity ratio*, and *Bank non-performing loan (NPL) ratio*. The model also includes time and firm fixed effects – d_t and f_i, as well as the error term (ε_{it}). Using this model specification, $\alpha_1 + \alpha_2 \times BankShare_{k,r}$ measures the treatment effect of bank mergers on $Y_{i,t}$, the variable representing firms' borrowing conditions.

Next, to investigate the impact of mergers over time, the following model is also employed:

$$Y_{i,t} = \alpha_0 + \alpha_1 Period1_{k,t} + \cdots + \alpha_5 Period5_{k,t} + \delta_1(Period1_{k,t} \times Bank\ share_{k,r}) + \cdots +$$

$$\delta_5(Period5_{k,t} \times Bank\ share_{k,r}) + \lambda HHI_{r,t} + \beta X_{i,t-1} + \gamma Z_{k,t} + d_t + f_i + \varepsilon_{ikt} \quad (2)$$

where $Period1_{k,t}$ to $Period4_{k,t}$ dummies are equal to one if as of time t, firm i's main bank k involved in a merger one to four years ago, respectively, and are equal to zero otherwise; while $Period5_{k,t}$ equals one if bank k involved in a merger more than five years ago, and zero otherwise. The remaining variables are defined as in model (1). As a result, in model specification (2), the *Merger* variable and its interaction with the *Bank share* variable are replaced by the period dummies measuring the number of years that have passed since the merger event took place and the corresponding interaction terms with the *Bank share*.

The above regression models (1) and (2) will be estimated separately for the SME and publicly listed firm samples, given that bank mergers may generate differential impacts on these groups of firms, as indicated in subsection 4.1. Considering that the panel dataset is unbalanced,

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potentially affected by mergers of non-main banks to be included in the control group. The analysis is conducted with this caveat in mind.

in the analysis, the following definitions are applied to precisely classify borrowers of the merging banks into continuing, new, and terminated ones. Continuing borrowers are defined as those who have the main bank relationship with the merging bank the nearest year before the merger and the relationship with the merged bank the nearest year after the merger. New borrowers are those that newly started or re-established the main bank relationship with the merged bank after the merger. Terminated borrowers are those who ended the relationship with the merged bank in the year of the merger or the nearest year before the merger (the allowed maximum gap between these two time-points is 3 years). When focusing on the impact on continuing borrowers, it is necessary to rule out the possibility that the terminated (dropped) borrowers are included in the control group and the new borrowers are included in the treatment group. Therefore, when examining the impacts on continuing borrowers' loan terms, terminated and new borrowers will be excluded from the publicly listed firm and SME samples.

In addition, to test Hypothesis 3 on the role of bank health, the main regression model (model (1)) will be utilized for merger subsamples to study the impact of mergers (i) between two healthy banks, (ii) between two unhealthy banks, and (iii) between a healthy acquirer and an unhealthy target. A merging bank is classified as healthy if its NPL ratio immediately before the merger is lower than the median of the bank sample. Using this approach, 37 of the 42 mergers that occurred between 2005 and 2014 could be classified. Of these, 9 were between two healthy banks, 16 were between two unhealthy banks, 9 were between a healthy acquirer and an unhealthy target, and 3 were between an unhealthy acquirer and a healthy target. Due to data limitations, this study does not consider the last scenario (mergers between an unhealthy acquirer and a healthy target), and the analysis is performed only on the SME sample[7].

4.3.2. Bank mergers and continuing zombie borrowers

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[7] This analysis could not be performed for public firm sample because most of the treatment firms are involved in mergers between two healthy banks.

Given Hypothesis 4, my next focus is to examine how bank mergers affect the continuing borrowers being categorized as zombies. To identify zombie firms, there are two well-known criteria proposed by Caballero et al. (2008) (hereafter, CHK) and/or Fukuda and Nakamura (2011) (hereafter, FN) that are often used by previous studies. According to CHK, zombies are those whose interest payments were lower than the minimum required interest payment ($R_{k,t}^*$), which is defined as:

$$R_{k,t}^* = rs_{t-1}BS_{i,t-1} + \frac{1}{5}\left(\sum_{j=1}^{5} rl_{t-j}\right)BL_{i,t-1} + rcb_{min\ over\ 5\ years,\ t}Bond_{i,t-1}$$

where $BS_{i,t}$, $BL_{i,t}$, and $Bond_{i,t}$ are short-term bank loans, long-term bank loans, and total bonds outstanding, respectively, of firm i at the end of year t; $rs_t, rl_t, rcb_{min\ over\ 5\ years,\ t}$ are the average short-term prime rate in year t, the average long-term prime rate in year t, and the minimum observed coupon rate on any convertible corporate bond issued in the last five years before t.

Importantly, however, FN argues that the CHK criteria could be an incorrect measure, since it may identify healthy firms as zombies, and at the same time, may not identify unhealthy firms as zombies. The authors proposed two additional criteria to identify zombies more accurate, namely, the "profitability" (i.e., firms whose EBIT exceeded $R_{k,t}^*$ were excluded from being categorized as zombies) and "evergreen lending" criteria (i.e., firms whose EBIT was less than $R_{k,t}^*$ and borrowings increased in the current period, total external debt was over half of their total assets in the previous period were categorized as zombies).

Applying the FN and CHK calculation methods to the firm data set collected from TDB, Figure 3 depicts the evolvement of zombie ratios between 2004 and 2019. It is clear from the figure that there was a substantial difference in the zombie ratio based on two criteria for both the private firm sample (part a) and the listed firm sample (part b). Specifically, the percentage of CHK zombies was generally higher for the sample of listed firms than for the private firm

sample, but both CHK zombie ratios tended to increase over time. Meanwhile, using the FN method shows that listed zombie firms made up a smaller share of the corresponding sample (at around 6.4%) than private zombie firms (at around 14.6%). During the period of analysis, the zombie ratios were highest during the crisis and a few years later – reaching a maximum of 23.9% for the private firm sample and 13.8% for the public firm sample, then gradually decreased and remained stable until 2019 (the end of the sample period). Given this contrasting result, throughout my analysis, zombie firms will be identified using the FN criteria.

[Figure 3]

Next, from the publicly listed firm and SME samples, I construct the corresponding zombie subsamples, which include poorly performed firms being categorized as zombies based on the FN criteria for at least 2 years during the period 2004-2019 (one-shot zombie firms are excluded). For each subsample, models (1) and (2) are again estimated to gauge the effect of mergers on the borrowing conditions of unprofitable zombie firms. Additionally, for zombie SMEs, model (1) will be re-utilized to examine whether the impact of bank mergers on zombie borrowers depends on the financial health of the merging banks.

4.3.3. Bank mergers and relationship termination

Finally, to explore how mergers affect the discontinuation of bank-firm relationships for borrowers that used to transact with the merging banks, especially for zombie firms, the following logit model is employed using the sample of SMEs or public firms, with new borrowers again being excluded:

$$\Pr\left(Discontinued_{i,t} = 1\right) = G[\alpha_0 + \alpha_1 Merger\_ST_{k,t} + \alpha_2 Merger_{k,t} + \alpha_3\left(Merger\_ST_{k,t} \times Zombie_{i,t-1}\right) + \alpha_4\left(Merger_{k,t} \times Zombie_{i,t-1}\right) + \alpha_5 Zombie_{i,t-1} + \lambda HHI_{r,t} + \beta X_{i,t-1} + \gamma Z_{k,t}] \ (3)$$

where $G(\cdot)$ is a cumulative distribution function of a logistic distribution:

$$G(z) = \exp(z)/[1 + \exp(z)] \qquad\qquad ;$$

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$Discontinued_{i,t}$ is a dummy variable that equals one for firm i in year t if the firm reports having the main bank relationship with a different bank in the subsequent year, and zero otherwise; $Merger\_ST_{k,t}$ equals one for the year of the merger and the nearest year before the merger (the maximum gap between these two time-points is 3 years) that the main bank k of firm i involved in, and zero otherwise; $Zombie_{i,t-1}$ equals one if firm i was classified as a zombie based on the FN criteria in year t-1; and the remaining variables are defined as in model (1). Note that while $Merger\_ST_{k,t}$ and the interaction term $Merger\_ST_{k,t} \times Zombie_{i,t-1}$ capture the immediate impacts of mergers, the inclusion of $Merger_{k,t}$ and $Merger_{k,t} \times Zombie_{i,t-1}$ in the regression model allow us to estimate the longer-term impact of mergers on the relationship termination.

Moreover, recalling that bank mergers may have an asymmetric impact on the disruption of lending relationships for borrowers of the target and acquirer banks, e.g., as suggested by Montoriol-Garriga (2008) and Degryse et al. (2011), I further study whether such differential impact can be observed, utilizing the following model:

$$\Pr(Discontinued_{i,t} = 1) = G[\alpha_0 + \alpha_1 Acquirer\_ST_{i,k,t} + \alpha_2 Acquirer_{i,k,t} + \alpha_3 Target\_ST_{i,k,t} +$$
$$\alpha_4 Target_{i,k,t} + \alpha_5 (Acquirer\_ST_{i,k,t} \times Zombie_{i,t-1}) + \alpha_6 (Acquirer_{i,k,t} \times Zombie_{i,t-1}) +$$
$$\alpha_7 (Target\_ST_{i,k,t} \times Zombie_{i,t-1}) + \alpha_8 (Target_{i,k,t} \times Zombie_{i,t-1}) + \alpha_9 Zombie_{i,t-1} +$$
$$\lambda HHI_{r,t} + \beta X_{i,t-1} + \gamma Z_{k,t}] \tag{4}$$

where $Acquirer\_ST_{i,k,t}$ (or $Target\_ST_{i,k,t}$) equals one for the year of the merger or the nearest year before the merger (again, the allowed maximum gap is 3 years) that the main bank k of firm i involved in as an acquirer (or a target), and zero otherwise; $Acquirer_{i,k,t}$ (or $Target_{i,k,t}$) equals one for all years (one or more than one year) after the bank k involved in a merger, and zero otherwise, provided that firm i had a main bank relationship with the target bank (or the acquirer bank) prior to this merger event. Simply put, these four independent variables are defined similarly as the $Merger\_ST_{k,t}$ and $Merger_{k,t}$ in model (3), but in model

(4), the client firms of the target and acquirer banks are distinguished from each other. Finally, $G(\cdot)$ function and the remaining control variables are defined as above.

5. Empirical Results

5.1. Summary statistics

Table 2 presents summary statistics of all firm variables used in the regression analysis from 2005 to 2019. In total, there are 1,783,142 firm-year observations for SME sample (Panel A) and 40,945 observations for public firm sample (Panel B).

Starting with the proxies for borrowing conditions, the mean loan ratio of SMEs is 51.70 percent, much higher than that of public firms with 13.74 percent. On average, SMEs pay an interest rate of 2.27 percent to their lending banks, while public firms pay a slightly lower interest rate at 2.26 percent. For both groups of firms, tangible assets account for about 25 percent of total assets. Looking at the averages of size, profitability, and the logarithm of firm age, the statistics indicate that SMEs are younger, smaller, and have lower profitability ratios than public firms.

[Table 2]

Next, Table 3 illustrates descriptive statistics of local market concentration and bank variables. In Panel A, there are 705 prefecture-year observations, corresponding to the HHI data of 47 prefectures across Japan over 15 years (2005-2019). The mean HHI of the loan market is 0.22, suggesting that the Japanese loan market has been moderately concentrated in recent years. The minimum value of HHI was 0.05 (in Aichi Prefecture in 2018), while the maximum value was 0.37 (in Shimane Prefecture also in 2018). Turning to the bank control variables, the sample for bank characteristics consists of 5,170 bank-year observations, covering only the period from 2005 to 2014 due to the limited data availability. Panel B shows that the mean of

the proxy for bank size (the natural log of total bank assets) is 12.77. An average bank has an equity ratio of 5.29 percent and an NPL ratio of 7.41 percent.

[Table 3]

Finally, Panel C of Table 3 provides the statistics of the newly merged banks' prefectural market shares – the proxy for merger size – in the year of the merger. Calculating the bank share variable for 50 bank mergers that occurred between 2005 and 2018 yields 220 merged bank-prefecture observations. The figure for the whole sample (including both SMEs and public firms) suggests that, on average, a newly merged bank extends loans to 6.30 percent of the total number of firms within the prefectures where it operates. Table 3(c) also reports the average bank share of merged banks having a lending relationship with only SMEs or listed firms for the subperiod 2005-2014 or the entire period 2005-2018. This information is applied to estimate the average effect of mergers on borrowers, and details will be presented in the following subsections. As can be seen, the mean of the bank share is higher for the listed firm sample than that for the SME sample, implying that in the dataset, listed firms tend to be involved in larger bank mergers.

5.2. The effect of bank mergers on SME borrowers

5.2.1. The effect of bank mergers on continuing SME borrowers – Baseline analysis

First of all, the impact of mergers on bank borrowing of SMEs that continue the relationship with the merged banks is investigated using the sample containing the continuing SME borrowers of the merged banks (the treatment group) and all SME borrowers of the non-merging banks (the control group).[8] Using model specification (1), the results are reported in Table 4. Due to limited data availability, data on bank characteristics are obtained only from 2005 to 2014. Therefore, the regressions are conducted for the period 2005-2019 without bank

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[8] As discussed in Subsection 4.3.1, in all my analyses on the impact on continuing borrowers, terminated and new borrowers are excluded from the sample to mitigate potential bias.

characteristics variables (columns (1)&(2)) or for the period 2005-2014 with a complete set of control variables (columns (3)&(4)). In the last two columns, I implement similar regressions as in columns (3) and (4) but exclude the mega-mergers from the sample, i.e., the BTM-UFJ in 2005 and the internal Merger of Mizuho Bank in 2013.

[Table 4]

As shown in columns (1), (3), and (5), when exploring the effect on interest rates, the coefficient on *Merger* is negative, and that on the interaction term *Merger*Bank share* is positive. Using the result in column (3) and the average bank share ratio of 6.98 percent from Panel C of Table 3, I obtain the average effect of -1.74 basis points. For the effect on interest rates to become positive, the newly merged bank should have a local market share of 18.60 percent or higher. This result suggests that bank mergers lower interest rates, probably due to the efficiency effect; however, this effect wanes as merger size increases.

Regarding the effect on loan ratio (see columns (2), (4), and (6)), after the HHI, firm, and bank characteristics are controlled for, the coefficient on *Merger* is positive, while the coefficient on *Merger*Bank share* is negative and statistically significant at the 5 percent level or higher. Overall, bank mergers lead to an increase in SMEs' loan ratio of 0.45 percentage point, derived from the result in column (4) and the mean bank share of 6.98 percent. However, if the size of the merged banks is sufficiently large, the merger may tighten firms' access to bank credit due to the loss of soft information and the prevalence of market power. In addition, the effect of HHI on SMEs' borrowing conditions is as predicted by Hypothesis 2: firms in prefectures with high market concentration are more disadvantaged in raising funds compared to those in prefectures with lower HHI.

In the next step, I analyze the effect of mergers on continuing SMEs' financing over time by employing model (2). Table 5 indicates that adverse impacts of merger size (such as due to soft information loss, organizational changes and market power effect) on firm financing

conditions dominate in the first three years after the merger. In contrast, in the long run, the merged banks may fully realize efficiency gains through mergers [9] and pass them on to borrowers, resulting in more favorable loan terms for continuing borrowers. This finding holds even when mega-mergers are excluded from the sample (columns (5)-(6)). However, one difference is that while the positive effect on the financing of continuing borrowers is statistically significant since the fifth year when using the sample including all mergers, this effect is significant since the fourth year for the non-mega merger subsample.

[Table 5]

To sum up, consistent with Hypotheses 1 and 2, client SMEs that continue to borrow from the merged banks generally benefit from a reduction in the interest rate and an increase in the loan ratio in the long run, and such effect persists over time. Nevertheless, these effects could be weakened or reversed if the merger size is large enough.

I then examine Hypothesis 3 and explore the role of bank financial health by classifying mergers into (i) mergers involving two healthy banks, (ii) mergers involving two unhealthy banks, and (iii) mergers involving a healthy acquirer and an unhealthy target. For each merger type, model (1) is again applied to estimate the impact on continuing SME borrowers.

[Table 6]

The results are reported in Table 6. As can be seen, mergers between two healthy banks (columns (1)-(2)) generally lead to an increase in interest rates paid by continuing SME borrowers and a reduction in loan ratio. The larger the size of the healthy merger, the greater the adverse effect on borrowers' loan terms. In contrast, mergers between two unhealthy banks or between a healthy acquirer and an unhealthy target tend to have positive effects on continuing SME borrowers: on average, the loan ratio increases by 3.51 percentage points for the former

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[9] Earlier studies claim that it often takes three years after a merger for the merged banks to exhaustively achieve cost savings (e.g., Berger et al., 1998; Focarelli and Pannetta, 2003).

(column (4)) or 1.26 percentage points for the latter (column (6)) (calculated using the average bank share ratio of 6.98 percent). These results imply that the financial health of the merging banks plays an important role in determining continuing borrowers' loan terms.

5.2.2. The effect of bank mergers on continuing borrowers – Zombie SMEs

To examine how merged banks treated zombie borrowers following the mergers, the regression model (1) is estimated for the zombie SME subsample, which includes firms being labeled as zombies based on the FN criteria for at least 2 years during the analysis period. The control group consists of zombie SME borrowers of the non-merging banks, while the treatment group comprises zombie SMEs that continue to transact with the merged banks (as explained, terminated and new zombie borrowers are excluded from the sample).

[Table 7]

The results are presented in Table 7. While mergers decrease the interest rate and increase the loan ratio of an average SME borrower (recall Table 4), for the zombie subsample, the coefficients on *Merger* are not statistically significant across all columns. The coefficients on *Merger*Bank share* – the proxy for merger size – are statistically significant in columns (4)-(5). However, this evidence was not robust to different adjustments of the merger sample, the period of analysis, and/or the sets of control variables. Overall, the results suggest that zombie SMEs borrowing from the newly merged banks have not been offered more favorable loan terms than zombie clients of the non-merging banks.

However, the impact on zombie borrowers may vary depending on the health of the merging banks. To test this hypothesis, Table 8 re-estimates model (1) for the three subsamples based on merger types. Following a merger between two healthy banks, zombie SMEs that continue to borrow from the newly merged banks are not subject to more stringent borrowing conditions. This differs from the results obtained in Table 6: while the healthy merged banks exercise market power over average SME borrowers, they do not exercise it over zombie firms.

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Meanwhile, following a merger between two unhealthy banks (columns (3)-(4)) or between a healthy acquirer and an unhealthy target (columns (5)-(6)), continuing zombie SME borrowers have a higher loan ratio. This positive impact on zombie borrowers is stronger for mergers between two unhealthy banks (4.86 percentage points on average) than for mergers between a healthy acquirer and an unhealthy target (2.87 percentage points on average).

[Table 8]

If zombie borrowers receive more favorable lending conditions, they may recover and improve their performance. To test this hypothesis, Table 9 investigates the impact of mergers classified by bank health on the performance of continuing zombie SMEs. The dependent variables are the firm's ROA (= Operating income / Total assets) or ROS (= Operating income / Operating revenue), while the independent and control variables are the same as in model (1). The results show that the relaxation in borrowing conditions for zombie SMEs does not lead to an improvement in their performance. Notably, the results in column (4) suggest that mergers between two unhealthy banks may negatively affect zombie SMEs' performance, with an average impact of -1.14 percentage points. Presumably, weak banks merge due to their belief in the implementation of TBTF policies, local market stabilization policies, or government bailouts, which allows them to continue engaging in forbearance lending behavior.

[Table 9]

5.2.3. The effect of bank mergers on relationship termination of SMEs

Another issue of interest is the effect of mergers on the termination of bank-firm relationships. As discussed in Section 2, the literature suggests that mergers can increase the probability of discontinuing the lending relationship, especially for customers of the target banks. Therefore, I begin this analysis by exploring the overall effect of mergers on relationship termination, using logit estimations and the SME sample excluding all new borrowers. The specifications are as described in models (3) and (4) but without variables related to zombie

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status; and the estimated average marginal effects (AME) are shown in columns (1) and (2) of Table 10.

[Table 10]

As can be seen, shortly after a merger, firms that used to borrow from a merging bank have a 0.86 percentage point higher probability of being dropped than those borrowing from non-merging banks. However, in the longer term, i.e., one year or more after a merger, client firms of a merging bank have a more stable firm-bank relationship (0.18 percentage point lower probability of relationship termination) than client firms of the non-merging banks. Classifying treated firms into customers whose main bank is an acquirer or a target, the result in column (2) indicates that both of these groups have a higher probability of being dropped immediately after a merger with a similar degree of impact. However, in the long run, only customers of the acquirers have a lower probability (0.27 percentage point) of being dropped, whereas this effect is not statistically significant for customers of the targets.

Next, using models (3) and (4), I investigate whether the termination of lending relationships by merged banks depends on the profitability and prospects of borrowers, i.e., whether the firms are identified as zombies or not at the time of the mergers. The result in column (3) of Table 10 suggests that, in the short run, client firms of the merging banks are more likely to lose the main bank relationship than those of the non-merging banks, and being categorized as zombies additionally increases their probability of discontinuation by 1.17 percentage points. The coefficient on *Merger*Zombie* is also positive, indicating that zombie SMEs are more likely to be dropped by the merged banks even in the long run, although this effect is 0.75 percentage point – somewhat weaker than that in the short run. Column (4) further reveals that zombie client SMEs of the target and the acquirer banks are more likely to have the relationship terminated in both the short and long run, while healthy borrowers only face a higher probability of relationship disruption around the time of the mergers.

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To examine the role of bank health, Table 11 utilizes model (3) to estimate the impact of mergers between health-healthy banks, unhealthy-unhealthy banks, and healthy-unhealthy banks on the termination of relationships with SMEs. The results indicate that the probability of relationship termination post-merger is only higher in the case of mergers between two healthy banks. Specifically, in the short run, client firms of healthy merging banks are more likely to lose the relationship than those of the non-merging banks, and zombie status increases this probability by 1.39 percentage points (column (2)). In the long run, only zombie SMEs are more likely to be dropped by the healthy merged banks, with an average impact of 0.95 percentage point. On the other hand, regardless of the zombie status, firms involved in unhealthy-unhealthy mergers or healthy-unhealthy mergers do not experience an increase in the probability of relationship termination.

[Table 11]

Based on the evidence in Tables 7 to 12, it can be concluded that Hypothesis 4A holds for mergers between two healthy banks, while Hypothesis 4B holds for mergers between two unhealthy banks or between a healthy acquirer and an unhealthy target. Following a merger between two healthy banks, the newly merged banks tend to cut ties with unprofitable, risky zombie borrowers, and the remaining zombie borrowers that continue to transact with the merged banks are not likely to enjoy favorable loan terms. As highlighted by Panetta et al. (2009), mergers likely improve banks' lending technology, screening capacity, and ability to detect zombie borrowers, thus enabling the merged banks to discriminate against troubled borrowers in making lending decisions. Moreover, after the mergers, the well-capitalized merged banks can clean out inefficient and unprofitable loans extended to non-credit worthy borrowers (e.g., as mentioned by Alessandrini et al. (2008) and Degryse et al. (2011)). Meanwhile, following a merger between unhealthy banks or between a healthy acquirer and an unhealthy target, the newly merged banks tend not to terminate relationships with zombie

borrowers and offer them favorable loan terms. These mergers may have enhanced the banks' consultation and monitoring abilities or their risk-taking capacity. However, for weak banks, this lending behavior may stem from their beliefs in TBTF policies.

5.3. The effect of bank mergers on publicly listed borrowers

5.3.1. The effects of bank mergers on continuing public borrowers – Baseline analysis

Next, the impact on publicly listed firms is considered. An important feature of the public firm sample is that the public firms in the treatment group are only related to 16 mergers out of 50 events in the merger sample. Besides, most of the treatment firms in the sample are clients of banks involved in large-scale mergers. This can be seen by looking at Panel C of Table 3: while the local market share of the newly merged banks is 10.60 percent for the public firm sample, this figure is 6.98 percent for the SME sample.

Given these features, the analysis first focuses on the overall effect of mergers on continuing listed firms using models (1) and (2). The results in Tables 12 and 13 show almost no difference between the interest rate and the loan ratio of listed firms transacting with merged banks versus non-merging banks. However, an exception is in the last column of Table 13, which suggests that from year five onwards, a merger with an average local market share of 10.60 percent raises the loan ratio by 1.28 percentage points.

[Table 12]

[Table 13]

Presumably, the merging banks' client public firms may already have had good access to bank loans and been offered low interest rates before the merger, so the merged banks may have been unable to lower the interest rate further. It is also possible that the observed effect is weak because the analysis was conducted on a sample of firms involved in relatively large mergers. Importantly, evidence from the present subsection and Section 5.2 demonstrates that large-scale mergers could harm client SMEs but generally do not adversely affect listed firms' loan

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conditions. This result implies that listed firms have stronger bargaining power than SMEs. If a merged bank exercises market power over a listed firm, the firm can easily switch to another bank or utilize other funding sources such as stocks and bonds.

5.3.2.The effect of bank mergers on continuing borrowers – Publicly listed zombie firms

In the next step, the impact of bank mergers on publicly listed zombie borrowers transacting with the merging bank before the merger and continuing to transact with the merged bank after the merger is examined. Table 14 reports the estimation results when estimating model (1) for the subsample of publicly listed zombie firms. Note that this subsample was obtained using the same method as when constructing the zombie SME subsample specified in Section 5.2.2.

[Table 14]

Columns (1) and (3) of Table 14 show that after a merger takes place, listed zombies that continue to borrow from the merged bank are charged 27.77 to 49.99 percentage points higher interest rates as compared to listed zombie clients of the non-merging banks. This finding is robust to model adjustments, which include estimating the model for the period 2005-2019 without bank controls, or the period 2005-2014 with all control variables. Regarding the effect on loan ratio, column (2) indicates that listed zombies borrowing from the merged banks have a 1.26 percentage point lower loan ratio than zombies borrowing from the non-merging banks. However, the result becomes statistically insignificant after adding bank characteristics to the regression model (see column (4)). The coefficients on *Merger*Bank Share* are not statistically significant, implying that regardless of the size of the merger, the publicly listed zombie clients of the merged banks have faced higher borrowing costs. This evidence is consistent with Hypothesis 4A that bank mergers are not beneficial for listed zombie borrowers, which supports the informational improvements and balance sheet cleansing hypothesis.

5.3.3.The effect of bank mergers on relationship termination of public firms

Last but not least, the effect of mergers on the discontinuation of lending relationships for public firms is investigated by employing the logit specifications (3) and (4). For the analysis, borrowers are classified into client firms of the target or the acquirer, and zombie or non-zombie firms. The results show that public firms that used to transact with the merging banks generally do not have a higher probability of relationship termination than those transacting with the non-merging banks, except for zombie borrowers of the target banks in a relatively long-term (see the coefficient on *Target*Zombie* in column (4)). This result implies that mergers may affect borrowers of the targets and acquirers, as well as risky and non-risky borrowers asymmetrically.

[Table 15]

The results in Tables 14 and 15 support Hypothesis 4A that mergers can adversely affect troubled zombie firms. It is important to note that most public firms in the treatment group are involved in mergers between two healthy banks. The findings obtained from Tables 14 and 15 remain unchanged when restricting the sample to mergers between two healthy banks (results not shown for brevity). Comparing this evidence with the results in Tables 8 and 11 on the impact of mergers between two healthy banks on zombie SMEs, we could see that while mergers between two healthy banks disrupt the relationships with zombie SMEs, the healthy merged banks continue to maintain relationships with the publicly listed zombie firms, yet tighten the loan terms for these borrowers. This contrasting result is consistent with the hypothesis that the merged banks may treat zombie SMEs and listed zombie firms unequally because listed zombie firms have stronger bargaining and negotiation powers (see, for example, Carow et al. (2006) for details of the bargaining power hypothesis). Besides, terminating the relationship with these large zombies will result in the realization of substantial losses and significant damage to bank balance sheet health as compared to terminating the relationship with zombie SMEs.

5.4. Additional analysis and discussion

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5.4.1. Subperiod analysis

At the end of 2009, the Japanese government announced the SME Financing Facilitation Act[10] as a measure to support SME financing in response to the global financial crisis. Effective from December 2009 to March 2013, the Act required banks to make every effort to comply with requests from SMEs to adjust loan contract terms. We could expect that banks' lending attitudes, and hence the effect of mergers, may differ before and after the implementation of this measure. Therefore, I conduct an analysis in which the SME sample is divided into two subperiods, i.e., 2005-2009 and 2010-2014. Using model specifications (1), the results reported in Table 16 shows that there is a clear difference in the impact of mergers on continuing SME borrowers in the first half and second half periods.

[Table 16]

As columns (1) and (2) show, in the 2005-2009 period, the negative impact of mergers on SME borrowing conditions dominates, and this undesired effect becomes greater as the market share of the merged bank increases. On the contrary, in the 2010-2014 period, the local market structure does not play a significant role in determining the impacts on SMEs (see columns (3)-(4)); instead, the coefficient on *Merger* suggests that firms borrowing from the merged bank have a lower interest rate and a higher loan ratio than their counterparts. Thus, we can conclude that during the period when banks have been encouraged to foster SME lending, more benefits of mergers are passed on to borrowers, and banks are less likely to exercise market power over their client firms than in the earlier period.

5.4.2. The effect of mergers by bank categories

Regional banks, shinkin banks, and credit unions all play an important role in lending at the regional level, but there are significant differences in their size. In this analysis, I look more closely at whether the impact of bank mergers in Japan varies across bank types. Specifically,

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[10] For more details on the Financing Facilitation Act, see, for example, Uesugi et al. (2015) and Yamori (2019).

focusing on SMEs, I divide the sample into (i) firms whose main bank is a regional bank and (ii) those whose main bank is a shinkin bank or credit cooperative. Using these subsamples, I re-estimate the impact of mergers on continuing SME borrowers based on model (1) and obtain the results presented in Table 17.

[Table 17]

Looking at columns (1) and (2) on the effect of mergers between regional banks, the results mirror the evidence obtained from the baseline analysis in Table 4. The average share of a newly merged regional bank is 9.31 percent, so it can be interpreted that on average, mergers lead to a decrease in SMEs' borrowing costs by 3.02 basis points and an increase in SMEs' loan ratio by 0.91 percentage point. As the size of the merger increases, the favorable effect on borrowers' loan terms becomes smaller and may be reversed, consistent with Hypotheses 1 and 2. On the other hand, evidence from columns (3) and (4) indicates that mergers between shinkin banks or credit cooperatives generally do not result in a significant change in interest rates, and the effects of the *Merger* and *Merger*Bank share* on loan ratio are opposite to the expected signs. A merged shinkin bank or credit cooperative with an average bank share of 4.41 percent (based on the statistics) may reduce the loan ratio of continuing SME borrowers by 1.55 percentage points. Recall that small banks often have an advantage in lending based on soft information and tend to lend to small borrowers. Presumably, small-scale mergers have led to the severe destruction of soft information, and the increase in organizational complexity has made it more difficult for the merged banks to acquire soft information (as suggested by Ogura and Uchida, 2014), thereby negatively affecting the financing of their client firms. However, further analysis is needed to clarify this aspect.

5.4.3. Definition of loan markets

In line with many previous studies, in this analysis, each prefecture is considered as a loan market. In typical cases, city banks have market shares in many prefectures (and thus, in many

loan markets) throughout Japan, regional banks operate in a main prefecture and several adjacent ones, while shinkin banks or credit cooperatives often involve in only one prefecture. However, the actual loan markets, which current data does not allow us to pinpoint, may differ from the boundaries of prefectures. For example, based on the definition in use, shinkin banks and credit cooperatives may have a limited market share in a prefecture, and mergers between these small banks only lead to a modest increase in local market share. In practice, this type of merger could have a larger effect on the actual loan market that merging banks belong to. In the future, it is necessary to have a closer look at this issue. One possible direction is to follow Uesugi et al. (2022) and employ urban employment areas[11] as an alternative definition of the loan markets to see how it affects the results. This measurement proposed by Kanemoto and Tokuoka (2002) enables us to view the loan market in a relatively smaller geographic range and thus may reflect the loan market of small banks more reasonably.

5.4.4. Exclusion of terminated borrowers

As explained in Section 4.3, when analyzing the effect on continuing borrowers' loan conditions, terminated and new borrowers are excluded from the sample to eliminate the possibility that the terminated ones (or the new ones) are included in the control (or the treatment) group, given the model specifications (1)&(2). To clarify the presence of each group of firms in the raw sample, I hereby provide some additional statistics. For the SME sample, before excluding all terminated and new borrowers, there are 1,783,142 observations (see Table 2), of which 20,104 correspond to the terminated, 230,624 to the continuing, 154,305 to the new, and 1,378,109 observations to the control borrowers. These statistics for the listed firm sample are 40,945 (total), 1,247 (terminated), 20,741 (treated), 2,593 (new), and 16,364 (control borrowers). As a result, the terminated SME (or public) borrowers account for 1.13% (or 3.05%) of the total sample and 8.02% (or 5.67%) of the total number of clients who had a relationship

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[11] For details, see https://www.csis.u-tokyo.ac.jp/UEA/index_e.htm.

with the merging bank before the merger. Since terminated firms represent only a limited portion of the sample, omitting this group is unlikely to substantially affect the results obtained from the analysis using models (1) and (2). However, to fully address the potential concern of sample selection bias, this analysis could be extended in the future by applying an empirical model which could simultaneously cover both continuing and terminating borrowers. It would be worthwhile to trace terminated borrowers and investigate how the mergers affect their loan conditions after their relationship with the main bank has been terminated.

5.4.5. Bank-firm relationships

Another problem is that this study only looks at the relationship between a firm and its main bank. As a result, the *Discontinued* variable used throughout the analysis only reflects the disruption of the main bank relationship instead of the complete suspension of the relationships between a bank and its client firms; and this will also affect the identification of terminated borrowers. It would be helpful to look at the entire bank-firm relationship and see if the results change. In an extended analysis, I utilized all the information on bank-firm relationships and recalculated the key variables. For example, the *Merger* is re-defined as one for all years after one or more of the banks transacting with the firm involved in a merger, and zero otherwise; while the *Discontinued* equals one if the firm did not report having a relationship with the bank in the subsequent year, and zero otherwise. It should be added that, on average, an SME in the sample has about 3 relationships with banks, while a typical publicly listed firm transacts with 6 banks. Hence, the TDB database, which provides the identity of up to ten banks with which a firm has transaction relationships, allows us to determine rather accurately the continuation or the termination of bank-firm relationships. Performing similar analyses as in the baseline, the results (omitted here for brevity) suggest the same findings, consistent with Hypotheses 1, 2, and H4A.

5.4.6. Detecting the impact on publicly listed firms

This study employs a consistent empirical strategy to explore the effects of mergers on SMEs and publicly listed firms. However, while the effect on SMEs can be clearly observed, the effect on listed firms is generally ambiguous. As discussed in Section 5.3, it is possible that treated firms may have had favorable financing conditions ex-ante, or that many of the listed firms have been involved in large-scale mergers. However, it is also important to note that while the headquarters of SMEs are dispersed throughout Japan, those of listed firms are usually located in Tokyo. Indeed, statistics show that while SMEs located in Tokyo account for only 11.85% of the total observations, listed firms headquartered in Tokyo account for 48.27% of the sample. This leads to another reason that clouds the obtained effect, namely the lack of geographical diversity: for many listed firms, the Bank share and the HHI are likely to reflect the market share and loan market in Tokyo, where the degree of banking competition is relatively high. For future refinement of the analysis on the listed firms, information on bank branches with which firms transact can be considered. More specifically, it would be better to take into account not only the market where a listed firm's head office is located but also all prefectures where transactions between the firm and bank branches take place, and to measure the average bank share or HHI in those markets. In this way, the role of the local market structure in determining the effect of mergers on listed firms can be gauged more precisely.

6. Conclusion

This study explores how bank mergers affect the borrowing conditions and transaction relationships of the merging banks' client firms, focusing on the mergers taking place in Japan between 2005 and 2018. A comprehensive data set covering information on mergers, firm-bank relationship and their characteristics, as well as prefecture-level HHI of the loan market, was constructed from various data sources, which includes the Nikkei FQ and the TDB databases. Considering that firms may differ in terms of the closeness of relationship with merging banks,

financial constraint level, and bargaining power, borrowers are classified into SMEs and publicly listed firms, or zombie and non-zombie borrowers.

The results first suggest that mergers generally reduce the average interest rate paid by continuing SME borrowers and increase their loan ratios in the long run, implying that merged banks pass efficiency gains on to borrowers. However, as the local market share of the newly merged banks – the proxy for merger size – increases, these favorable effects are weakened and could be reversed if the size of the merged banks is sufficiently large, probably due to the significant loss of soft information and the exertion of market power.

Second, the financial health of merging banks plays an important role in determining loan terms. Zombie SME borrowers involved in mergers between healthy banks have a higher probability of losing the relationship with the newly merged banks in both the short and long term, probably due to the improvements in the merged banks' informational improvement and ability to detect risky borrowers. In contrast, zombie SMEs involved in mergers between unhealthy banks or between a healthy acquirer and an unhealthy target have better access to bank loans and are unlikely to have their lending relationships terminated. However, this relaxation in borrowing conditions did not improve the performance of these zombie SMEs.

Third, evidence shows that the impacts of mergers on the loan terms of publicly listed continuing borrowers are negligible overall. Presumably, public firms may already have been offered low interest rates before the merger, thus the merged banks may have been unable to decrease the interest rate further. However, publicly listed zombie clients transacting with the merged banks face more stringent borrowing conditions as compared to zombie clients of non-merging banks. Finally, I find that publicly listed zombie firms do not have a higher probability of being dropped overall, apparently because these firms have more bargaining power.

These findings imply that mergers can generate heterogeneous effects on the financing of their client firms, depending on the size of the mergers, the characteristics of banks, firms, and

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their lending relationships. Nevertheless, various issues need to be considered in the future. First, more effort should be taken to uncover the impact of mergers on publicly listed firms as well as on zombie borrowers. In the analysis, I examined how loan terms (interest rates and loan ratios) of zombie borrowers or lending relationships changed after the merger. However, note that loan contract terms may change in the form of no new money, and this aspect could be added to the analysis. Second, how does the impact depend on the merger characteristics, such as the merging banks' relative size and geographical relationship? Above I provided a simple analysis of the effect of mergers by bank categories, but further investigation is warranted. Third, it is unclear whether dropped borrowers can establish an alternative lending relationship, and how their financing activities change after the merged banks terminated the lending relationship with them. Finally, the present study did not examine how bank mergers generally affect the client firms' performance, such as through changes in borrowing conditions and banks' ability to monitor their customers; or influence the lending behavior of rival banks. These questions are also left for future research.

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Tables and Figures

Table 1. Definitions of main variables

Variable	Definition
Dependent variables	
Loan ratio	(Short-term loans + Long-term loans) / Total assets
Interest rate	Interest expenses*100 / (Short-term loans + Long-term loans)
Discontinued	Equals one for year t if firm i report having the main bank relationship with a different bank in the subsequent year, and zero otherwise.
Independent variables related to bank mergers	
Merger	Equals one for all years (one or more than one year) after a merger if bank *k* is a merged bank, and zero otherwise.
Bank share	Number of borrowers of merged bank *k* in prefecture *r* at the time of merger / Total number of borrowers in prefecture *r* at the time of merger
Period 1	Equal one for the first year after the merger of bank *k*, and zero otherwise.
Period 2	Equal one for the second year after the merger of bank *k*, and zero otherwise.
Period 3	Equal one for the third year after the merger of bank *k*, and zero otherwise.
Period 4	Equal one for the fourth year after the merger of bank *k*, and zero otherwise.
Period 5	Equal one from the fifth year onwards after the merger of bank *k,* and zero otherwise.
Merger_ST	Equals one for the year of the merger and the nearest year before the merger that bank *k* involved in, and zero otherwise.
Target_ST	Equals one for the year of the merger and the nearest year before the merger that bank *k* involved in as a target, and zero otherwise.
Acquirer_ST	Equals one for the year of the merger and the nearest year before the merger that bank *k* involved in as an acquirer, and zero otherwise.
Target	Equals one for all years after the bank *k* involved in a merger, and zero otherwise, provided that firm *i* had a main bank relationship with the target bank prior to this event.
Acquirer	Equals one for all years after the bank *k* involved in a merger, and zero otherwise, provided that firm *i* had a main bank relationship with the acquirer bank prior to this event.

Control variables	
Market concentration	
HHI	HHI on loans of prefecture *r* in year *t*
Firm variables	
Tangibility	Property, plant, and equipment / Total assets
Size	Log (Total assets) (unit of Total assets: thousand yen)
Profitability	EBITDA / Total assets
Ln Age	Log (1+ Firm age)
Zombie	Equals one if the firm is a zombie firm based on the FN criteria
Bank variables	
Bank size	Log (Bank total assets) (unit of Bank total assets: million yen)
Bank equity ratio	Net assets/ Bank total assets
Bank NPL	(Loans to bankrupt borrowers + Delinquent loans + Loans past due 3 months or more + Restructured loans)/ Total loans and bills discounted

Table 2. Summary statistics of firm variables

Variable	Obs.	Mean	SD	Min	Max
A. Private SMEs					
Loan ratio	1,783,142	0.5170	0.4914	0	3.2464
Interest rate	1,637,431	2.2656	1.7282	0	12.2311
Tangibility	1,782,656	0.2685	0.2227	0	1.0847
Size	1,783,142	12.3047	1.6429	0	21.1091
Profitability	1,755,699	0.0282	0.1650	-2.5685	1.0554
Ln Age	1,783,142	3.2740	0.6483	0.6928	4.8461
B. Public firms					
Loan ratio	40,945	0.1374	0.1470	0	3.2464
Interest rate	31,618	2.2593	2.1518	0	12.2311
Tangibility	40,945	0.2477	0.1860	0	0.9441
Size	40,945	17.1711	1.6177	11.3919	23.5978
Profitability	40,909	0.0487	0.0836	-3.7396	0.8864
Ln Age	40,945	3.8727	0.5715	1.0694	4.9404

Table 3. Summary statistics: Market concentration and bank variables

Variable	Obs.	Mean	SD	Min	Max	Period
A. Market concentration						
HHI	705	0.2213	0.0706	0.0486	0.3700	2005-2019
B. Bank characteristics						
Bank size	5,170	12.7748	1.5125	8.3081	19.1219	2005-2014
Bank equity ratio	5,170	0.0529	0.0205	0.0096	0.2092	2005-2014
Bank NPL	5,144	0.0741	0.0434	0	0.4846	2005-2014
C. Merged banks' market shares						
Bank share (Full sample)	220	0.0630	0.1253	0.0000	0.8593	2005-2018
Bank share (SME sample)	187	0.0698	0.1319	0.0000	0.8593	2005-2014
Bank share (SME sample)	211	0.0656	0.1272	0.0000	0.8593	2005-2018
Bank share (Public firms)	89	0.1060	0.1713	0.0001	0.8593	2005-2014
Bank share (Public firms)	96	0.1004	0.1665	0.0001	0.8593	2005-2018

Table 4. Impact of mergers on continuing borrowers: SMEs

	(1)	(2)	(3)	(4)	(5)	(6)
	Interest rate	Loan ratio	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	-0.0388***	0.0010	-0.0279*	0.0067**	-0.0347*	0.0091**
	(0.0126)	(0.0020)	(0.0157)	(0.0028)	(0.0202)	(0.0037)
Merger*Bank Share	0.0968***	-0.0043	0.1500***	-0.0314***	0.1836***	-0.0212**
	(0.0299)	(0.0048)	(0.0455)	(0.0069)	(0.0646)	(0.0102)
HHI	0.3881***	-0.1354***	0.3984**	-0.1576***	0.2775*	-0.1734***
	(0.1003)	(0.0161)	(0.1484)	(0.0225)	(0.1576)	(0.0248)
Sample	All mergers	All mergers	All mergers	All mergers	Non-mega mergers	Non-mega mergers
Period	2005-2019	2005-2019	2005-2014	2005-2014	2005-2014	2005-2014
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	No	No	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,471,838	1,601,195	866,036	936,319	789,688	848,849

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Figures in parentheses are cluster-robust standard errors.

Table 5. Impact of mergers on continuing borrowers over time: SMEs

	(1)	(2)	(3)	(4)	(5)	(6)
	Interest rate	Loan ratio	Interest rate	Loan ratio	Interest rate	Loan ratio
Period 1	-0.0212	0.0006	-0.0458	0.0076	0.0161	0.0021
	(0.0197)	(0.0032)	(0.0324)	(0.0053)	(0.0320)	(0.0051)
Period 2	-0.0144	0.0030	0.0043	0.0025	-0.0507	0.0034
	(0.0217)	(0.0035)	(0.0294)	(0.0045)	(0.0336)	(0.0054)
Period 3	0.0062	-0.0053	0.0421	-0.0046	-0.0052	0.0007
	(0.0226)	(0.0036)	(0.0324)	(0.0049)	(0.0377)	(0.0060)
Period 4	-0.0288	0.0001	-0.0091	0.0028	-0.0975**	0.0200***
	(0.0236)	(0.0037)	(0.0339)	(0.0051)	(0.0398)	(0.0063)
Period 5	-0.1004***	0.0027*	-0.0880***	0.0140***	-0.0735**	0.0261***
	(0.0165)	(0.0016)	(0.0278)	(0.0042)	(0.0345)	(0.0055)
Period 1*Bank Share	0.1018**	0.0048	0.1783***	-0.0236***	0.0889	-0.0054
	(0.0477)	(0.0076)	(0.0575)	(0.0086)	(0.0793)	(0.0126)
Period 2*Bank Share	0.1395***	0.0002	0.2036***	-0.0163*	0.1947**	-0.0028
	(0.0512)	(0.0082)	(0.0660)	(0.0098)	(0.0820)	(0.0130)
Period 3*Bank Share	0.0256	0.0030	0.0375	-0.0168*	0.1066*	-0.0054
	(0.0533)	(0.0085)	(0.0718)	(0.0100)	(0.0603)	(0.0126)
Period 4*Bank Share	0.0901	-0.0168*	0.1208	-0.0437***	0.2389***	-0.0427***
	(0.0550)	(0.0087)	(0.0742)	(0.0112)	(0.0923)	(0.0146)
Period 5*Bank Share	0.1526***	-0.0089*	0.1843***	-0.0517***	0.3078***	-0.0624***
	(0.0364)	(0.0053)	(0.0611)	(0.0092)	(0.0807)	(0.0128)
HHI	0.3369***	-0.1373***	0.3253***	-0.1632***	0.2862*	-0.1731***
	(0.1006)	(0.0162)	(0.1490)	(0.0226)	(0.1579)	(0.0249)
Sample	All mergers	All mergers	All mergers	All mergers	Non-mega mergers	Non-mega mergers
Period	2005-2019	2005-2019	2005-2014	2005-2014	2005-2014	2005-2014
Bank controls	No	No	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,471,838	1,601,195	866,036	936,319	789,688	848,849

* p<0.1, ** p<0.05, *** p<0.01. Figures in parentheses are cluster-robust standard errors.

Table 6. Impact of mergers on continuing SME borrowers: Bank health

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Interest rate	Loan ratio	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	-0.0312	0.0030	-0.0298	0.0608***	-0.0029	0.0147**
	(0.0235)	(0.0035)	(0.1028)	(0.0166)	(0.0429)	(0.0069)
Merger*Bank Share	0.1658***	-0.0278***	0.2802	-0.3680***	0.1168	-0.0288*
	(0.0559)	(0.0083)	(0.7847)	(0.1271)	(0.1173)	(0.0159)
HHI	0.3676***	-0.1602***	0.1453	-0.1538***	0.2051	-0.1760***
	(0.1521)	(0.0230)	(0.1637)	(0.0258)	(0.1627)	(0.0257)
Sample	Healthy – Healthy mergers		Unhealthy – Unhealthy mergers		Healthy – Unhealthy mergers	
Period	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	830,138	897,930	740,389	795,890	744,731	800,446

* p<0.1, ** p<0.05, *** p<0.01. Figures in parentheses are cluster-robust standard errors.

Table 7. Impact of mergers on continuing borrowers: Zombie SMEs

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Interest rate	Loan ratio	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	-0.0055	-0.0020	0.0023	0.0077	-0.0259	0.0139
	(0.0184)	(0.0044)	(0.0266)	(0.0060)	(0.0327)	(0.0094)
Merger*Bank Share	0.0174	0.0044	0.0246	-0.0297*	0.2044**	-0.0288
	(0.0436)	(0.0105)	(0.0680)	(0.0152)	(0.0947)	(0.0217)
HHI	0.0898	-0.1569	0.1661	-0.2486***	-0.0739	-0.2545***
	(0.1424)	(0.0343)	(0.2076)	(0.0464)	(0.2201)	(0.0500)
Sample	All mergers	All mergers	All mergers	All mergers	Non-mega mergers	Non-mega mergers
Period	2005-2019	2005-2019	2005-2014	2005-2014	2005-2014	2005-2014
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	No	No	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	492,694	506,776	307,313	314,961	284,716	291,536

* p<0.1, ** p<0.05, *** p<0.01. Figures in parentheses are cluster-robust standard errors.

Table 8. Impact of mergers on continuing zombie SMEs borrowers: Bank health

	(1)	(2)	(3)	(4)	(5)	(6)
	Interest rate	Loan ratio	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	0.0089	0.0007	-0.2062	0.0799**	-0.0025	0.0311**
	(0.0347)	(0.0077)	(0.1401)	(0.0321)	(0.0593)	(0.0135)
Merger*Bank Share	0.0180	-0.0230	0.9240	-0.4483*	0.0956	-0.0338
	(0.0838)	(0.0187)	(1.1152)	(0.2564)	(0.1800)	(0.0415)
HHI	0.0612	-0.2405***	-0.2503	-0.2137***	-0.1702	-0.2517***
	(0.2127)	(0.0474)	(0.2289)	(0.0520)	(0.2272)	(0.0517)
Sample	Healthy – Healthy mergers		Unhealthy – Unhealthy mergers		Healthy – Unhealthy mergers	
Period	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	293,388	300,710	265,881	272,274	267,949	274,385

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Figures in parentheses are cluster-robust standard errors.

Table 9. Impact of mergers on continuing zombie SMEs borrowers: Bank health

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	ROS	ROA	ROS	ROA	ROS
Merger	-0.0055	-0.0019	-0.0162	-0.0229**	-0.0057	-0.0058
	(0.0040)	(0.0025)	(0.0165)	(0.0101)	(0.0071)	(0.0044)
Merger*Bank Share	0.0040	-0.0007	0.1492	0.1646**	0.0015	0.0114
	(0.0096)	(0.0059)	(0.1326)	(0.0813)	(0.0215)	(0.0132)
HHI	0.1548***	0.0967***	0.1673***	0.1052***	0.1796***	0.1108***
	(0.0245)	(0.0151)	(0.0270)	(0.0166)	(0.0268)	(0.0165)
Sample	Healthy – Healthy mergers		Unhealthy – Unhealthy mergers		Healthy – Unhealthy mergers	
Period	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	322,316	322,272	291,234	291,192	293,435	293,392

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Figures in parentheses are cluster-robust standard errors.

Table 10. Impact of mergers on relationship termination of SMEs – AME

	Dependent variable: Discontinued			
	(1)	**(2)**	**(3)**	**(4)**
Merger_ST	0.0086***		0.0077***	
	(0.0008)		(0.0009)	
Merger	-0.0018***		-0.0026***	
	(0.0007)		(0.0007)	
Merger_ST*Zombie			0.0117***	
			(0.0028)	
Merger*Zombie			0.0075***	
			(0.0020)	
Target_ST		0.0085***		0.0077***
		(0.0014)		(0.0015)
Target		-0.0003		-0.0014
		(0.0010)		(0.0011)
Acquirer_ST		0.0088***		0.0078***
		(0.0010)		(0.0011)
Acquirer		-0.0027***		-0.0033***
		(0.0008)		(0.0009)
Target_ST*Zombie				0.0103**
				(0.0052)
Target*Zombie				0.0095***
				(0.0030)
Acquirer_ST*Zombie				0.0123***
				(0.0033)
Acquirer*Zombie				0.0061**
				(0.0025)
Zombie			-0.0010	-0.0010
			(0.0007)	(0.0007)
HHI	-0.0438***	-0.0436***	-0.0459***	-0.0457***
	(0.0026)	(0.0027)	(0.0027)	(0.0027)
Sample	All mergers	All mergers	All mergers	All mergers
Period	2005-2014	2005-2014	2005-2014	2005-2014
Bank controls	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	1,084,397	1,084,397	1,017,079	1,017,079

Table 11. Impact of mergers on relationship termination of SMEs: Bank health

	(1)	(2)	(3)	(4)	(5)	(6)
			Dependent variable: Discontinued			
Merger_ST	0.0103***	0.0092***	0.0001	-0.0004	0.0022	0.0026
	(0.0009)	(0.0010)	(0.0038)	(0.0042)	(0.0034)	(0.0037)
Merger	0.0023***	0.0012	0.0032	0.0024	-0.0077***	-0.0076***
	(0.0008)	(0.0009)	(0.0037)	(0.0041)	(0.0023)	(0.0026)
Merger_ST*Zombie		0.0139***		-0.0068		0.0127
		(0.0031)		(0.0152)		(0.0102)
Merger*Zombie		0.0095***		0.0076		0.0028
		(0.0023)		(0.0100)		(0.0069)
Zombie		-0.0011		-0.0009		-0.0010
		(0.0007)		(0.0007)		(0.0007)
HHI	-0.0441***	-0.0463***	-0.0558***	-0.0586***	-0.0584***	-0.0614***
	(0.0027)	(0.0028)	(0.0028)	(0.0029)	(0.0028)	(0.0029)
Sample	Healthy – Healthy mergers		Unhealthy – Unhealthy mergers		Healthy – Unhealthy mergers	
Period	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014	2005-2014
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,039,407	975,203	916,779	857,124	921,927	861,975

Table 12. Impact of mergers on continuing borrowers: Public firms

	(1)	(2)	(3)	(4)
	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	-0.0971	0.0003	0.0485	0.0046
	(0.0749)	(0.0028)	(0.1209)	(0.0043)
Merger*Bank Share	0.2705	0.0005	0.0018	-0.0039
	(0.1822)	(0.0068)	(0.2639)	(0.0094)
HHI	-1.0535	-0.0663**	0.8139	-0.0946**
	(0.8002)	(0.0298)	(1.1769)	(0.0403)
Sample	All mergers	All mergers	All mergers	All mergers
Period	2005-2019	2005-2019	2005-2014	2005-2014
Bank controls	No	No	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	28,421	36,923	18,837	24,426

Table 13. Impact of mergers on continuing borrowers over time: Public firms

	(1) Interest rate	(2) Loan ratio	(3) Interest rate	(4) Loan ratio
Period 1	0.0264	-0.0021	0.0520	0.0015
	(0.1306)	(0.0050)	(0.1435)	(0.0052)
Period 2	0.0485	0.0012	0.3801	0.0024
	(0.1337)	(0.0051)	(0.2365)	(0.0084)
Period 3	-0.1458	-0.0011	-0.0280	0.0059
	(0.1377)	(0.0052)	(0.2422)	(0.0087)
Period 4	-0.1432	0.0007	0.0320	0.0070
	(0.1407)	(0.0053)	(0.2517)	(0.0090)
Period 5	-0.1599	0.0025	-0.0369	0.0150**
	(0.0983)	(0.0037)	(0.1781)	(0.0064)
Period 1*Bank Share	0.0713	0.0065	0.0053	0.0013
	(0.3121)	(0.0118)	(0.3327)	(0.0119)
Period 2*Bank Share	0.1393	-0.0032	-0.5691	-0.0022
	(0.3186)	(0.0120)	(0.4888)	(0.0173)
Period 3*Bank Share	0.1084	0.0035	0.0172	-0.0031
	(0.3274)	(0.0123)	(0.5009)	(0.0178)
Period 4*Bank Share	0.2194	-0.0028	0.0957	-0.0118
	(0.3344)	(0.0125)	(0.5193)	(0.0185)
Period 5*Bank Share	0.4542	-0.0023	0.1947	-0.0204*
	(0.3237)	(0.0083)	(0.3680)	(0.0121)
HHI	-0.9776	-0.0662**	0.8378	-0.0942**
	(0.8115)	(0.0302)	(1.1981)	(0.0411)
Sample	All mergers	All mergers	All mergers	All mergers
Period	2005-2019	2005-2019	2005-2014	2005-2014
Bank controls	No	No	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	28,421	36,923	18,837	24,426

Table 14. Impact of mergers on continuing borrowers: Public zombie firms

	(1)	(2)	(3)	(4)
	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	0.2777**	-0.0126*	0.4999***	-0.0192
	(0.1282)	(0.0076)	(0.2140)	(0.0122)
Merger*Bank Share	-0.4695	0.0285	-0.6049	0.0439
	(0.3299)	(0.0194)	(0.4807)	(0.0273)
HHI	0.9457	0.0820	4.5311**	0.0531
	(1.2998)	(0.0710)	(1.9179)	(0.0976)
Sample	All mergers	All mergers	All mergers	All mergers
Period	2005-2019	2005-2019	2005-2014	2005-2014
Bank controls	No	No	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	7,352	7,960	4,867	5,237

Table 15. Impact of mergers on relationship termination of public firms – AME

	Dependent variable: Discontinued			
	(1)	**(2)**	**(3)**	**(4)**
Merger_ST	0.0041		0.0030	
	(0.0030)		(0.0031)	
Merger	-0.0082**		-0.0097**	
	(0.0042)		(0.0044)	
Merger_ST*Zombie			0.0161	
			(0.0101)	
Merger*Zombie			0.0166**	
			(0.0082)	
Target_ST		0.0005		-0.0000
		(0.0041)		(0.0041)
Target		-0.0107		-0.0131
		(0.0085)		(0.0088)
Acquirer_ST		0.0071		0.0057
		(0.0047)		(0.0047)
Acquirer		-0.0054*		-0.0062*
		(0.0033)		(0.0035)
Target_ST*Zombie				0.0156
				(0.0171)
Target*Zombie				0.0232**
				(0.0095)
Acquirer_ST*Zombie				0.0151
				(0.0116)
Acquirer*Zombie				0.0073
				(0.0124)
Zombie			0.0012	0.0013
			(0.0050)	(0.0050)
HHI	-0.0715***	-0.0747***	-0.0723***	-0.0753***
	(0.0275)	(0.0278)	(0.0274)	(0.0276)
Sample	All mergers	All mergers	All mergers	All mergers
Period	2005-2014	2005-2014	2005-2014	2005-2014
Bank controls	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	25,719	25,719	25,693	25,693

## Table 16. Impact of mergers on continuing SME borrowers: Sub-period analysis

	(1)	(2)	(3)	(4)
	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	-0.0134	0.0022	-0.0371*	0.0107**
	(0.0318)	(0.0039)	(0.0203)	(0.0045)
Merger*Bank Share	0.3102***	-0.0353***	0.0388	0.0009
	(0.0716)	(0.0087)	(0.0813)	(0.0129)
HHI	0.3476**	-0.0492	-0.5275*	0.0729
	(0.2839)	(0.0345)	(0.0367)	(0.0494)
Period	2005-2009	2005-2009	2010-2014	2010-2014
Bank controls	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	389,093	417,208	476,943	519,111

Table 17. Impact of mergers on continuing SME borrowers by bank categories

|	(1)	(2)	(3)	(4)
	Interest rate	Loan ratio	Interest rate	Loan ratio
Merger	-0.0537*	0.0121**	0.0107	-0.0236***
	(0.0280)	(0.0056)	(0.0428)	(0.0078)
Merger*Bank Share	0.2529***	-0.0324***	-0.2596	0.1828***
	(0.0829)	(0.0125)	(0.3021)	(0.0550)
HHI	0.1701	-0.1253***	-0.1231	-0.3002***
	(0.2118)	(0.0316)	(0.2735)	(0.0496)
Sub-sample	Regional Banks	Regional Banks	Shinkin, Credit Cooperatives	Shinkin, Credit Cooperatives
Period	2005-2014	2005-2014	2005-2014	2005-2014
Firm controls	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	494,549	535,300	233,846	245,571

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. Figures in parentheses are cluster-robust standard errors.

Figure 1. Number of financial institutions in Japan
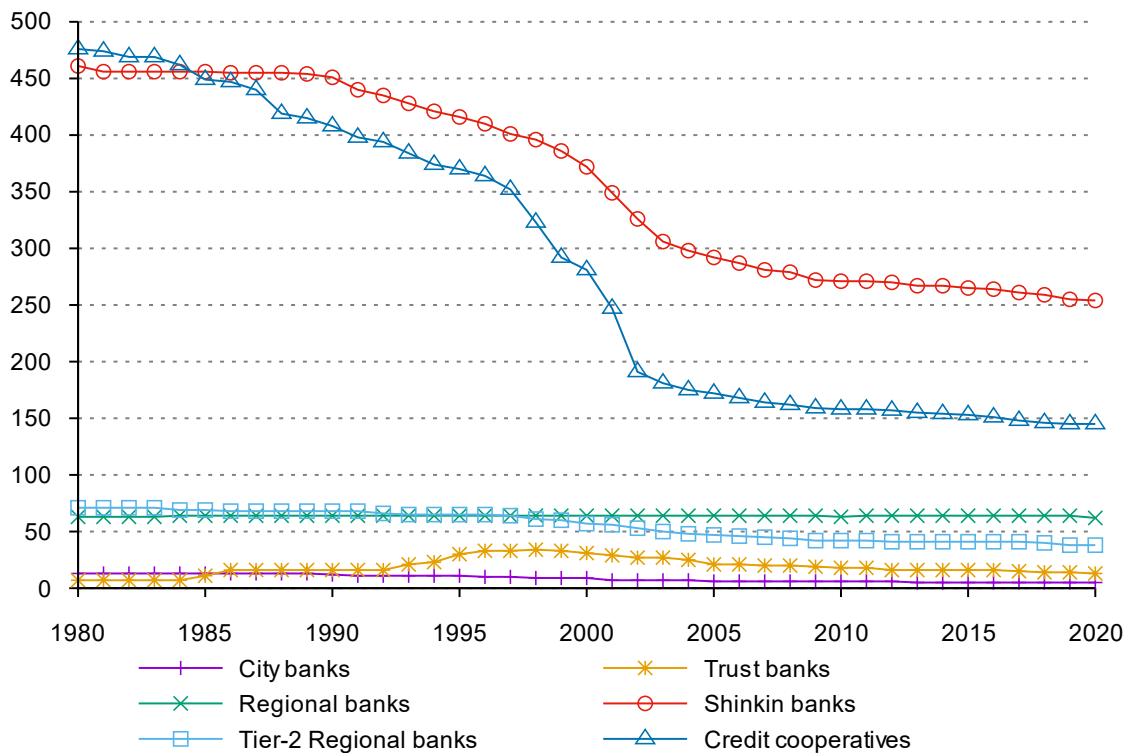

Source: Based on data from the Deposit Insurance Corporation of Japan
(https://www.dic.go.jp/english/e_kikotoha/page_000175.html)

Figure 2. Number of enterprises by size in Japan
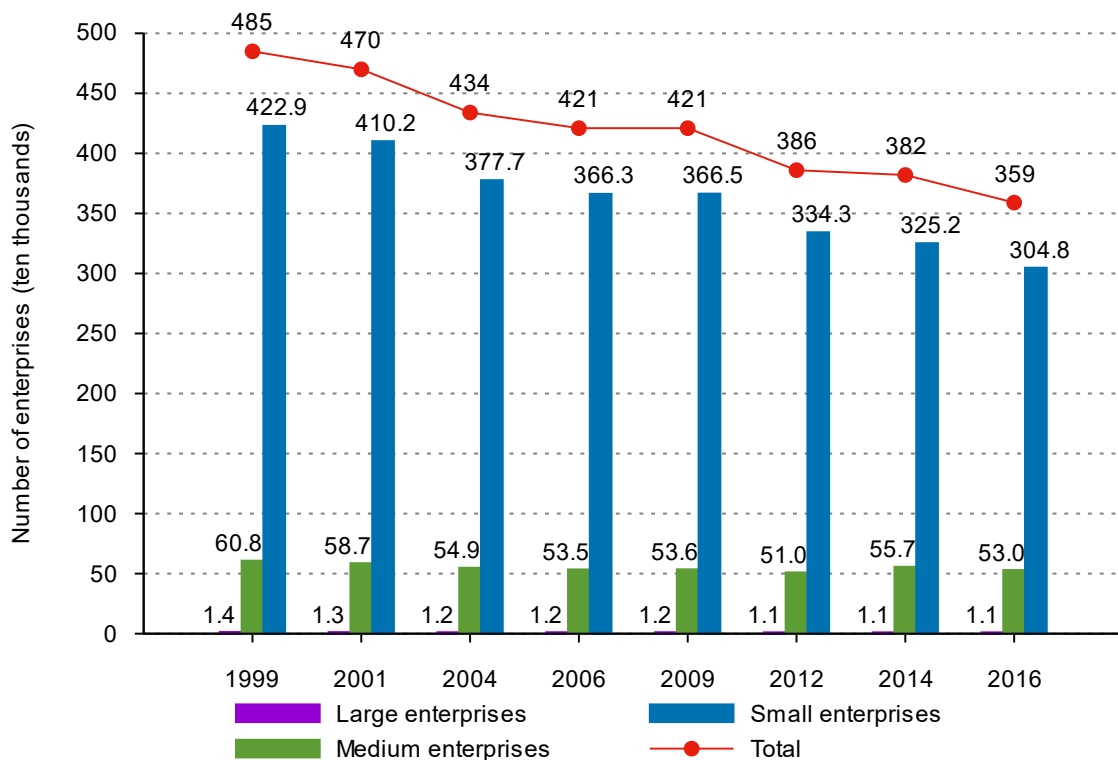
Source: Small and Medium Enterprises Agency, data was originally from the Ministry of Internal Affairs and
Communications (https://www.chusho.meti.go.jp/pamflet/hakusyo/2020/chusho/b1_3_1.html)

Figure 3. Zombie ratios – CHK and FN criteria

(a) Private firms

(b) Public firms
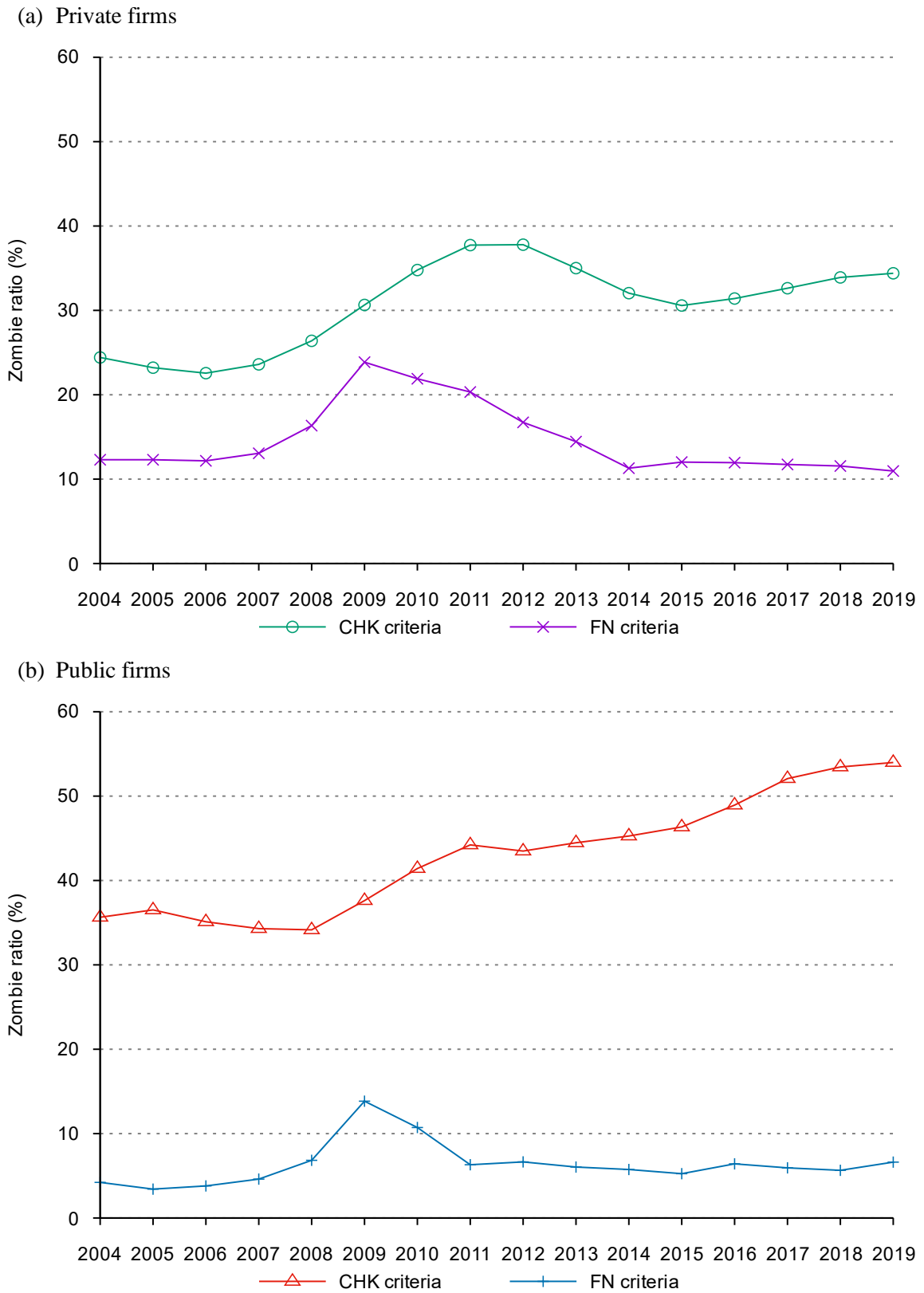
Source: Author's calculation based on data from the database of Teikoku Databank

Appendix

Table A.1. Number of merger cases

	City bank	Regional bank	Trust bank	Shinkin bank	Credit Cooperative	Total
2005	0	0	0	4	4	8
2006	1	2	0	4	1	8
2007	0	1	0	2	0	3
2008	0	1	0	5	1	7
2009	0	0	0	3	0	3
2010	0	2	1	2	2	7
2011	0	0	0	1	0	1
2012	0	1	0	1	0	2
2013	1	0	0	0	1	2
2014	0	0	0	1	0	1
2015	0	0	0	0	0	0
2016	0	0	0	2	0	2
2017	0	0	0	1	1	2
2018	1	1	0	1	1	4
Total	3	8	1	27	11	50

Table A.2. Largest mergers in terms of total assets

No.	Time	Merged Bank	Acquirer	Targets	Classification
1	2006/01	MUFG Bank	Bank of Tokyo Mitsubishi	United Financial of Japan	City Bank
2	2013/07	Mizuho Bank	Mizuho Bank	Mizuho Corporate Bank	City Bank
3	2012/09	Juroku Bank	Juroku Bank	Gifu Bank	Regional Bank
4	2018/10	Aozora Bank	Aozora Bank	GMO Aozora Net Bank	City Bank
5	2006/10	Kiyo Bank	Kiyo Bank	Wakayama Bank	Regional Bank
6	2018/05	Kiraboshi Bank	Tokyo Tomin Bank	Yachiyo Bank, Shin-Ginko Tokyo	Trust Bank
7	2010/05	Senshu Ikeda Bank	Senshu Bank	Ikeda Bank	Regional Bank
8	2006/01	Tama Shinkin Bank	Tama Chuo Shinkin Bank	Taihei Shinkin Bank, Hachioji Shinkin Bank	Shinkin Bank
9	2010/03	Ibaraki Bank	Kanto Tsukuba Bank	Ibaraki Bank	Regional Bank
10	2006/03	Yamagata Bank	Yamagata Bank	Yamagata Kencho Shokuin Credit Cooperative	Regional Bank

Table A.3. Mergers with the highest local market share (at the time of the merger)

No.	Time	Prefecture	Merged Bank	Acquirer	Target	Classification
1	2006/10	Wakayama	Kiyo Bank	Kiyo Bank	Wakayama Bank	Regional Bank
2	2008/10	Hokkaido	Hokuyo Bank	Hokuyo Bank	Sapporo Bank	Regional Bank
3	2012/09	Gifu	Juroku Bank	Juroku Bank	Gifu Bank	Regional Bank
4	2006/03	Yamagata	Yamagata Bank	Yamagata Bank	Yamagata Kencho Shokuin Credit Cooperative	Regional Bank
5	2006/01	Tokyo	MUFG Bank	Bank of Tokyo Mitsubishi	United Financial of Japan	City Bank
6	2007/05	Yamagata	Kirayaka Bank	Yamagata Shiawase Bank	Shokusan Bank	Regional Bank
7	2006/01	Aichi	MUFG Bank	Bank of Tokyo Mitsubishi	United Financial of Japan	City Bank
8	2006/01	Osaka	MUFG Bank	Bank of Tokyo Mitsubishi	United Financial of Japan	City Bank
9	2013/07	Tokyo	Mizuho Bank	Mizuho Bank	Mizuho Corporate Bank	City Bank
10	2010/03	Ibaraki	Ibaraki Bank	Kanto Tsukuba Bank	Ibaraki Bank	Regional Bank