The Real Effects of Bank Taxation:

Evidence for Corporate Financing and Investment

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Abstract
This paper examines how bank taxation affects the financing decisions and investment activities of corporates. Exploiting exogenous tax variation at the bank level, we show that taxing banks' gross profits leads to higher bank leverage, and results in lower bank risk and credit supply. The contraction in credit supply has implications for corporate debt financing and investment activity. Corporates more exposed to banks subject to gross profit tax exhibit lower leverage and rely less on bank debt. Corporates partly offset lower bank financing by switching to bond financing. The cost of bond financing increases with corporate exposure to the tax. A greater exposure also impacts negatively on corporate investment activity. Overall, our results highlight the importance of bank taxation for corporate financing and investment decisions.

Keywords: bank taxation; credit supply; Japanese banks; natural experiment; corporate financing; investment

JEL Classification: G21, G28

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1. Introduction

The impact of bank shocks on the real economy has increasingly gained the attention of academics and policymakers since the global financial crisis and onset of the Covid-19 pandemic. In this paper, we investigate whether and how corporates respond to an exogenous tax shock to the banking industry.[1] Using micro-level data on lending relationships, we examine how bank taxation affects the availability of bank credit and debt choices of corporates. We also examine the resultant implications for corporate financing and investment.

Identifying how bank taxation affects the debt choices of corporates in an empirical setting is challenging due to a variety of endogeneity concerns. When corporates and banks are both subject to tax reform, any taxes imposed may affect the supply and demand for credit simultaneously. Thus, making it difficult to isolate the impact of taxes on credit supply conditions. Another challenge arises if tax reforms are driven by significant changes in underlying economic conditions, which affect the financial health of both corporates and banks.

In the present study, we address these challenges by using the so-called Ishihara tax as a quasi-natural experiment.[2] From 2000 to 2002, the Ishihara tax was levied on the gross profit of Japanese commercial banks with sizeable activities in the Tokyo prefecture.[3] The institutional features of the Ishihara tax provide an ideal setting to investigate our research question. In contrast to general tax changes that affect both corporates and banks, the Ishihara tax applied to a subset of banks only (leaving the tax regime facing corporates and most other banks unchanged). The Ishihara tax was imposed in a single jurisdiction, the Tokyo prefecture, and did not affect any of the other 46 prefectures in Japan. As a consequence, the Ishihara tax allows for the construction of a set of counterfactuals that illustrate how lending relationships between banks and corporates would have evolved in the absence of any tax change. The Ishihara tax was only levied over a period of two years and then repealed. This short-term nature of the Ishihara tax allows us to also test the impact of reversing the tax

[1] For a review of the burgeoning literature see Cetorelli (2019); Berger, Molyneux and Wilson (2020) and Güler, Mariathasan, Mulier and Okatan (2021). Much of this literature exploits variation in credit supply resulting from exogenous shocks to banks' access to funding or from changes in banking regulation and supervision.

[2] The tax is named after its creator Shintaro Ishihara who was elected as Governor of Tokyo in the 1999 Tokyo gubernatorial election.

[3] In the early 2000s, the banking sector in Japan was emerging gradually from a severe financial crisis. For extensive discussions of Japan's financial crisis of the 1990s and its global repercussions see: Peek and Rosengren (2000); Hoshi and Kashyap (2000); Ito and Patrick (2005). For a more recent overview see Uchida and Udell (2019).

treatment. Finally, despite being a local tax, the Ishihara tax constituted an economically significant increase in the tax expenses of affected banks at a scale that could plausibly trigger a change in bank behavior.[4]

In this paper, we use the Ishihara tax as an instrument to investigate how bank taxation affects credit supply and in turn the subsequent impact on the financial and investment decisions of corporates. We employ a difference-in-differences estimation approach at the bank, loan and corporate level. At the bank level we analyze the extent to which banks liable to pay the Ishihara tax adjust leverage, risk and loan quantities relative to unaffected counterparts. While this allows us to investigate how banks adjust balance sheets in response to the Ishihara tax, it does not allow us to identify the impact on credit supply. To further disentangle the impact of the Ishihara tax on credit supply from credit demand, we utilize a comprehensive micro dataset that documents outstanding loans extended by banks to large listed corporate borrowers. We apply the Khwaja and Mian (2008) framework (which allows us to absorb corporate characteristics through the inclusion of corporate fixed effects) in order to compare the lending of affected and unaffected banks to the same borrower before and after the introduction of the Ishihara tax. Finally, at the corporate level, we examine the impact of the Ishihara tax on the financing decisions and investment activities of corporate borrowers. Specifically, we investigate the debt choices and investment activities of corporate borrowers with a higher exposure to taxed banks (via their existing banking relationships) relative to corporate borrowers with less exposure.

Our main findings are manifold. The first set of findings document a link between taxation and bank behaviour. At the bank level, we show that in response to the Ishihara tax, adjustments to bank leverage occurred alongside a decline in lending and risk. A one percentage point increase in the effective tax rate increased bank leverage by 0.3 percentage points. Lending and risk-weighted assets reduced by 2.2 percentage points. We also find that the repeal of the Ishihara tax has a limited, albeit asymmetric impact on bank leverage. This asymmetric response of bank leverage is driven by differences in the tax-sensitivity of bank deposits and non-deposit liabilities.

In further tests we show that banks reduce credit supply to corporate borrowers. Utilizing, the Khwaja and Mian approach on a subset of listed corporates, we confirm (at the loan level) that the decline in bank lending was not the result of changes in credit demand conditions. Controlling for corporate credit demand, we

[4] In 2000, the Tokyo Government collected Ishihara taxes totaling ¥111 billion, representing around 30% of overall tax expenses of affected banks that year.

find that banks affected by the Ishihara tax reduced lending to corporates by 3. 7 percentage points relative to banks in the control group. Adjustments to leverage alongside changes in bank risk further suggests that decisions regarding bank leverage and asset risk are interconnected. This finding is in line with theories on bank risk-shifting, which predict that in the presence of regulatory constraints on equity ratios, banks trade off leverage with portfolio risk (Koehn and Santomero 1980; Kim and Santomero 1988). Our findings also suggest that bank taxation has implications for credit supply, and corroborate theoretical evidence which shows that (by raising banks' cost of equity) changes in corporate income tax rates lead to lower bank lending (Albertazzi and Gambacorta, 2010).

A second set of findings documents a credit supply effect of bank taxation on corporate financing and investment activity. At the corporate level, we show that the reduction in bank credit supply following the imposition of the tax leads to changes in corporate debt structure. Corporates switch from bank to bond financing and reduce total borrowing. These findings suggest that corporate borrowers are unable to compensate fully for the reduction in bank credit supply. The increase in bond issuance suggests that corporates are (to some extent) able to circumvent adverse credit conditions. A decline in total borrowing suggests that corporates offset higher financial risks that result from shifting from bank- to market-based financing. We also document an increase in the cost of bond financing. The imposition of the Ishihara tax also had real economic implications. Corporate borrowers with a higher exposure to the Ishihara tax via their existing banking relationships reduce investment activity proportionately more than less exposed counterparts. These findings suggest that the Ishihara tax had significant (negative) implications for real economic outcomes.

In order to validate the robustness of our findings, we employ alternative model specifications and conduct various sub-sample analyses. To corroborate the evidence produced by the difference-in-differences analysis, we run a placebo test by pre-dating the treatment period by two years. Second, we use an alternative dataset with loan pricing information to verify if the contraction in credit supply is supply-driven. Third, we cluster corporates in order to control for industry and location specific factors that could drive credit demand. Fourth, we employ an alternative tax measure to rule out concerns that our results are driven by a tax measure that might be endogenous to bank balance sheet decisions. Our findings remain qualitatively unchanged across all alternative specifications and sub-sample analyses. Overall, the findings of our empirical analysis suggest a causal link between the Ishihara tax, credit supply, and corporate financing and investment activities.

Our study contributes to the literature that examines the link between corporate financing decisions and conditions affecting suppliers of credit. A number of studies provide evidence that corporate leverage is not simply a function of corporate demand for debt. Changes in supply conditions arising from informational frictions (Faulkender and Petersen 2006; Sufi 2009; Tang 2009) as well as financial frictions (Leary 2009; Lemmon and Roberts 2010) are important determinants of corporate debt policy. Prior evidence also suggests that financial sector (de)regulation plays an important role in shaping financing activities of corporates (Utrero-Gonzalez 2007; Rice and Strahan 2010; Braggion and Ongena 2017; Avezum, Huizinga and Raes 2019). Our study extends the existing literature by documenting the role that bank taxation can play in determining corporate debt choices.

Our study extends the literature on bank taxation. A number of studies investigate the impact of taxes on bank financing decisions (Hemmelgarn and Teichmann, 2014; Keen and De Mooij, 2016; Schepens, 2016; Bremus, Schmidt and Tonzer, 2020). A more recent strand of the literature focuses on the link between taxes and bank credit supply. Célérier, Kick and Ongena (2020) and Biswas, Horváth and Zhai (2019) trace out bank reactions to the allowance for corporate equity (ACE) tax introduced in Belgium, which instituted a symmetric tax treatment of equity and debt. The imposition of the ACE tax led to an expansion in equity capital as well as an increase in credit supply. Using a large cross-country dataset, Horváth (2020) finds that higher corporate income tax rates are associated with higher leverage, lower risk and credit supply. For European countries, Devereux, Johannesen and Vella (2019) document a positive link between bank risk and bank levies (regulatory bank taxes). Buch, Hilberg and Tonzer (2016) find that banks reduced lending in response to the German bank levy. Our study differs from this existing literature in several ways. First, by exploiting the Ishihara tax in combination with loan-level data, we are able to separately identify credit supply from demand, in order to show how fiscal policy affects bank credit supply, and in turn corporate financing decisions and investment activity. Second, access to data on the actual tax liabilities of banks allows us to measure precisely the exposure of corporates to the Ishihara tax via their existing banking relationships.[5] This allows us to study the complete transmission of the tax from the bank to the corporate level. Third, by studying both the impact of the negative

[5] Devereux, Maffini and Xing (2018) show that errors in measuring corporate tax liabilities can lead to underestimation of the tax effects on capital structure.

and positive shock arising from the imposition (in 2000) and removal (in 2002) of the Ishihara tax, our findings provide valuable insights into the asymmetric impacts of bank taxes.[6]

The remainder of the paper is structured as follows. Section 2 provides a detailed discussion of the history and characteristics of the Ishihara tax. In Section 3, we present our data and methodology. Section 4 reports the results from the bank and loan level analyses, while Section 5 reports the results from the corporate level analysis. In Section 6, we provide a discussion of the results derived from a variety of robustness checks. Section 7 concludes.

2. Institutional background

To estimate the impact of taxes on bank behavior, we exploit a differential tax treatment of banks that occurred in Japan in 2000 when the Tokyo Government levied a special tax that affected one group of banks, while leaving other banks unaffected. The imposition of the bank tax occurred during the period when the Japanese banking system was recovering from a major banking crisis which had dominated much of the 1990s.[7] The tax known as the Ishihara tax is named after its creator Shintaro Ishihara, the Tokyo Governor at the time. Ishihara's motive to impose a tax on banks was of political nature. As a newly appointed governor, Ishihara aimed to increase his popularity by imposing a tax on the banking industry, which had received large scale taxpayer-funded support during the Japanese banking crisis. Ishihara's tax proposal resonated well with parties at the local level and was passed swiftly into legislation.

The Ishihara tax was set at a rate of 3%. In contrast to standard corporate income taxes on net income, the base of the tax was gross profit equal to revenues earned from core operations. Gross profit comprises three components: the net fee and commission margin, the net trading margin and the net interest margin. This latter net interest margin component accounted on average for 80% of gross profits during the sample period. Akin to corporate income taxation, the taxable base includes interest income as well as tax-deductible interest expenses. Under the terms of the Ishihara tax, taxing gross rather than net profits ensured a relatively stable stream of tax revenue for the Tokyo government. Banks liable for the tax were selected based on three criteria.

[6] Heider and Ljungqvist (2015), Mukherjee, Singh, and Zaldokas (2017) and Milonas (2016) provide evidence of asymmetric corporate responses to tax changes.

[7] To resolve the banking crisis that peaked with the collapse of major financial institutions in 1997 and to contain the negative impact on the economy, the government implemented a large-scale and far-reaching program of reforms. This program included: recapitalizing distressed banks; creating a new financial services regulator; establishing a support scheme for distressed non-financial firms, and the introduction of a zero interest rate policy.

First, banks with a physical presence in Tokyo would have gross profits generated in this metropolitan area taxed by the Tokyo Government. Second, only domestic banks were liable for the tax. Foreign banks (including those with operations in Tokyo) were not liable for the tax. Third, banks with average deposits exceeding ¥5 trillion over the past five years were subject to the tax. Banks with deposits below this threshold were exempt from the Ishihara tax (DeWit 2000).

A timeline of key events surrounding the Ishihara tax is summarized in Table 1. The bank tax was planned initially to be levied over a period of five years. However, following a successful legal challenge by banks, the tax was not collected over the full period. By the end of the second year, the Tokyo District Court declared the bank tax to be void followed by a final decision against the tax by the Tokyo High Court. For the purposes of the empirical analysis conducted in the present study, we consider the declaration of the District Court at the end of March 2002 as the date which marks the official termination of the Ishihara tax. After this declaration, the Tokyo Government ceased collecting the Ishihara tax, and was ordered by the Court to pay back the ¥160bn it had already collected from banks.

Tax changes often violate exogeneity assumptions because governments propose them far in advance of imposition and collection. If taxpayers anticipate and change behavior prior to a change in taxation, potential outcomes are likely to correlate with the policy intervention. In this respect, the Ishihara tax is an exception for two reasons. First, the tax was planned in great secrecy, giving banks no time to make strategic adjustments as a means of avoiding the bank tax. No details were revealed to the public prior to its first announcement on 7th February 2000 (DeWit 2000). We verify this through a news wire search, where we find no press coverage discussing the bank tax prior to this date. At the first public announcement, the Tokyo Government issued a preliminary list with banks selected to pay the Ishihara tax. These banks would later all be obliged to make tax payments to the Tokyo Government. Second, it is unlikely that banks could predict the type of tax change. For the tax proposal to become legally binding, it took approximately eight weeks. This period was marked by a high level of uncertainty as decisions regarding the design of the bank tax were finalized. The final terms and conditions of the bank tax were not revealed until one week prior to formal adoption. In addition, the rule which legitimized the adoption of the bank tax was based on an unusual interpretation of Japanese tax law. The Tokyo Government exploited a loophole in the tax system which entitled local governments to implement certain tax policies without the consent of the national government (Ishi 2001). Although tax policies are not decided

exclusively at national level in Japan, the introduction of a special tax for banks on a local level was rather unusual. Due to the potential interaction with other types of bank regulation, bank taxation is generally considered as a policy tool used at national level. We check for anticipation effects in our robustness tests (discussed in Section 6.1) by introducing a placebo tax in the period just prior to the introduction of the Ishihara tax. If banks anticipated the tax change, we would expect to pick up a change in bank behavior during this period. Our results do not indicate any anticipatory effects (with the relationship between the Ishihara tax and our outcome variables proving to be insignificant).

Our research design rests on the assumption that the adoption of the Ishihara tax triggered a change in bank behavior. If the Ishihara tax did not represent a significant increase in the tax liabilities of affected banks, we would be concerned about a potentially weak impact on bank behavior following its introduction. We examine payments made in relation to the Ishihara tax relative to other tax payments. In fiscal year 2000, the Tokyo Government collected bank taxes of ¥111 billion, representing around 30% of affected banks' overall tax expenses in that year. Figure 1 shows the evolution of average effective tax rates of treated and control banks over the sample period from 1998 to 2003.[8] With the introduction of the Ishihara tax in fiscal year 2000, the average effective tax rate of treated banks increases substantially relative to control banks. With the repeal of the tax, average effective tax rates of treated banks revert to previous trends.

Identifying the effects of the Ishihara bank tax requires that the Ishihara tax did not coincide with a change in other corporate tax rates. Over our sample period from 1998 to 2004, there was relatively little change in the corporate tax rate. The rate was cut once in 1998 from 34.5% to 30% and then remained unchanged until 2011. It is therefore unlikely that changes in the corporate tax rate could bias our results. However, in 2003, at the time of the reversal of the Ishihara tax (end of January 2003), Japan substantially reformed the way corporations were taxed at the local level. The reform included the introduction of a local enterprise tax, which became effective in April 2004 (Bird and Vaillancourt 2006). After April 2004, corporations (financial as well as non-financial) with capital in excess of ¥100 million were taxed at the prefecture level. Similar to corporate income tax, the new enterprise tax also allowed for deduction of interest

[8] We calculate the average effective tax rate as the current income tax as a share of income before tax. For banks subject to the Ishihara bank tax, income tax reported in income statements for 2000 and 2001 include amount of bank taxes paid to the Tokyo government.

expenses. Given that the new enterprise tax was widely discussed in public prior to its effective date, we cannot rule out entirely that anticipation effects are not driving our results when testing for the repeal of the tax. [9]

[Insert Table 1 about here]

[Insert Figure 1 about here]

3. Data and methodology

3.1 Sample

We utilize three datasets collected from the Nikkei NEEDS Financial Quest Database. These comprise loan, bank and firm datasets. For all three datasets, we obtain data for the period 1997 to 2003. This period comprises a pre-treatment period (April 1997 to March 1999), a treatment period (April 2000 to March 2002), and a post-treatment period (April 2002 to March 2003), and is determined primarily by the introduction of the Ishihara tax which became effective on 1st April 2000 and was subsequently repealed on March 29, 2002.

Our first dataset is at the loan level and comprises detailed annual information on the long-term loans granted to Japanese listed corporates. Specifically, we observe loans outstanding to individual corporates from each treated bank at the end of the corporate's financial year. A loan thus refers to a bank-corporate pair. Following the approach by Khwaja and Mian (2008), we restrict our sample to corporates with multiple bank relationships.[10] By dropping corporates from our sample that borrow only from a single bank, we ensure that we observe for each corporate the credit amount issued by at least two different banks at a given time. This allows us to capture corporate-specific demand for credit by applying the within-firm estimator. We discuss this approach in further detail in Section 3.2.2.

We match the loan dataset with the bank and firm datasets. The firm dataset contains corporate level balance sheet, income statement, and other attributes (associated industry and location of corporate headquarters). We drop corporates in the financial and public sector. In our analysis, we focus on the intensive margin sample, which includes only corporates to which banks in the treated group extend credit both before

[9] Prior research has shown that banks increase debt in anticipation of higher tax rates (Milonas, 2016; Schandelbauer 2017)

[10] 84% of corporates in our sample borrow from more than one bank with corporates having on average seven relationship banks.

and during the period of the Ishihara tax. To avoid timing issues when considering change variables, we follow Gianetti and Simonov (2013), and include only corporates that report for the year ending in March. The bank dataset contains balance sheet, income statement items and other attributes (location of bank headquarters) of both, City and Regional banks.[11] We augment this data with tax information hand-collected from the annual reports produced by banks. Trust banks and Long-Term Credit banks are excluded from our sample, since these types of banks have supervisory procedures and business models that are fundamentally different from commercial banks. The restriction of our sample to commercial banks ensures sufficient overlap in the distribution of the covariates across treated and untreated banks, thus allowing correct statistical inference to be drawn (Imbens and Rubin 2015). Banks that fail or enter public administration during the period of our analysis are also excluded from the sample.[12] We also identify one incidence of a merger between a treated and a non-treated bank.[13] To ensure the separability of treatment and control groups, these banks are also excluded from our sample. Since we require that corporates borrow from banks prior and during the Ishihara tax, we exclude any new banks that enter the sample during the treatment period. Following Amiti and Weinstein's (2018) classification of new banks, we drop banks that are the result of mergers or restructuring of existing institutions. Our final sample consists of 123 banks, of which 17 are subject to the Ishihara tax, as well as 1776 corporates borrowers.

3.2 Methodology

3.2.1 Bank level

First, we analyze at the bank level the extent to which banks respond to an increase in tax by exploiting the Ishihara tax. We classify banks into treated banks (those that are liable to pay the bank tax) and control

[11] City banks are large in size with branches in major cities throughout Japan and beyond. These banks have a wide geographic scope, and a diversified portfolio of clients and products (including private banking and asset management). Regional banks are regulated under the terms of the Banking Act. These institutions operate within one of the 47 prefectures (administrative regions) in Japan. These banks are normally headquartered in the capital city of a prefecture, and carry out the vast majority of their business within a given prefecture, acting as an important source of finance for medium-sized firms and local government. The majority of Regional banks are quoted publicly, and the largest offer a full range of banking and financial services.

[12] The following banks were excluded from the sample: Hokkaido Takushoku Bank (failed November 17, 1997), Tokuyo City Bank (failed Nov 27, 1997), Tokyo Sowa Bank (under public administration, June 12, 1999), Kokumin Bank (under public administration, April 11, 1999), Niigata Chuo Bank (under public administration, October 2, 1999), Ishikawa Bank (failed, March 2001), Chubu Bank (failed, March 8, 2001), Kyoto Kyoei Bank (failed, October 14, 1997), Kofuku Bank (under public administration, May 22, 1999), Kansai Sawayaka Bank (formerly Kofuku Bank), Namihaya Bank (under public administration, August 7, 1999), Midori Bank (failed, May 15,1998). (Source: Bank of Japan, Deposit Insurance Corporation Japan, Financial Services Agency Japan).

[13] Hachijuni Bank (treated) acquires Niigata Chuo Bank (non-treated), September 29, 2000; (Financial Services Agency Japan).

banks (those that are not). Based on this classification we use a difference-in-differences approach, which compares the difference in the outcome of the treated banks between the pre-tax period and the post-tax period with the same difference in the outcome of the non-treated banks. To investigate the effect of the Ishihara tax on bank behavior, we estimate the following difference-in-differences regression specification:

$$Y_{it} = \delta \underbrace{BEX_i \times Post_t}_{TAX_{it}} + \beta X_i + a_i + \gamma_t + \epsilon_{it} \quad (1)$$

where i denotes bank. Y_i represents each of the dependent variables: bank leverage defined as total liabilities to total assets, bank lending defined as outstanding total loans to total assets, and bank risk defined as the ratio of risk-weighted assets to total assets. Figure 2 plots the evolution of the mean of these three outcome variables for banks liable to the bank tax and those in the control group. The trends in the outcome variables of banks in the treatment and control group follow similar paths in the pre-treatment period, but then diverge with the introduction of the Ishihara tax in 2000. In particular, loans and risk-weighted assets of treated banks decline relative to control banks, while liabilities increase.

[Insert Figure 2 about here]

BEX_i is our explanatory variable, which captures bank i's exposure to the Ishihara tax by determining the average effective rate at which a bank's gross profits are taxed by the Tokyo government. Specifically, we divide the amount of bank tax paid by bank i to the Tokyo government as a share of its gross profit tax (see Section 3.3 for a detailed discussion of this measure of tax exposure). The indicator variable $Post_t$ equals one after the Ishihara tax is introduced and zero otherwise. Therefore, TAX is greater than zero for banks liable to the bank tax and zero otherwise. The model also includes time dummies, γ_t, to capture time effects common to all banks, as well as, bank specific fixed effects, α_i, to control for unobserved bank level heterogeneity. ϵ_{it} is a stochastic error term.

X_i is a vector of pre-treatment bank-level control variables. To control for potential differences in banks' capital structure, business models, funding strategies, and profitability of banks, we include bank size, capital, net interest income as a share of revenue, return on asset, loan loss provisions, liquidity and deposit funding. All variables enter our model as pre-treatment time-averaged variables. We include bank size defined as the natural logarithm of the book value of total assets. Larger banks have been shown to be more risk diversified, have access to debt capital and increased investment opportunities (Demsetz and Strahan 1997; Deng, Elyasiani, and Mao 2007). Banks size is thus commonly found to be positively related to bank leverage. We also

control for bank profitability by including return on assets (ROA) as well as net interest income as a share of revenue to capture the extent to which banks generate revenue from interest income (from traditional financial intermediation activity). On one hand, more profitable banks may find it easier to retain capital. On the other hand, more profitable banks may choose asset portfolios with higher risk and return characteristics. To control for the extent to which banks rely on demand deposits as a source of funding, we include deposits to total assets. Access to liquidity in the form of bank deposits allows financial firms to switch to riskier assets more readily, and has been shown to be linked to increased loan growth (Acharya and Naqvi 2012). Following prior literature on bank capital and risk, we also include a measure of banks' pre-treatment capital as well as credit risk (measured as the ratio of loans-loss provisions to total loans). A number of studies document a strong relationship between bank capital and bank lending (Gambacorta and Mistrulli 2004; Carlson, Shan and Warusawitharana 2013). Finally, in order to control for bank merger and acquisition activity we include *Merger*, a dummy variable, which takes the value of one if a bank is involved in a merger or acquisition and zero otherwise. In addition, we also include *PRA*, a dummy variable which takes the value of one if a bank received capital injection under the Prompt Recapitalization Act in 1999, and zero otherwise.[14] Table 2 provides the variable definitions, while Table 3 reports summary statistics.

[Insert Table 2 about here]

[Insert Table 3 about here]

3.2.2 Loan level

Our analysis at the bank level allows us to investigate how banks adjust balance sheets in response to the bank tax. However, it is not suited to identifying the actual impact on credit supply given that we cannot disentangle credit supply from demand. We overcome this issue by utilizing a loan-level dataset (which comprises multiple bank-corporate relationships), and control for credit demand by saturating the regression specification with a set of corporate fixed effects (Khwaja and Mian 2008). Specifically, we estimate the following equation:

$$Y_{ijt} = \delta \underbrace{BEX_i \times Post_t}_{TAX_{it}} + \beta X_i + a_j + \gamma_t + \epsilon_{ijt} \qquad (2)$$

[14] The Prompt Recapitalization Act (PRA) was enacted by the Japanese government in 1999. Under this act, some banks in our sample from both, the treatment and control group received public capital injections in March 1999. Recent empirical findings suggest that capital injections result in boosting the credit supply of banks as banks assume riskier projects (Allen, Chakraborty and Watanabe 2011; Black and Hazelwood 2013; Giannetti and Simonov 2013).

Y_{ijt} represents *credit growth* and *credit decrease* measures of credit supply. *Credit growth* defined as the logarithmic difference between the average loan amount (issued by bank i to corporate j) during the intervention period (year 2000 and 2001) and the pre-intervention period (year 1998 and 1999). To prevent outliers from affecting our results, we winsorize *credit growth* at the 5% and 95% (following Acharya, Eisert, Eufinger and Hirsch 2018). *Credit decrease* is a dummy variable which equals one if credit growth in a given year is in the lowest quartile (decreases by more than 12.6%). We introduce the same bank characteristics X_i as in our bank-level analysis (Equation 1).

To produce standard errors that are robust to autocorrelation, we follow prior literature and collapse our bank-level and loan-level data into a single pre-treatment and a single treatment period before estimating the models represented in Equation 1 and 2 (Bertrand, Duflo and Mullainathan, 2004). Standard errors are clustered at the bank level (Equation 1), and at the bank and corporate level (Equation 2). Estimation of both models is executed using Ordinary Least Squares (OLS). The coefficient of interest is δ, which represents the impact of the bank tax on bank behavior. We expect that banks respond to the tax by increasing leverage, reducing risk as well as lending. Hence in Equation 1, we expect $\delta > 0$ in regression with leverage, and $\delta < 0$ with risk and lending as dependent variables. In Equation 2, we expect $\delta < 0$ in regression with *credit growth*, and $\delta > 0$ with *credit decrease* as dependent variables.

3.3 Banks' exposure to the Ishihara tax

Measuring tax liabilities is typically complicated by the fact that precise tax payments per jurisdiction are rarely observed. In the case of the Ishihara bank tax, we observe the banks' actual tax amounts paid to the Tokyo tax authority. Ishihara tax expenses are disclosed as separate items in banks' annual Yuho report, and can also be obtained from court documents of the Ishihara bank tax lawsuit. This in turn allows us to obtain a relatively accurate picture of the tax status of individual banks. Importantly, we can clearly identify and distinguish tax expenses paid to the Tokyo jurisdiction from all other tax expenses reported in banks' income statements. As such, the disclosed amounts are akin to tax returns as they indicate the current tax liabilities of the banks subject to the Ishihara tax.

To determine banks' exposure to the Ishihara bank tax, we calculate the effective average tax rate. Specifically, we measure the tax amount paid (to the Tokyo Government) by bank *i* as a share of the bank's gross income (the tax base of the Ishihara tax). Our measure of banks' effective average tax rate is a modified version

of the commonly used cash effective tax rate, and borrows from the concept of accounting-based effective tax rates that measure the average tax burden (Hanlon and Heitzman 2010).[15] A disadvantage that arises from using the effective average tax rate is its potential endogeneity with banks' balance sheets. To address endogeneity concerns, we employ an alternative measure of banks' tax exposure that relies on banks' business activity in Tokyo. In Section 6.4, we report estimates of Equation 1 and 2 that employ the alternative measure.

Table 3 summarizes the statistical characteristics of our TAX_i exposure measure. We find that the exposure to the Ishihara tax ranges from 0.034% to 2.81% for banks that are liable to the tax. This suggests that the extent to which banks were exposed to the Ishihara tax varied considerably. While variation in tax exposure are likely to reflect differences in the amount of gross profit that banks generated from business activities in the Tokyo prefecture, it is possible that the observed variation reflects differences in banks' compliance with tax law. To address any concerns that the variation in banks' exposure to the Ishihara tax is due to tax avoidance, we examine the extent to which banks' tax payments correlate with their respective business activity in Tokyo. In order to proxy for a bank's business activity in Tokyo, we compute the ratio of the number of Tokyo-based to total employees for each bank.

In order to determine the tax amount payable, Tokyo tax authorities allocate the tax base (gross profit) in proportion to the number of employees and the size of office space in Tokyo. Figure 3 plots the relation between banks' tax exposure and their business activity (measured on the basis of Tokyo-based employees). Tax exposure and business activity are positively associated suggesting that our main exposure variable captures the extent to which banks were exposed to the bank tax, and rules out the presence of major tax compliance issues or tax avoidance schemes that could potentially weaken our identification strategy.

[Insert Figure 3 about here]

4. Empirical results & discussion

4.1 Bank level

[15] Prior literature typically considers the effective marginal tax rate as the theoretically more appropriate measure to identify tax effects (Graham and Mills, 2008). In the case of the Ishihara tax, we decided to opt for the effective average tax rate for the following reasons. First, we have relatively accurate information of banks' tax expenses. Using the effective average tax rate provides us with extensive variation in banks' tax liabilities. Variation in banks' marginal tax rates would be minimal given that the Ishihara bank tax is not a progressive, but a flat tax. Second, banks' exposure to the Tokyo Metropolitan Area varies widely, and therefore requires a measure that reflects these differences in exposure to the Ishihara tax scheme. For the aforementioned reasons, we believe that our effective average tax rate variable represents a measure that is appropriate to address the research question at hand.

4.1.1 Bank leverage, lending and risk

We first examine whether banks liable to the bank tax reduce lending and risk and increase leverage in response to the Ishihara tax by estimating Equation (1). Table 4 Panel A presents the results. We find that banks more exposed to the Ishihara tax increase their leverage ratio and also reduce lending as well as risk. Further, a detailed investigation of the composition of bank loan portfolios reveals that banks adjust risk exposures to retail and corporate loans in response to the bank tax. Overall, the reaction of banks to the Ishihara tax suggests that taxes on bank profits potentially impact both sides of bank balance sheets.

The estimates presented in Table 4 Panel A are the first results of the bank-level analysis. We find that the coefficients on TAX_i reported in Column 1 and 2 are negative and statistically significant at the 1% level. The estimated coefficient in Column 1 is -0.0219, implying that a percentage point increase in the effective tax rate reduces bank lending by about 2.2 percentage points. Likewise, the estimated coefficient in Column 2 is -0.0223, implying that a percentage point increase in the effective tax rate leads to a reduction in risk-weighted assets of approximately 2.2 percentage points. The results for bank lending and bank risk are consistent with our priors that banks adjust lending and risk in response to a tax on gross profits. The coefficient reported in Column 3 is positive and statistically significant at the 5% level. The estimate of 0.0029 implies that a percentage point increase in the effective tax rate leads to an increase in bank leverage of approximately 0.3 percentage points. Our result for bank leverage closely corresponds to findings reported in the literature. For a large cross-country sample, Horváth (2020) documents that a percentage point increase in the corporate income tax rate results in a 0.09 percentage increase in bank leverage. Keen and De Mooij (2016) find that bank leverage increases by 0.17 percentage points in response to a percentage point increase in the corporate income tax rate.

Given that the Ishihara tax impacts bank lending and risk, we complement our analysis to investigate whether banks changed the composition of their loan portfolios from riskier into safer assets or reduced the size of their asset portfolios. In order to do so, we replace the dependent variable of Equation (1) with the natural logarithm of total assets, corporate loans and retail loans. The results of this analysis are presented in Table 4, Panel A, Column 4 to 6 respectively. We find that the coefficient on TAX_i with total assets as the dependent variable (Column 4) is not statistically significant. This indicates that banks did not adjust risk-weighted assets by shrinking their assets. The estimated coefficient in Column 5 with corporate loans as the dependent variable is negative and statistically significant at the 5%. For retail loans (Column 6), the estimated coefficient is negative and statistically significant at the 1% level. Coefficients of -0.57 and -0.35 imply that a 1

percentage point increase in banks' effective tax rates results in a reduction in corporate loans of 0.57 percentage points and 0.35 percentage points in retail loans. This suggest that banks adjusted risk-weighted assets in response to the bank tax by reducing their risk exposure to corporate loans and to a lesser extent to retail loans.[16]

[Insert Table 4 about here]

4.1.2 Tax repeal

A key feature of the Ishihara tax is that the tax was repealed by order of the Tokyo High Court after a period of two years. The repeal of the tax resulted not only in the abolishment of the tax, but also a requirement that taxes previously collected by the Tokyo Government be repaid to affected banks. Thus, the repeal is equivalent to a reduction in the tax rate, and (due to the repayments by the Tokyo government to the affected banks) a windfall event. Accordingly, we would expect that banks use this sudden spike in additional income to lend more and increase risk. However, it is less clear what the implications of the tax repeal are for bank leverage. Prior theoretical and empirical literature on corporate taxation suggests that changes in tax rates may have asymmetric effects on corporate leverage. For instance, Heider and Ljungqvist (2015) show that increases in corporate income tax rates are linked to higher corporate leverage, while decreases in tax rates are not. Admati, DeMarzo, Hellwig and Pfleiderer (2018) theoretically explore this so-called leverage ratchet effect, and show that once a firm is highly levered, shareholders resist leverage reduction via new equity issuance (given that cash flows would benefit debtholders at shareholders' expense). Sundaresan and Whang (2014) present an alternative explanation for asymmetric responses in the context of banking firms. Their model shows that debt in the form of deposits has a lower tax sensitivity than other types of debt. Because deposits provide banks with benefits beyond those arising from tax deductions, it is optimal for banks to remain leveraged even when tax benefits decline. [17]

[16] In an unreported test (the results of which are available from the authors upon request), we investigate the impact of the Ishihara tax on zero risk-weighted government securities. In the presence of capital regulations, which penalise bank assets with positive risk weights, the model by Célérier, Kick and Ongena (2020) predicts that banks' share of government securities will be higher relative to the share of loans in response to tax. In line with the model, our results point to amplifications of distortions resulting from capital requirements. We find that banks subject to the Ishihara tax shift their portfolio composition from loans toward government securities.

[17] For instance, deposits generate income through fees, and have been shown to facilitate monitoring of borrowers (Mester, Nakamura, and Renault 2007)

The empirical evidence of banks' asymmetric response to lower tax benefits is mixed. In line with the static perspective of capital structure, Martin-Flores and Moussu (2019) find that European banks adjust capital downwards in response to an increase in the debt tax bias. Using a sample of US banks, Milonas (2016) examines the structure of bank capital in response to decreases in tax rates, and finds no evidence for an asymmetric tax response. Using a sample of Italian local banks, Gambacorta, Ricotti, Sundaresan and Wang (2017) provide evidence in support of the Sundaresan and Whang (2014) model. The authors empirically examine bank financing choices in response to a tax rate cut, and find that non-deposit liabilities are more tax sensitive than deposits.

Under the assumption that the Ishihara tax repeal is equivalent to a reduction in the tax rate and banks react symmetrically to tax rate changes, we expect that banks respond to the tax repeal by decreasing leverage. To test whether the repeal of the bank tax impacts positively on bank lending and risk, and negatively on bank leverage, we estimate Equation 1 with the following changes. We define April 2001 to March 2002 as the pre-treatment period, and April 2002 to March 2003 as the treatment period. We limit our treatment period to the year 2003 because with the repeal of the Ishihara tax, a new local enterprise tax with similar characteristics to the bank tax was announced. From 2004, local governments began to tax gross profits of all corporates (including both financial and non-financial corporates) with capital over ¥100 million. To capture the effect of the repeal of the tax, we measure a banks' exposure to the repeal by calculating the share of the funds reimbursed by the Tokyo government relative to gross profit. We replace our variable BEX_i with this measure in Equation 1. Finally, in order to account for heterogenous responses to the tax repeal, we decompose our original leverage variable into deposit funding (defined as deposits to total assets) and non-deposit liability components (defined as the ratio of total liabilities minus deposits to total assets).

Table 5, Panel A presents the results of estimating our difference-in-differences regressions. The coefficients in columns 1 and 6 are positive and statistically significant at the 1% level, suggesting that banks respond to the tax repeal by increasing lending. In particular, we find that banks increase their exposure to retail loans, while we do not find evidence for an increase in lending to corporates (coefficient in Column 5 is not statistically significant, and close to zero). The coefficient in Column 2 is positive, but only marginally significant (at the 10% level), indicating that banks may respond to the repeal by increasing risk. The coefficient in Column 3 is not statistically significant and close to zero, suggesting that banks do not respond to the tax

repeal by reducing leverage. Table 5, Panel B presents the results from testing for the drivers of asymmetric bank responses to the tax repeal. Column 1 shows a positive, albeit statistically insignificant coefficient, while the coefficient in Column 2 is negative and statistically significant at the 5% level. This suggest that the asymmetric response of bank leverage is due to differences in the tax sensitivity of bank deposits and other forms of debt. Overall, our results lend support to the income effect of tax, and point to the presence of asymmetric tax effects resulting from differences in the tax sensitivity of bank deposits and non-deposit liabilities.

[Insert Table 5 about here]

4.2 Loan level

Next we analyze the average impact of the Ishihara tax on credit supply to corporate borrowers.[18] To rule out that the reduction in bank lending is driven by demand effects, we exploit the across-bank variation of the Ishihara tax as well as the fact that corporate borrowers obtain loans from multiple credit institutions with different degrees of exposure to the bank tax. In particular, we follow the approach by Khwaja and Mian (2008) using our loan level dataset to compare within-borrower variation in credit growth while accounting for corporate credit demand by inclusion of corporate fixed effects. We find that the imposition of the Ishihara tax has a statistically significant effect on credit availability for corporate borrowers. Corporates that borrow from banks with a higher tax exposure face a larger drop in credit availability. This is reflected in lower long-term credit growth and a higher likelihood that the corporate experiences a larger drop in outstanding loans. Furthermore, this negative impact is largely offset for large corporate borrowers. Overall, our findings suggest that taxes on bank profits play a significant role for the credit availability of corporates.

Table 4 Panel B presents the results of the difference-in-differences regression based on Equation 2 (Section 4.2). The coefficient in Column 1 (dependent variable: *credit growth*) is statistically significant at the 5% level and takes on the value of -0.0370. This implies that a one percentage point increase in banks' exposure to the tax leads to a 3.7 percentage point decrease in credit supplied to corporates in our sample. In economic terms, the point estimate of -0.0370 implies that the average supply-driven contraction in credit to corporate

[18] While our analysis in Section 4.1 reveals that banks increase exposure to corporate and retail loans, a lack of data prevents us from testing the impact on households.

borrowers is 4.05%.[19] With the total sum of credit outstanding in our sample in the pre-treatment period amounting to 6.6 Trillion Japanese Yen (62.5 Billion USD), this translates into a contraction in outstanding credit of 270 Billion Japanese Yen (2.5 Billion USD). The coefficient in Column 2 is positive and statistically significant at the 1% level. This indicates that corporate borrowers more exposed to the Ishihara tax via their lenders are more likely to experience a large drop in credit.

Prior evidence suggests that larger corporate borrowers are more likely to be insulated from adverse contractions in bank credit supply (Khwaja and Mian 2008; Amador and Nagengast 2016; Berg 2018; Berton, Mocetti, Presbitero and Richiardi 2018; Balduzzi, Brancati and Schiantarelli 2018; Siemer 2019). In contrast, smaller corporate borrowers are more dependent on bank funding to finance activities (Berger and Black 2019). Thus, we would expect that larger corporates are likely to be less affected by a contraction in credit following the introduction of the Ishihara tax. Given our previous analysis at the bank level indicates that banks reduce risk-weighted assets, we would thus expect to see a larger contraction in credit supply for riskier borrowers.

In order to investigate these heterogenous effects, we augment Equation 2 by interacting TAX_i with a dummy variable for corporate size and risk. First, we use a dummy that equals one for large corporates (belong to the largest 50% of corporates) in the pre-treatment period and zero otherwise. Second, we interact TAX_i with a dummy that equals one for corporates with above median level of risk in the pre-treatment period and zero otherwise. To measure corporate risk, we use the Merton's distance-to-default measure (Merton 1974; Vassalou and Xing 2004). Our proxy of risk is an investor-perceived default risk that uses market-based information in addition to market interest rates, and book value of debt. In other words, distance-to-default utilizes both accounting- and market-based data. As such, it is a forward-looking measure of risk which is less prone to managerial manipulation than solely accounting-based risk proxies (Hagendorff and Vallascas 2011; Millidonis and Stathopoulos 2011). Table 4, Panel B, Column 3 through 6 report the results. We find that larger corporates are less affected by the contraction in bank credit. Results further indicate that riskier corporate borrowers are more likely to experience a large decrease in credit supply. Overall, this suggests that smaller and riskier corporate borrowers are less insulated from the adverse contraction in credit supply, in line with the notion that banks respond to the tax by rebalancing loan portfolios towards less risky assets.

5. The real effects of the Ishihara tax

[19] The average effective tax rate, BEX_i, of banks liable to the bank tax is 1.095%.

In a final step, we test how bank taxation through its impact on credit supply impacts on corporate financing and investment activity.

5.1 Corporate borrowers' exposure to the Ishihara tax

To analyse the extent to which corporate borrowers are affected by the Ishihara tax via their existing banking relationships, we need a measure that captures corporate exposure to the bank tax. We follow Cingano, Manaresi and Sette (2016), and employ a measure that takes into account the financial dependence of corporate *j* to bank *i* prior to the introduction of the Ishihara tax as well as bank *i's* exposure to the Ishihara tax. We construct the variable *CEX* as follows:

$$CEX_j = \sum_i \underbrace{\frac{outstanding\ loans_{ij}}{bank\ debt_j}}_{w_{ij}} \times BEX_i$$

where w_{ij} captures corporate dependency on a given bank in the pre-treatment period. The numerator is the average amount of outstanding loans of corporate *j* obtained from bank *i* over the pre-treatment period. The denominator is the average amount of bank loans outstanding of corporate *j* as reported in its balance sheet. To take into account that corporate exposure to the Ishihara tax may differ depending on its bank(s) exposure to the tax, we also let corporate exposure CEX_j depend on BEX_i, our measure of bank exposure. We then divide our sample of corporates into treated and control entities by classifying corporates with an above median exposure to the Ishihara tax via their lenders as treated and those below median exposure as corporates in the control group. Table 2 provides the definition of variables, while Table 3 provides information on the statistical properties of our variables.

5.2 The tax effect on corporate borrowing

Having established that banks reduce credit supply in response to the Ishihara tax with resultant negative consequences for corporate borrowers' credit availability, we next investigate whether the decline in bank lending led to an overall reduction in corporate borrowing. Prior evidence suggests that larger corporates switch to bond financing in response to adverse shocks to bank credit supply (Becker and Ivanshina 2014; Goel and Zemel 2018; Crouzet 2018). Given that our sample comprises large, listed corporates that hold multiple bank relationships and have access to other types of debt instruments, corporates may choose to increase borrowings from other banks or financial markets.

To investigate, corporates' debt choice in response to the tax-induced contraction in credit supply, we estimate the following equation:

$$Y_{jt} = \delta \underbrace{CEX_j^D * Post_t}_{CTAX_{jt}} + \beta X_j + \hat{a}_j + \gamma_t + \epsilon_{jt} \quad (3)$$

where Y_{jt} represents each of our dependent variables which comprise the growth rate of corporate *j*'s bank debt, bonds, commercial paper, and total debt. Figure 4 plots the evolution of the bank debt, commercial paper, bonds and total debt for corporates in the treated and control group. The trends in bank debt, commercial paper, bonds and total debt follow similar paths in the pre-treatment period. With the introduction of the Ishihara tax in 2000, bank debt and total debt of treated corporates declines relative to control corporates, while bonds increase. CEX_j^D is an indicator variable that is one for corporates with CEX_j above the median (see Section 5.1 for a detailed discussion), and zero otherwise. The indicator variable $Post_t$ equals one after the Ishihara tax is introduced and zero otherwise. Therefore, $CTAX_{jt}$ is different from zero for corporates with above median exposure to the tax in the treatment period.

[Insert Figure 4 about here]

X_j is a vector of pre-treatment variables which control for corporate attributes. These variables comprise the book leverage ratio, the liquidity ratio, Tobin's Q, return on assets, sales growth and firm size. To control for debt usage and the ability to meet debt obligations, we include leverage and liquidity ratios. We construct the leverage ratio by dividing the book value of corporate total liabilities to total assets. Corporate liquidity is calculated as the share of current assets to total assets. In order to control for corporate long-term and short-term profitability, we include Tobin's Q, and return on assets and sales growth respectively. Tobin's Q is the ratio of the market value to book value. The return on assets is the net profit normalized by total assets. Sales growth is the growth rate of gross sales. Firm size is the natural logarithm of total assets. To better control for corporate demand for credit, we include the estimated corporate fixed effects $\hat{a}_j$ from Equation 2 (Cingano, Manaresi and Sette, 2016). In addition, we complement the model with a set of prefecture-industry fixed effects to control for local demand effects. To produce standard errors that are robust to concerns of autocorrelation, we follow Bertrand, Duflo and Mullainathan (2004) and average the corporate-level data before and after the bank tax when estimating Equation (3).

Panel A of Table 6 presents the results. The point estimate in Column 1 is negative and statistically significant at the 1% level, indicating that corporates more exposed to the Ishihara tax did not increase borrowing from banks not subject to the Ishihara tax by more than corporates in the control group. While we do not find evidence that corporates increase their use of commercial papers, results indicate that corporates switched to bond financing. The coefficient in Column 3 is positive and statistically significant at the 5% level, implying that corporates shift borrowing activity to bond markets. Moreover, we find that corporates reduce total borrowing. Overall, our findings suggest that corporates respond to adverse credit supply conditions by increasing borrowing in financial markets as well as reducing total borrowing. In Appendix A2 of the paper, we test for effects of the tax repeal on corporate borrowers. Results reported in Table A2 of the appendix suggest that corporate borrowers increase bank debt in response to the tax repeal.

[Insert Table 6 about here]

5.3 The tax effect on funding costs

Having established that corporates substitute bank loans with bonds, we investigate the extent to which the contraction in credit supply impacted on corporate borrowing costs. Specifically, we examine whether corporates with more exposure to the Ishihara tax incur higher debt costs. For a small set of corporates that issued bonds in the pre-treatment and treatment period, we investigate the relationship between bond spreads and bond issuers' exposure to the Ishihara tax.

Prior theoretical and empirical literature suggests that there are benefits to borrowing from banks (Holmstrom and Tirole 1997; Datta, Iskandar-Datta and Patel 1999). The literature attributes these benefits to banks' superior access to private information on borrowers (Fama 1985), as well as to their efficiency and flexibility in restructuring and renegotiating debt claims with borrowers (Berlin and Loeys 1988; Gertner and Scharfstein 1991; Denis and Mihov 2003). In line with this literature, we expect to observe higher at-issue yield spreads for public straight bond offerings from corporates that are more exposed to the Ishihara tax via existing lending relationships.

We collect data on Japanese bond issues from Thomson Reuters SDC Platinum database for our sample period and merge it with our corporate dataset. This yields a sample of 90 corporates that issued bonds in both, the pre-treatment and treatment period. We then estimate a modified version of our difference-in-differences model (Equation 3) using the following specification. Y_{jt} represents the average spread-to-benchmark of

corporate j. $CTAX_j$ is our independent variables that captures corporate j's exposure to the Ishihara tax. X_j denotes corporate pre-treatment controls comprising book leverage ratio and size, as well as bond controls comprising average maturity and bond amount. We include industry fixed effects and cluster standard errors at the corporate level. In order to produce standard errors that are robust to concerns of autocorrelation, we follow Bertrand, Duflo, and Mullainathan (2004) and average our corporate-level data before and after the bank tax when estimating Equation (3). The estimates are reported in Panel B of Table 6. We find that the spread-to-benchmark increases by 36 basis points for corporates more exposed to the Ishihara tax via their lender. This increase in the spread is economically and statistically significant. Overall, our results from this analysis suggest that corporates face higher debt costs when switching from bank loans to bonds.

[Insert Table 6 about here]

5.4 The tax effect on investment and employment

In a final step, we turn to direct effects of the bank tax on corporates and investigate whether the tax-induced credit crunch has implications for employment and investment activity. Using our corporate panel, we estimate Equation 3 with employment and investment rate as the dependent variable. Employment is defined as the growth in the number of employees. The investment rate is defined as the growth in net investments. We calculate net investment as the sum of property, plant and equipment, inventories, advertising expenditure, research and development expenses. We then subtract depreciation.

The results are reported in Table 6, Panel C. The coefficient in Column 1 is negative, but not statistically significant. This implies that the bank tax had no effect on employment growth. The coefficient in Column 2 is negative and statistically significant at the 5% level. The point estimate implies that following the lending cut (induced by the bank tax), treated corporates reduce investment activity by more than control corporates. A percentage point increase in corporate exposure, lowers the investment rate by 1.9%. Overall, our results suggest that the bank tax has direct implications for corporate investment activity.

5.5 Heterogenous tax effects

Results from the loan level analysis indicate that large corporate borrowers are less affected by the contraction in bank credit relative to smaller corporates. Using our cross-sectional model, we assess whether the effect of the Ishihara tax on corporate level outcomes differs for large borrowers. To do so, we augment Equation 3 by interacting $CTAX_j$ with the size dummy. Table 6, Panel D reports the results. The coefficients in

Column 1, 3, 4 and 6 are statistically significant at the 10% level. The estimates suggest that in contrast to smaller counterparts, large corporate borrowers do not bear the full brunt of the banks' tax shock. Specifically, we find that the contraction in bank debt and total debt is lower for large corporates. Our results also suggest that investment activity of large corporates is less impacted by the tax. Moreover, large corporates increase bond funding less than smaller counterparts.

6. Robustness of the main findings

6.1 Parallel trends

A key identification assumption behind our estimation strategy is that, in the absence of treatment, the difference-in-differences estimator is zero (the parallel trend assumption). This assumption requires that the trend in the outcome variable is similar for both treatment and control groups in the pre-tax (shock) period. We test for parallel trends at the bank level and corporate level.

6.1.1 Bank level

We first visually examine the pre-treatment trends of banks in both groups. As shown in Figure 2, Panel A to C the mean of the three bank-level outcome variables follow a parallel trend prior to the introduction of the tax. To check more formally whether the parallel trend assumption is satisfied, we conduct a placebo test by assuming falsely that the bank tax was introduced from 1998 to 1999. By introducing a placebo tax before the actual bank tax was adopted, we also test for potential anticipation effects. Given that some banks were subject to capital injections during this period (and similar to the baseline specification), we include a dummy in the model to control for this effect. Table 7, Panel A reports the estimates. We find that the coefficients on $Placebo\ TAX_i$ do not differ from zero. This suggests that: the parallel trend assumption for the pre-period is not violated; anticipation effects are not present; and the effects on the outcome variables reported in Table 4 are associated with the introduction of the Ishihara tax.

[Insert Table 7 about here]

6.1.2 Corporate level

We also test for violations of the parallel trend assumption at the corporate level. As shown in Figure 4, Panel A to D, corporate level outcome variables follow parallel trends in the pre-treatment period. Again, we conduct a placebo test, which assumes falsely that the Ishihara tax was introduced in 1999. Table 7, Panel B

reports the estimates. We find that the coefficients on $Placebo\ CTAX_j$ are not statistically significant for our main corporate outcome variables, suggesting that the parallel trend assumption is not violated.

6.2 Loan pricing

To address concerns that our results are supply-side driven, we would ideally test whether and how the pricing behaviour of Japanese banks adjusts in response to the Ishihara bank tax. Unfortunately, Nikkei NEEDS provides only information on the amount of the loans but not corresponding loan rates. For our sample of Japanese corporate borrowers and their lenders, we are therefore unable to investigate the tax effects on banks' pricing behaviour.

In order to examine selected aspects of banks' pricing behaviour, we rely instead on an alternative dataset obtained from the Thomson Reuter's LPC (Loan Pricing Corporation). LPC's DealScan data provide comprehensive information on syndicated loans, including contract terms as well as detailed information about the parties involved in the syndicated loans. We obtain data for the period from 1st April 1998 to 31st March 2002, and manually match the Japanese lenders in the LPC database with our set of Japanese banks. We exclude all corporate borrowers that are classified as financial services firms (SIC codes between 6000 and 6999) and drop all observations for which the spread (All-In-Drawn) is missing. We follow De Haas and Van Horen (2012) and divide the loan facility equally among all members of a syndicate if bank allocation is missing. This results in a sample of 87 Japanese banks and 1674 corporate borrowers.[20]

Given that the syndicated loan dataset contains only information on the loan at the time of origination, we do not observe changes in loan amounts or pricing over time. To address the lack in time-series variation, we follow Acharya, Eisert, Eufinger and Hirsch (2019) and aggregate corporate borrowers into clusters. Thus, our unit of analysis is at the *bank–cluster* level rather than at the *bank–corporate* level. To group corporate borrowers into clusters, we follow the cluster definition by DeJonghe, Dewachter, Mulier, Ongena and Schepens (2019).[21] Our final dataset includes 253 bank-cluster pairs for which we observe one loan issued before and

[20] The majority of corporate borrowers in our sample are of non-Japanese origin. During our sample period, syndicated loan markets in Japan were relatively undeveloped as the majority of loan transactions between Japanese banks and domestic corporate borrowers was of bilateral nature. Japanese corporates only really began to borrow syndicated loans from 2003 onwards (Akiyoshi and Minamihashi 2014). While Japanese corporates were more or less absent from syndicated loan markets, Japanese banks participated actively in syndicated loan transactions with non-Japanese borrowers.

[21] Specifically, we group corporate borrowers according to the primary industry (SIC) code, location (district or country level) as well as loan size (above or below median) in the DealScan dataset.

after the Ishihara bank tax. We also create a second sample in which we drop lenders that do not act as lead arrangers.[22] We then estimate the following equation:

$$Y_{ict} = \delta \underbrace{BEX_i \times Post_t}_{TAX_{it}} + \beta X_i + a_c + \gamma_t + \epsilon_{ict} \quad (4)$$

where Y_{ict} is the natural logarithm of the loan volume or the average spread for the pair of bank *i* and corporate cluster *c*. X_i is our set of bank control variables as defined in Equation 1, Section 3.2.1. a_c is a set of corporate cluster fixed effects, which control for credit demand of corporate borrowers in our clusters. To produce standard errors that are robust to autocorrelation, we follow Bertrand, Duflo and Mullainathan (2004) and collapse our loan level data into a single pre-treatment and a single treatment period before estimating the model in Equation 4. Standard errors are clustered at the bank and corporate cluster level (Equation 2). Estimation of the model is executed using Ordinary Least Squares (OLS). The coefficient of interest is δ, which represents the impact of the bank tax on bank pricing and lending behavior. Table 7, Panel C reports the results for the two samples. We find that the coefficient in Column 1 on *TAX* is negative and significant at the 10% level, implying that banks decrease loan amounts in response to the tax, and providing further evidence for the effect of the tax on bank lending. Moreover, we also find that banks more exposed to the Ishihara tax increase the prices of loans. In Column 2, the coefficient is positive and statistically significant at the 1% level. The findings suggest that banks adjust pricing behavior in response to the Ishihara tax corroborating further that the tax effect is supply-side driven.

6.3 Region- & industry-specific factors

At the time when the Ishihara tax was announced, the Tokyo government had experienced declining revenues from corporate income taxes. One concern that this may raise is that the introduction of the Ishihara tax coincided with a deterioration in the local economic climate in the Tokyo prefecture, which impacted corporate health and thus on credit demand. To mitigate concerns that any local economic factors specific to the Tokyo prefecture may be driving the contraction in credit supply, we apply a strategy similar to that of Peek and Rosengren (1997) and focus our analysis on Japanese corporates without direct business exposure to Tokyo but with a pre-treatment relationship to a bank affected by the Ishihara tax. We therefore drop from our

[22] We follow the definition by Bharath, Dahiya, Saunders and Srinivasan (2011) and define a bank as lead arranger if the banks takes an agent or arranger role or has a "yes" for the lead arranger credit.

sample all corporates that are headquartered in the Tokyo prefecture.[23] Using this smaller sample, we estimate Equation 2. Table 8, Panel A Column 1 and 2 reports the results. The coefficients on TAX_i are statistically significant and have the expected signs implying that our results are not driven by Tokyo-specific factors.

Another concern may be that corporate borrowers in our loan-level dataset experienced industry-specific shocks that affected corporates' demand for credit. In order to ensure that industry-specific factors are not driving our results, we follow the approach by Acharya, Eisert, Eufinger and Hirsch (2018) and form corporate clusters based on local industries. By aggregating corporates into prefecture-industry clusters, we ensure that corporates are subject to the same regional and sectoral shocks. This allows to attribute the variation in credit amounts to a reduction in credit supply. Using a sample of 442 corporate clusters, we estimate Equation 2. By using corporate-cluster fixed effects, we control for industry-specific effects on credit demand. The results are reported in Table 8, Panel A Column 3 and 4. The coefficient in Column 3 is negative and statistically significant at the 10% level. The coefficient in Column 4 is positive and statistically significant at the 1% level. This suggests that shocks affecting credit demand in local industries are not driving our results.

6.4 Alternative tax measure

In this section, we check the robustness of our main results to using an alternative measure of banks' tax exposure. In order to alleviate concerns that the effective average tax rate may be endogenous to banks' balance sheet decisions, we apply a tax measure that proxies for banks' exposure to the Tokyo Metropolitan Area in the pre-treatment period on the basis of bank employees in Tokyo. An employee-based measure has the advantage that it closely aligns with the approach taken by the Tokyo tax authority, which allocates the tax base of the Ishihara tax, based on the number of employees as well as the size of offices in Tokyo. Since we do not observe the exact formula used by the Tokyo tax authority or have access to data on office size for all banks, we calculate the allocation on the basis of employees. We manually collect employee data from banks' annual Yuho reports for the pre-treatment year 1998.[24] Our alternative measure of tax exposure is defined as the number of employees based in Tokyo to the number of domestic employees. In order to allow better comparison between estimates obtained from the employee-based versus the effective average tax rate, we multiply the employee-

[23] Around 30% of the 1776 corporates in our sample are based in Tokyo.
[24] Number of employees per location are reported on a bi-annual basis in annual Yuho reports. 1998 represents the last year in which banks reported employee numbers per prefecture before the imposition of the Ishihara tax in 2000.

based ratio with the statutory tax rate of 3%.[25] We then re-estimate our models in Equation 1 and 2 using the alternative employee-based measure of banks' tax exposure. Estimates reported in Table 8, Panel B and C confirm that the original results reported in Table 4, Panel A and B are robust to the alternative, employee-based measure of bank tax exposure.

7. Conclusion

In this paper we conduct a comprehensive investigation into how bank taxation impacts bank behaviour and how this is transmitted to corporate borrowers. To identify the impact of bank taxation, we use the so-called Ishihara tax as an instrument for variation in the taxation of bank revenues, alongside several unique datasets on banks, loans and corporates. We conduct an extensive empirical analysis at the bank, loan, and corporate level to investigate the extent to which bank taxation transmits to the real economy. Our analysis produces two major findings. First, in line with our priors, we show that an increase in bank taxation impacts on bank leverage, risk and lending. This suggests that bank taxation has a leverage incentivizing effect as well as a portfolio re-allocation effect with resultant implications for credit supply to the real economy. Second, we find that bank taxation through its effect on credit supply affects corporate financing and investment activity. Corporates that are more reliant on affected banks are unable to fully substitute a decline in bank borrowing with other sources of financing. Corporate investment activity declines in response to the tax on bank revenues. The economic magnitude of the effect of bank taxation on corporates can thus be considered as a lower bound. Given that the results presented in this paper are based on publicly traded corporates, we would expect this effect to be more pronounced for small and medium-sized unlisted corporates which (according to evidence presented in prior literature) are more affected by information asymmetries in credit markets.

Overall, the findings of this study suggest that taxes play an important role in affecting the behavior of banks. The extent to which banks transmit tax increases to customers has implications for the availability of credit. An important policy implication of our paper is that taxing banks (through its negative effects on credit supply) has potentially adverse consequences for the real economy. This highlights the risk that the bias

[25] In essence, this variable should be equivalent in size to our original tax exposure variable. Tax payment of bank i paid to the Tokyo tax authority, are defined as: $\tau_i = gross\ profit_i \times allocation\ rate_i \times statutory\ tax\ rate$. *Gross profit* is the tax base. *Allocation rate* refers to the rate applied by the Tokyo tax authority to allocate the tax base. The *statutory tax rate* is 3%.

introduced via the tax treatment of debt distorts leverage and portfolio decisions of both banks and corporates. As such our findings inform ongoing policy debates regarding how to most effectively tackle high indebtedness of banks and corporates. Consequently, policymakers engaged in designing and monitoring the effectiveness of bank tax regimes should be cognizant of the effects on bank stakeholders and the wider economy.

References

Acharya, V. & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics*, *106*(2), 349-366.

Acharya, V. V., Eisert, T., Eufinger, C., & Hirsch, C. (2018). Real effects of the sovereign debt crisis in Europe: Evidence from syndicated loans. *Review of Financial Studies*, *31*(8), 2855–2896.

Admati, A., DeMarzo, P., Hellwig, M., & Pfleiderer, P. (2018). The leverage ratchet effect, *Journal of Finance*, 73(1), 145-198.

Akiyoshi, F., & Minamihashi, N. (2014). *The effect of bilateral lending relationships on syndicated loans: Evidence from Japan.* Technical report, Centre for Finance.

Albertazzi, U. & Gambacorta, L. (2010). Bank profitability and taxation. *Journal of Banking & Finance*, 34(11), 2801–2810.

Allen, L., Chakraborty, S. & Watanabe, W. (2011). Regulatory remedies for banking crises: Lessons from Japan. *Journal of International Business Studies*, 42(7), 875–893.

Amador, J., & Nagengast, A, (2016). The effect of bank shocks on firm-level and aggregate investment, *Working Paper no. 1914*, ECB.

Amiti, M., & Weinstein, D. E. (2018). How much do idiosyncratic bank shocks affect investment? Evidence from matched bank-firm loan data. *Journal of Political Economy*, *126*(2), 525-587.

Avezum, L., Huizinga, H., & Raes, L. (2019). *The Impact of Bank Regulation on Firms' Capital Structure: Evidence from Multinationals.* SSRN 3190124.

Balduzzi, P., Brancati, E., & Schiantarelli, F. (2018). Financial markets, banks' cost of funding, and firms' decisions: Lessons from two crises. *Journal of Financial Intermediation* 36, 1–15.

Becker, B. & Ivashina, V. (2014). Cyclicality of credit supply: Firm level evidence. *Journal of Monetary Economics*, *62*, 76-93.

Berg, T. (2018). Got rejected? Real effects of no*t g*etting a loan. *Review of Financial Studies*, 31, 4912-4957.

Berger, A.N. & Black, L. (2019). Small business lending: The roles of technology and regulation from pre-crisis to crisis to recovery, in Berger, A. N., Molyneux, P., & Wilson, J. O. S. (eds.) *Oxford Handbook of Banking*, 3rd Edition. Oxford: Oxford University Press.

Berger, A. N., Molyneux, P., & Wilson, J. O. S. (2020). Banks and the real economy: An assessment of the research. *Journal of Corporate Finance*, *62*, 101513.

Berlin, M., & Loeys, J. (1988). Bond covenants and delegated monitoring. *Journal of Finance*, *43*(2), 397-412.

Berton, F., Mocetti, S., Presbitero, A. F., & Richiardi, M. (2018). Banks, firms, and jobs. *Review of Financial Studies,* 31, 2113–2156.

Bertrand, M., Duflo, E. & Mullainathan, S. (2004). How much should we trust differences-in-differences Estimates? *Quarterly Journal of Economics*, 119(1), 249–275.

Bharath, S. T., Dahiya, S., Saunders, A., & Srinivasan, A. (2011). Lending Relationships and Loan Contract Terms. *Review of Financial Studies*, 24(4),1141–1203.

Bird, R. M. (2006). Local Business Taxes. In. Bird, R. M., & Vaillancourt, F. (Ed.) *Perspectives on fiscal federalism*. (pp.225-246) Washington, DC: The World Bank

Biswas, S., Horváth, B. L., & Zhai, W. (2019). *Eliminating the tax shield through allowance for corporate equity: Cross-border credit supply effects.* SSRN 3271366.

Black, L. K., & Hazelwood, L. N. (2013). The effect of TARP on bank risk-taking. *Journal of Financial Stability*, *9*(4), 790-803.

Braggion, F., & Ongena, S. (2019). Banking sector deregulation, bank–firm relationships and corporate leverage. *Economic Journal*, 129(618), 765-789.

Bremus, F., Schmidt, K., & Tonzer, L. (2020). Interactions between bank levies and corporate taxes: How is bank leverage affected? *Journal of Banking & Finance*, 105874.

Buch, C.M., Hilberg, B. & Tonzer, L. (2016). Taxing banks: An evaluation of the German bank levy. *Journal of Banking & Finance*, 72, 52–66.

Carlson, M., Shan, H., & Warusawitharana, M. (2013). Capital ratios and bank lending: A matched bank approach. *Journal of Financial Intermediation*, *22*(4), 663–687.

Célérier, C., Kick, T., & Ongena, S. (2020). *Taxing Bank Leverage: The Effects on Bank Portfolio Allocation.* SSRN Working Paper

Cetorelli, N. (2019). Banking and Real Economic Activity, in Berger, A. N., Molyneux, P., & Wilson, J. O. S. (eds.) *Oxford Handbook of Banking*, 3rd Edition. Oxford: Oxford University Press.

Cingano, F., Manaresi, F., & Sette, E. (2016). Does credit crunch investment down? New evidence on the real effects of the bank-lending channel. *Review of Financial Studies*, *29*(10), 2737-2773.

Crouzet, N., 2018. Aggregate implications of corporate debt choices. *The Review of Economic Studies*, *85*(3), pp.1635-1682.

Datta, S., Iskandar-Datta, M., & Patel, A. (1999). Bank monitoring and the pricing of corporate public debt. *Journal of Financial Economics*, *51*(3), 435-449.

De Haas, R., & Van Horen, N. (2012). International shock transmission after the Lehman Brothers collapse: Evidence from syndicated lending. *American Economic Review*, 102(3), 231-37.

Dehejia, R. H., & Wahba, S. (2002). Propensity score-matching methods for nonexperimental causal studies. *Review of Economics and Statistics*, *84*(1), 151-161.

De Jonghe, O., Dewachter, H., Mulier, K., Ongena, S., & Schepens, G. (2019). Some Borrowers Are More Equal than Others: Bank Funding Shocks and Credit Reallocation*. Review of Finance, January 2019, 1–43.

Demsetz, R. S., & Strahan, P. E. (1997). Diversification, size, and risk at bank holding companies. *Journal of Money Credit and Banking*, 300-313.

Deng, S. E., Elyasiani, E., & Mao, C. X. (2007). Diversification and the cost of debt of bank holding companies. *Journal of Banking & Finance*, *31*(8), 2453-2473.

Denis, D. J., & Mihov, V. T. (2003). The choice among bank debt, non-bank private debt, and public debt: evidence from new corporate borrowings. *Journal of Financial Economics*, *70*(1), 3-28.

Devereux, M., Johannesen, N., & Vella, J. (2019). Can taxes tame the banks? Evidence from the European bank levies, *Economic Journal*, 129(624), 3058–3091.

Devereux, M.P., Maffini, G. & Xing, J. (2018). Corporate tax incentives and capital structure: New evidence from UK firm-level tax returns. *Journal of Banking & Finance*, *88*, 250-266.

DeWit, A. (2000). The income tax and the Tokyo bank tax. *Asian Perspectives*, 24(4), 197–216.

Fama, E. F. (1985). What's different about banks? *Journal of Monetary Economics*, *15*(1), 29-39.

Faulkender, M., & Petersen, M. A. (2006). Does the source of capital affect capital structure? *Review of Financial Studies*, *19*(1), 45-79.

Gambacorta, L., & Mistrulli, P. (2004). Does bank capital affect lending behavior. *Journal of Financial Intermediation* 13, 436–457.

Gambacorta, L., Ricotti, G., Sundaresan, S., & Wang, Z. (2017). The effects of tax on bank liability structure. *BIS Working Papers*, Number 611.

Gertner, R., & Scharfstein, D. (1991). A theory of workouts and the effects of reorganization law. *Journal of Finance*, *46*(4), 1189-1222.

Giannetti, M., & Simonov, A. (2013). On the real effects of bank bailouts: Micro evidence from Japan. *American Economic Journal: Macroeconomics*, *5*(1), 135-67.

Goel, M. & Zemel, M., 2018. Switching to bonds when loans are scarce: Evidence from four US crises. *Journal of Corporate Finance*, *52*, pp.1-27.

Güler, O., Mariathasan, M., Mulier, K., & Okatan, N. G. (2021). The real effects of banks' corporate credit supply: A literature review. *Economic Inquiry*, 1-34.

Graham, J. R., & Mills, L. F. (2008). Using tax return data to simulate corporate marginal tax rates. *Journal of Accounting and Economics*, 46(2-3), 366-388.

Hagendorff, J., & Vallascas, F., (2011). CEO pay incentives and risk-taking: Evidence from bank acquisitions. *Journal of Corporate Finance* 17(4), 1078-1095.

Hanlon, M. & Heitzman, S. (2010). A review of tax research. *Journal of Accounting and Economics*, *50*(2-3), 127-178.

Heider, F., & Ljungqvist, A. (2015). As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes. *Journal of Financial Economics,* 118(3), 684-712.

Hemmelgarn, T., & Teichmann, D. (2014). Tax reforms and the capital structure of banks. *International Tax and Public Finance*, *21*(4), 645-693.

Holmstrom, B., & Tirole, J. (1997). Financial intermediation, loanable funds, and the real sector. *Quarterly Journal of Economics*, *112*(3), 663-691.

Horváth, B. L. (2020). The interaction of bank regulation and taxation. *Journal of Corporate Finance*, 101629.

Hoshi, T. & Kashyap, A.K. (2000). *The Japanese Banking Crisis: Where Did It Come From And How Will It End?* In B. S. Bernanke & J. J. Rotemberg, eds. Macroeconomics Annual 1999. Boston, MA: MIT Press, 129–212.

Imbens, G. W., & Rubin, D. B. (2015). *Causal Inference in Statistics, Social, and Biomedical Sciences*. Cambridge University Press.

Ishi, H. (2001). *The Japanese Tax System*, Oxford: Oxford University Press.

Ito, T. & Patrick, H. (2005). Problems and prescriptions for the Japanese economy: An Overview. In H. Ito, H. Patrick, & D. E. Weinstein, eds. *Reviving Japan's Economy: Problems and Prescriptions*. Cambridge, MA: MIT Press, 1–37.

Keen, M., & de Mooij, R. A. (2016). Debt, taxes, and banks. *Journal of Money Credit and Banking*, *48*(1), 5–33.

Kim, D., & Santomero, A. M. (1988). Risk in banking and capital regulation. *Journal of Finance*, 43(5), 1219-1233.

Khwaja, A. I., & Mian, A. (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, *98*(4), 1413-42.

Koehn, M., & Santomero, A. M. (1980). Regulation of bank capital and portfolio risk. *Journal of Finance*, 35(5), 1235-1244.

Leary, M. T. (2009). Bank loan supply, lender choice, and corporate capital structure. *Journal of Finance*, *64*(3), 1143-1185.

Lemmon, M., & Roberts, M. R. (2010). The response of corporate financing and investment to changes in the supply of credit. *Journal of Financial and Quantitative Analysis*, 555-587.

Martin-Flores, J., & Moussu, C. (2019). Is bank capital sensitive to a tax allowance on marginal equity? *European Financial Management,* 25(2), 325–357.

Merton, R.C. (1974). On the pricing of corporate debt: The risk structure of interest rates*. Journal of Finance* 29, 449-470.

Mester, L. J., Nakamura, L. I., & Renault, M. (2007). Transactions accounts and loan monitoring. *Review of Financial Studies*, 20(3), 529-556.

Millidonis, A., & Stathopoulos, K. (2011). Do U.S. insurance firms offer the "wrong" incentives to their executives? *Journal of Risk and Insurance* 78(3), 643-672.

Milonas, K. (2016). Bank taxes, leverage, and risk. *Journal of Financial Services Research*, *54*(2), 145-177.

Mukherjee A., Singh M. & Zaldokas A. (2017). Do corporate taxes hinder innovation? *Journal of Financial Economics*, 124(1), 195-221.

Peek, J. & Rosengren, E.S. (1997). The international transmission of financial shocks: The case of Japan, A*merican Economic Review*, 87(4), 495-505.

Peek, J. & Rosengren, E.S. (2000). Collateral damage: Effects of the Japanese banking crisis on real activity in the United States. *American Economic Review*, 90(1), 30–45.

Rice, T. & Strahan, P.E. (2010). Does credit competition affect small‐firm finance? *Journal of Finance*, 65(3), 861-889.

Schandlbauer, A. (2017). How do financial institutions react to a tax increase?. *Journal of Financial Intermediation*, 30, 86-106.

Schepens, G. (2016). Taxes and bank capital structure. *Journal of Financial Economics* 120(3), 585–600.

Siemer, M. (2019). Employment effects of financial constraints during the Great Recession. *Review of Economics and Statistics,* 101, 16–29.

Sufi, A. (2009). Bank lines of credit in corporate finance: An empirical analysis. *Review of Financial Studies*, *22*(3), 1057-1088.

Sundaresan, S., & Z. Wang, (2014). Bank Liability Structure, *Working paper*, Columbia University and Indiana University.

Tang, T. T. (2009). Information asymmetry and firms' credit market access: Evidence from Moody's credit rating format refinement. *Journal of Financial Economics*, *93*(2), 325-351.

Uchida, H. & Udell, G.F. (2019). Banking In Japan. In A. N. Berger, P. Molyneux, & J. O. S. Wilson, eds. *Oxford Handbook of Banking* (3rd ed.). Oxford: Oxford University Press, 873–912.

Utrero-González, N. (2007). Banking regulation, institutional framework and capital structure: International evidence from industry data. *Quarterly Review of Economics and Finance*, *47*(4), 481-506.

Vassalou, M., & Xing, Y. (2004). Default risk in equity returns. *Journal of Finance* 59, 831-868.

Figures and tables

Figure 1 | Average effective tax rate of treated and control banks from 1998 to 2003

This figure shows the average effective tax rate of banks in the treated and control group. The treatment period comprises year 2000 and 2001. The effective tax rate is calculated as the share of cash taxes paid to income before taxes.

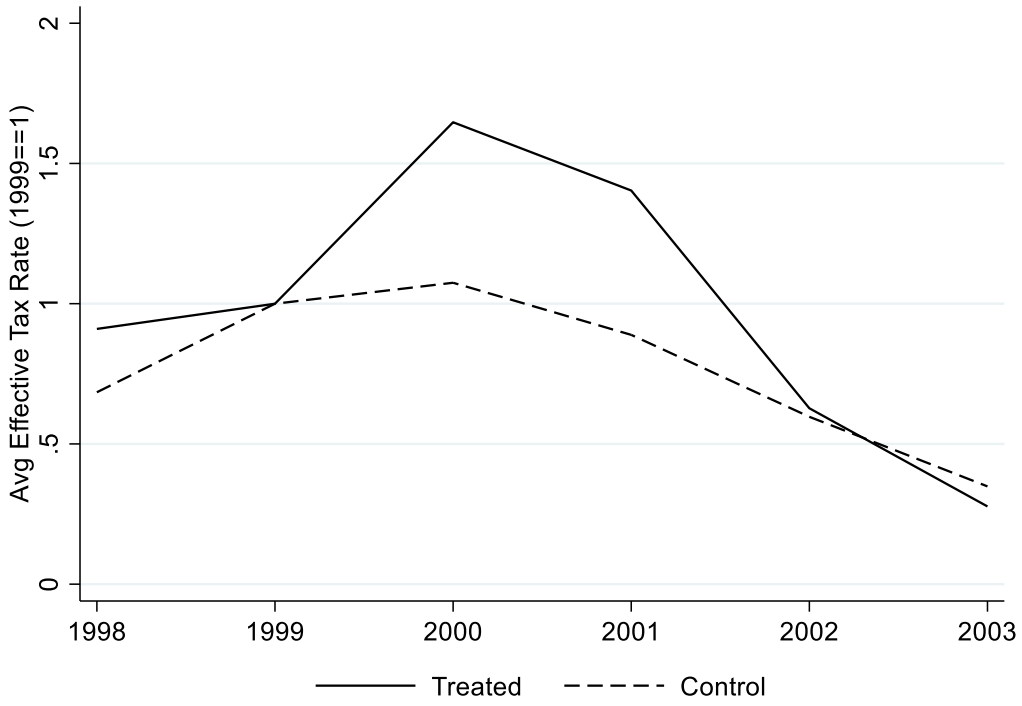

Figure 2 | Evolution of bank lending, risk and leverage from 1996 to 2002

This figure plots the evolution of bank-level outcome variables for both banks in the treated and banks in the control group from 1996 to 2002. The dashed vertical line in each panel mark 1999, the year immediately before the Ishihara tax. The dashed lines (counterfactual) indicates the counterfactual provided by the control units. Panel A depicts the mean of loans to total assets, Panel B the mean of risk-weighted assets to total assets, and Panel C the mean of total liabilities to total assets

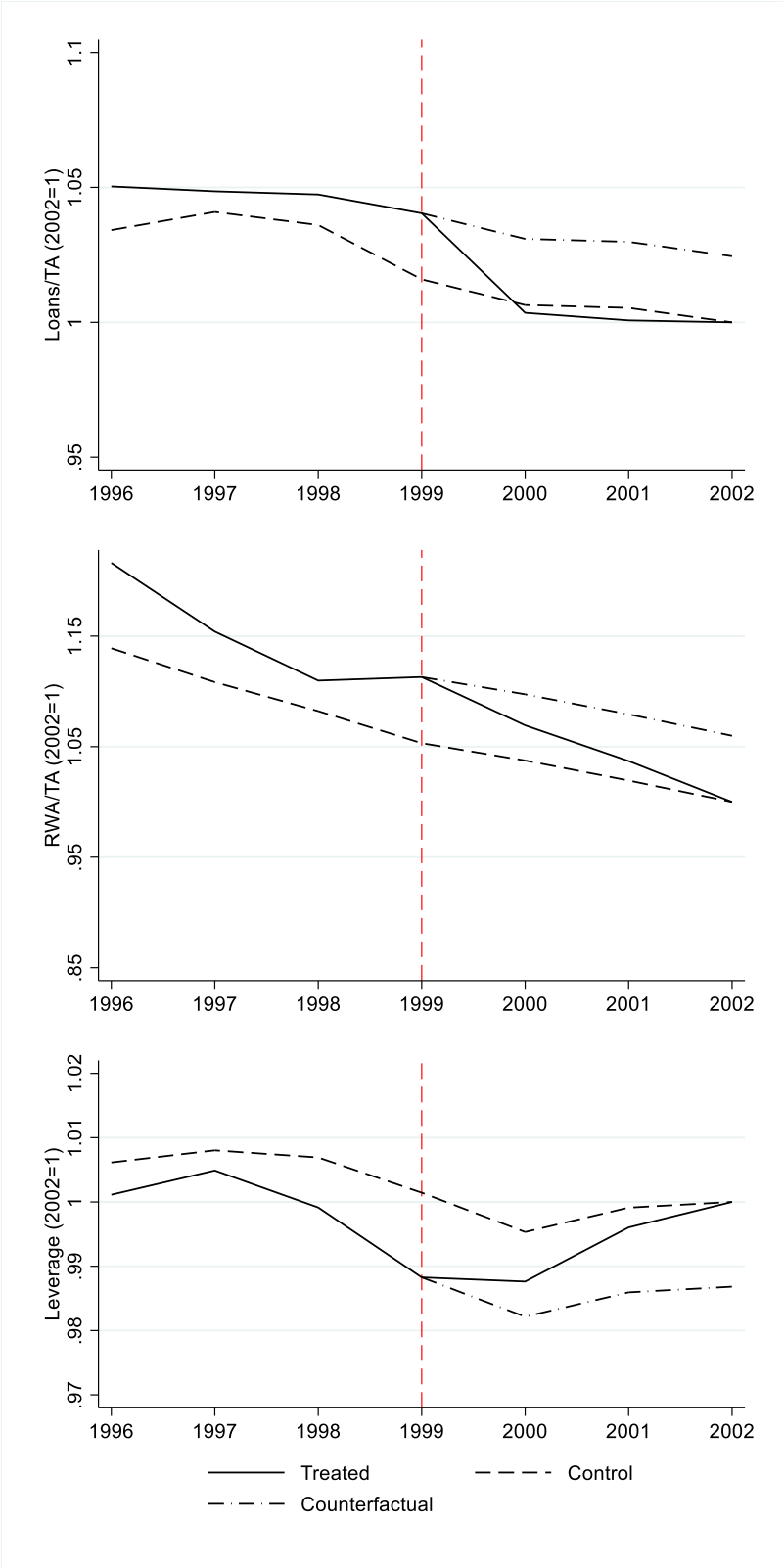

Figure 3 | Bank tax exposure and business activity in Tokyo

This figure plots the relation between our measures of banks' exposure to the Ishihara tax and their business activity in Tokyo. Tax exposure is calculated as a bank's tax amount paid (to the Tokyo Government) divided by its gross income (the tax base of the Ishihara tax). Business activity is calculated as the share of Tokyo-based employees relative to total employees.

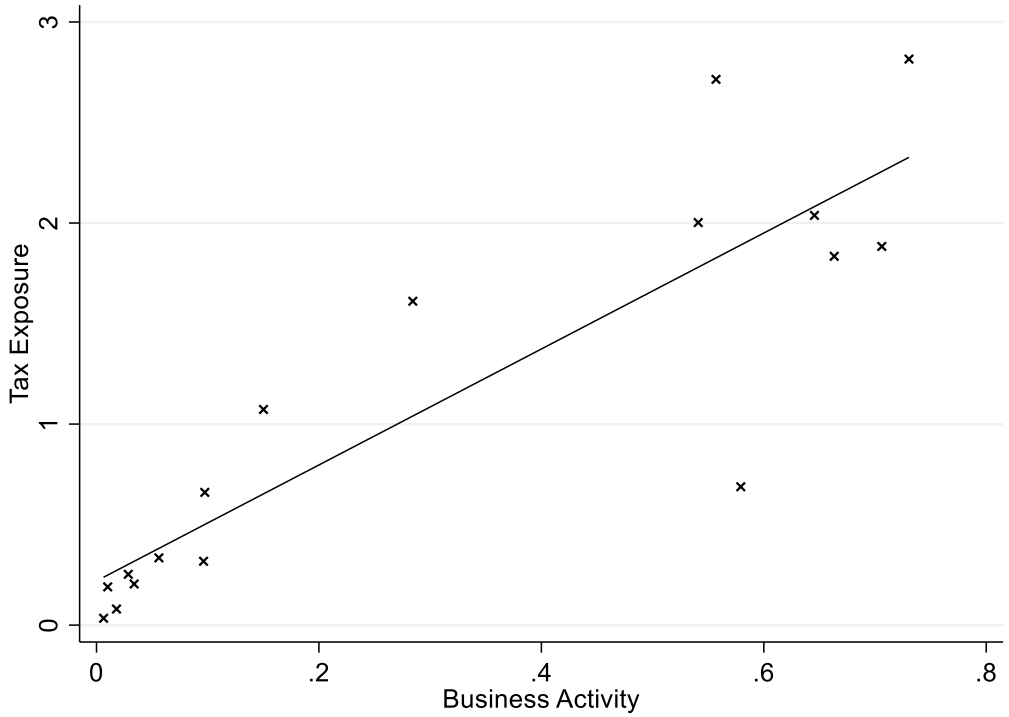

Figure 4 | Evolution of corporate borrower debt

This figure plots the evolution of corporate-level bank debt, commercial paper, bonds and total debt for corporate borrowers in the treated and control group from 1998 to 2002. The dashed vertical line in each panel mark 1999, the year immediately before the Ishihara bank tax. The dashed lines (counterfactual) indicates the counterfactual provided by the control units. Panel A depicts the mean of bank debt. Panel B depicts the mean of commercial paper. Panel C depicts the mean of bonds. Panel D depicts the mean of total debt.

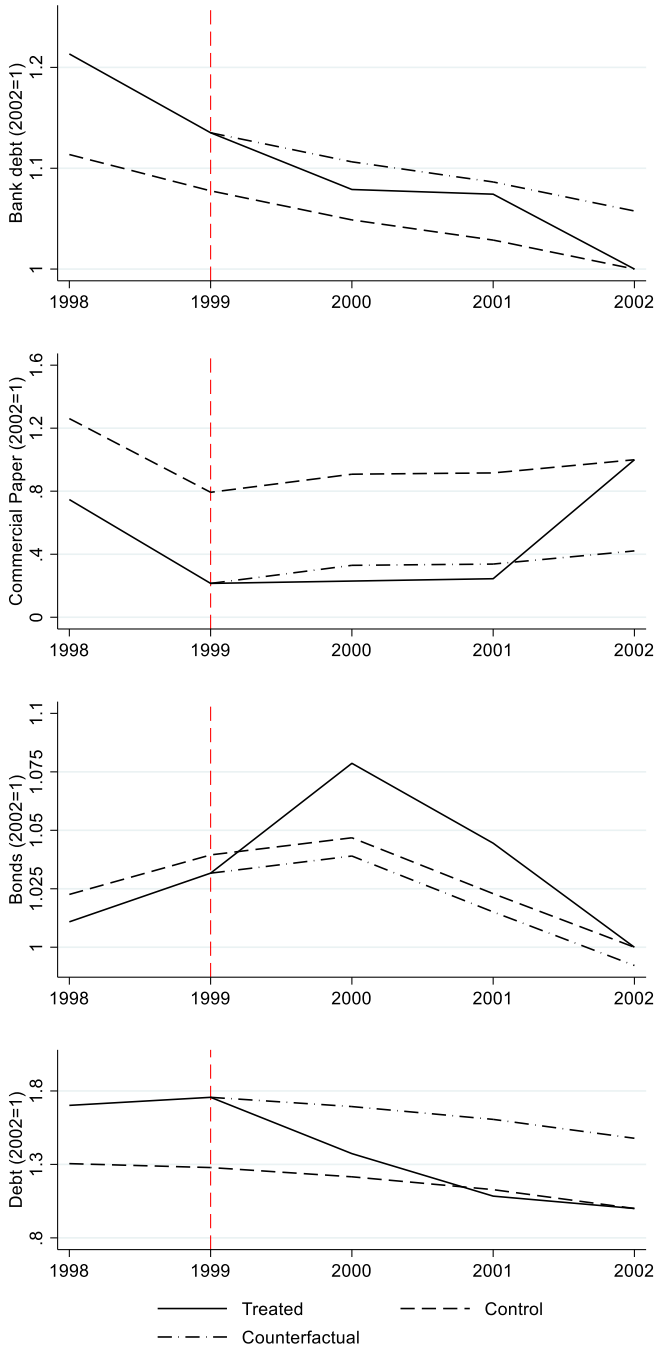

Table 1 | Timeline of events

This table lists the events associated with the imposition and the removal of the Ishihara tax.

Date	Event
February 7, 2000	Ishihara announces plan to levy a special bank tax, selects banks for tax treatment
March 23, 2000	Tokyo Assembly of Public Finance approves the Ishihara tax
April 1, 2000	Ishihara tax adopted
October 18, 2000	Lawsuit filed against Tokyo Government
July 7, 2001	Tokyo Government collects tax revenue*
March 26, 2002	District Court declares bank tax to be void
March 29, 2002	Tokyo Government files appeal with the Tokyo High Court
January 30, 2003	Supreme Court rejects appeal by Tokyo Government and rules against the Ishihara tax

Sources: Meiji-Gakuin (2008), The Japan Times, Ministry of Finance (Japan)

The Japanese taxation system generally delays the recognition of income for tax purposes until the income has been realized. Banks affected by the Ishihara tax filed tax returns at the end of fiscal year 2000 (fiscal year 2000 = 1st April 2000 - 30th March 2001). Tax payments were due by the end of the third month after filing.

Table 2 | Variable definitions

This table reports definitions for all variables used in the paper. Variables are grouped by focus of analysis: bank, loan, corporate, and bond level.

Bank level	
BEX_i	Bank i's exposure to the bank tax: effective tax rate calculated as tax payments made to Ishihara tax to gross profit (tax base of the Ishihara tax)
Dependent variables	
Loans/total assets	Loans to total assets
RWA/total assets	Risk-weighted assets to total assets
Leverage	Total liabilities to total assets
log Corporate loans	Natural logarithm of corporate loans
log Retail loans	Natural logarithm of retail loans
log Assets	Natural logarithm of total assets
Pre-treatment covariates	
Leverage	Liabilities to total assets
Size	Natural logarithm of total assets
Capital	Equity to total assets
Net interest income/ revenue	Net interest income to revenue
Deposit funding	Deposits to total assets
Return on assets (ROA)	Return to total assets
Loan risk	Loan loss provision to total loans
Liquidity	Cash to total assets
Capital injection	A dummy equal to one if bank received capital injection in FY1998, and zero otherwise
Merger	A dummy equal to one for banks with M&A activity, and zero otherwise
Loan level	
Credit	Natural logarithm of credit amount granted with maturity >1 year
Large decrease in credit	A dummy if $Credit$ is in the lowest quartile of the distribution, and zero otherwise
Corporate level	
CEX_j	Corporate j's exposure to the bank tax (see Section 5.1 for a detailed description of the measure)
CEX_j^D	A dummy equal to one for corporates with above median exposure to the bank tax (CEX_j)
Dependent variables	
Growth of bank debt	Percentage change in debt borrowed from banks
Growth of commercial paper	Percentage change in commercial paper
Growth of bond debt	Percentage change in bond debt
Growth of total debt	Percentage change in total borrowing
Investment rate	Net investment is defined as the sum of (property, plant and equipment, inventories, advertising expenditure, research and development expenses) plus depreciation. Net investment is normalised by pre-treatment total assets.
Growth in number of employees	Percentage change in number of employees
Pre-treatment covariates	
Leverage	Total liabilities to total assets
Liquidity	Current assets to total assets
Size	Natural logarithm of total assets
ROA	Return on assets
Sales Growth	Growth of sales in %
Tobin's Q	Market value to book value of total assets
Bond level	
Spread-to-benchmark	Spread of the yield of a corporate bond relative to that of a government security of comparable maturity
Maturity	Natural logarithm of bond maturity in days
Issued amount	Natural logarithm of issued bond amount

Table 3 | Summary statistics

This table provides summary statistics for all variables employed in the paper. Panel A provides summary statistics for the variables used in the bank-level analysis for the full sample of 123 banks; Panel B contains summary statistics for the variables used in the loan-level analysis; Panel C provides summary statistics for the variables used in the corporate-level analysis; and Panel D tabulates summary statistics for the variables used in the bond-level analysis.

Variable	Obs	Mean	Std. Dev.	Min	Max
PANEL A					
Bank level					
BEX_i (%)	123	0.151	0.513	0.000	2.816
Loans/total assets	123	0.685	0.066	0.472	0.832
RWA/total assets	123	0.577	0.067	0.413	0.726
Leverage	123	0.954	0.011	0.928	0.979
log Corporate loans	123	13.607	1.034	11.869	16.226
log Retail loans	120	12.700	0.975	11.114	15.378
log Assets	120	14.519	1.217	12.134	18.168
Size	123	14.501	1.209	12.087	18.184
Capital	123	0.041	0.010	0.013	0.067
Net interest income/ revenue	123	0.569	0.123	0.199	0.808
Deposit funding	123	0.870	0.079	0.535	0.943
ROA	123	-0.001	0.003	-0.015	0.004
Loan risk	123	0.010	0.006	0.001	0.031
Liquidity	123	0.037	0.017	0.009	0.097
Capital Injection	123	0.041	0.198	0	1
Merger	123	0.203	0.404	0	1
PANEL B					
Loan level					
Credit	5,036	6.096	1.342	3.555	8.553
Large decrease in credit	5,036	0.346	0.476	0	1
PANEL C					
Corporate level					
CEX_j^D	1,776	0.499	0.500	0	1
Growth of bank debt	1,776	0.007	0.465	-1.0000	9.626
Growth of commercial paper	1,776	0.028	0.346	-0.496	10.532
Growth of bond debt	1,776	0.024	0.549	-0.765	16.667
Growth of total debt	1,774	0.006	0.160	-0.594	2.945
Investment rate	1,775	0.006	0.065	-0.473	1.165
Growth in number of employees	1,771	-0.038	0.209	-3.413	1.486
Pre-treatment covariates					
Leverage	1,776	0.639	0.180	0.122	1.329
Liquidity	1,776	0.546	0.166	0.065	0.957
Size	1,776	10.671	1.298	8.724	13.443
ROA	1,776	-0.001	0.049	-0.679	0.351
Sales Growth	1,776	0.025	0.061	0.000	0.763
Tobin's Q	1,776	5.124	11.634	0.144	309.849
Spread-to-benchmark	90	50.275	37.903	5.5	246.667
Maturity (log)	90	7.653	0.339	7.009	8.898
Issued amount (log)	90	4.633	0.547	3.464	6.618

Table 4 | Baseline regression results

Panel A of this table reports the results of ordinary least squares regressions using a sample of 123 banks spanning the period April 1997 to March 2002. The dependent variables are change in loans to total assets (Column 1), risk-weighted assets to total assets (Column 2), debt to total assets (Column 3), natural logarithm of total assets (Column 4), natural logarithm of corporate loans (Column 5), natural logarithm of retail loans (Column 6). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 1) using first-differenced data. The independent variable of interest is *TAX*. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Robust standard errors clustered at the bank level are reported in parentheses. Panel B of this table reports the results of ordinary least squares regressions using a sample of 5,036 bank-corporate combinations. The dependent variables are percentage growth in credit (Column 1, 3, 5) and a dummy variable that equals one if the growth in credit is in the lowest quartile and zero otherwise (Column 2, 4, 6). Column 3 and 4 report results for the estimated effect of tax on credit supply conditional on borrower size. Column 5 and 6 report results for the estimated effect of tax on credit supply conditional on borrower risk. We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 2) using first-differenced data and control for corporate credit demand using corporate fixed effects. The independent variable of interest is *TAX*. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Robust standard errors clustered at the bank-corporate level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

Panel A *Bank level*	(1) ΔLoans/TA	(2) ΔRWA/TA	(3) ΔLeverage	(4) ΔAssets	(5) ΔCorp. loans	(6) ΔRetail loans
TAX_i	-0.0219*** (0.0080)	-0.0223*** (0.0067)	0.0029** (0.0014)	-0.0040 (0.0690)	-0.5725** (0.2291)	-0.3523*** (0.0812)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
N	123	122	123	123	123	120
R^2	0.3515	0.3778	0.1180	0.1706	0.3321	0.3221

Panel B *Loan level*	(1) ΔCredit	(2) Large decrease in credit	(3) ΔCredit	(4) Large decrease in credit	(5) ΔCredit	(6) Large decrease in credit
TAX_i	-0.0370** (0.0156)	0.0298*** (0.0110)	-0.0523*** (0.0172)	0.0402*** (0.0138)	-0.0282** (0.0137)	0.0164 (0.0134)
$size_j^D$			-0.4419 (0.3059)	0.2701 (0.1635)		
$TAX_i \times size_j^D$			0.0335* (0.0194)	-0.0224* (0.0123)		
$risk_j^D$					-0.0973 (0.1497)	-0.0574 (0.0932)
$TAX_i \times risk_j^D$					-0.0181 (0.0167)	0.0278** (0.0138)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Corporate FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5030	5036	5030	5036	5030	5036
R^2	0.5590	0.5326	0.5598	0.5332	0.5592	0.5332

Table 5 | Tax repeal

Panel A of this table reports the results of ordinary least squares regressions using a sample of 115 banks spanning the period April 2001 to March 2003 (with April 2001 to March 2002 as the pre-treatment period, and April 2002 to March 2003 as the treatment period). The dependent variables are change in loans to total assets (Column 1), risk-weighted assets to total assets (Column 2), debt to total assets (Column 3), natural logarithm of total assets (Column 4), natural logarithm of corporate loans (Column 5), natural logarithm of retail loans (Column 6). We time-average each measure in the two years prior to the tax and the two years following the introduction of the tax. We run the regression (Eq. 1) using first-differenced data. The independent variable of interest is TAX^{repeal}. Bank controls are size, net interest income as a share of revenue, deposit funding, capital, ROA, loan risk, liquidity, capital injection, merger. Robust standard errors clustered at the bank level are reported in parentheses. Panel B of this table reports the results of ordinary least squares regressions using a sample of 115 banks spanning the period April 2001 to March 2003 (with April 2001 to March 2002 as the pre-treatment period, and April 2002 to March 2003 as the treatment period). The dependent variables are change in deposits to total assets (Column 1), non-deposits to total assets (Colum 2). We time-average each measure in the two years prior to the tax and the two years following the introduction of the tax. We run the regression (Eq. 1) using first-differenced data. The independent variable of interest is TAX^{repeal}. Bank controls are size, net interest income as a share of revenue, deposit funding, capital, ROA, loan risk, liquidity, capital injection, merger. Robust standard errors clustered at the bank level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

PANEL A *Bank level*	(1) ΔLoans/TA	(2) ΔRWA/TA	(3) ΔLeverage	(4) ΔAssets	(5) ΔCorp. loans	(6) ΔRetail loans
TAX_i^{repeal}	0.0435*** (0.0103)	0.0210*** (0.0064)	0.0041 (0.0039)	-0.0010 (0.0352)	-0.0198 (0.0173)	0.1824** (0.0789)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
N	115	115	115	115	115	113
R^2	0.2711	0.2641	0.0780	0.1102	0.0979	0.3686

PANEL B *Bank level*	(1) ΔDeposits/TA	(2) ΔNon-deposits/TA
TAX_i^{repeal}	0.0411 (0.0248)	-0.0601** (0.0268)
Bank controls	Yes	Yes
N	115	115
R^2	0.3031	0.3515

Table 6 | Real effects of the Ishihara tax

Panel A of this table reports the results of ordinary least squares regressions using a sample of 1776 corporates. The dependent variables are growth of bank debt (Column 1), commercial paper (Column 2), bond debt (Column 3), total debt (Column 4). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 3) using first-differenced data. The independent variable of interest is *CTAX*, a measure of corporate exposure to the Ishihara tax. Corporate controls are leverage, liquidity, size, ROA, sales growth, and Tobin's Q. Estimated corporate fixed effects, $\hat{a}$, and a set of prefecture-industry fixed effects are included. Panel B of this table reports results of ordinary least squares regression (Eq.3) using a sample of 90 corporates. The dependent variable *Spread-to-benchmark* is the premium at-issue yield spread of the debt security over the yield of a Japanese government security of comparable maturity, averaged at the corporate level. The independent variable of interest is *CTAX.* Bond-specific control variables averaged at the corporate level include maturity and issued bond amount. Industry fixed effects are included. Robust standard errors clustered at the corporate level are reported in parentheses. Panel C of this table reports the results of ordinary least squares regressions using a sample of 1776 corporates. The dependent variables are growth of employment (Column 1), investment rate (Column 2). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 3) using first-differenced data. The independent variable of interest is *CTAX*, a measure of corporate exposure to the Ishihara tax. Corporate controls include leverage, liquidity, size, ROA, sales growth, and Tobin's Q. Estimated corporate fixed effects, $\hat{a}$, and a set of prefecture-industry fixed effects are included. Panel D of this table reports the results of ordinary least squares regressions using a sample of 1776 corporates. The dependent variables are bank debt (Column 1), commercial paper (Column 2), bond debt (Column 3), total debt (Column 4), employment (Column 5), investment rate (Column 6). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 3) using first-differenced data. The independent variable of interest is $CTAX \times size$. Corporate controls include size dummy, leverage, liquidity, size, ROA, sales growth, and Tobin's Q. Robust standard errors clustered at the corporate level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

Panel A: Debt Choice *Corporate level*	(1) Δ Bank Debt	(2) Δ Commercial paper	(3) Δ Bonds	(4) Δ Total Debt
$CTAX_j$	-0.1083*** (0.0410)	0.0002 (0.0149)	0.1625** (0.0825)	-0.0378** (0.0158)
Corp. controls	Yes	Yes	Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Prefect.-industry FE	Yes	Yes	Yes	Yes
Credit demand ($\hat{a}_j$)	Yes	Yes	Yes	Yes
N	1776	1776	1776	1775
R^2	0.3609	0.1483	0.0914	0.2993

Panel B: Bond pricing *Corporate level*	(1) Δ *Spread*-to-benchmark
$CTAX_j$	0.3640** (0.1679)
Maturity	-0.4225 (0.2978)
Bond amount	0.0372 (0.1554)
Corp. controls	Yes
Industry FE	Yes
N	90
R^2	0.4906

Panel C: Investment *Corporate level*	(1) Δ Employment	(2) Δ Investment rate
$CTAX_j$	-0.0366 (0.0369)	-0.0193** (0.0079)
Corp. controls	Yes	Yes
Prefecture FE	Yes	Yes
Industry FE	Yes	Yes
Prefect.-industry FE	Yes	Yes
Credit demand ($\hat{a}_j$)	Yes	Yes
N	1582	1776
R^2	0.3027	0.3570

Panel D: Size *Corporate level*	(1) Δ Bank Debt	(2) Δ Commercial paper	(3) Δ Bonds	(4) Δ Total Debt	(5) Δ Employ.	(6) Δ Invest.
$CTAX_j$	-0.1950*** (0.0677)	-0.0714 (0.0521)	0.3766*** (0.1296)	-0.0728** (0.0302)	-0.0766 (0.0479)	-0.0366*** (0.0132)
$CTAX_j \times size_j^D$	0.1333* (0.0750)	0.0819 (0.0562)	-0.2460* (0.1367)	0.0598* (0.0331)	0.0525 (0.0552)	0.0236* (0.0133)
Corp. controls	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1776	1776	1776	1775	1582	1776

R^2	0.0796	0.0941	0.0431	0.0954	0.0812	0.1132

Table 7 | Robustness I

Panel A of this table reports the results of ordinary least squares regressions using a sample of 123 banks spanning the period from 1996 to 1999 with 1998-1999 as the placebo treatment period. The dependent variables are change in loans to total assets (Column 1), risk-weighted assets to total assets (Column 2), debt to total assets (Column 3), natural logarithm of total assets (Column 4), natural logarithm of corporate loans (Column 5), natural logarithm of retail loans (Column 6). We run the regression (Eq. 1) using first-differenced data. The independent variable of interest is *Placebo TAX*. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy. Robust standard errors clustered at the bank level are reported in parentheses. Panel B of this table reports results of ordinary least squares regressions using a sample of 1776 corporates spanning the period from 1998 to 1999 with 1999 as the placebo treatment period. The dependent variables are growth of bank debt (Column 1), commercial paper (Column 2), bond debt (Column 3), total debt (Column 4. We run the regression (Eq. 3) using first-differenced data. The independent variable of interest is $Placebo\ CTAX$. Corporate controls are leverage, liquidity, size, ROA, sales growth, and Tobin's Q. A set of prefecture-industry fixed effects are included. Panel C of this table reports the results of ordinary least square regressions using a sample of 253 bank-corp.-cluster pairs. The dependent variables are change in the loan amount (Column 1) and change in the spread (Column 2) measured at the bank-corp.-cluster level. Column 3 and 4 restrict the sample to banks acting as lead arrangers. We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 4) using first-differenced data. The independent variable of interest is *TAX*, the effective tax rate of bank *i*, calculated as tax payments made (related to Ishihara tax) as a share of gross profit (the tax base of the Ishihara tax). Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Robust standard errors clustered at the bank level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

Panel A: Parallel Trends *Bank level*	(1) ΔLoans/TA	(2) ΔRWA/TA	(3) ΔLeverage
$Placebo\ TAX_i$	-0.0036 (0.0177)	0.6149 (0.8099)	-0.0051 (0.0034)
Covariates	Yes	Yes	Yes
Capital Inj. Dummy			
N	123	69	123
R^2	0.1768	0.0452	0.3321

Panel B: Parallel Trends *Corporate level*	(1) Δ Bank Debt	(2) Δ Commercial paper	(3) Δ Bonds	(4) Δ Total Debt	(5) Δ Employ.	(6) Δ Invest.
$Placebo\ CTAX_j$	-0.0675 (0.0435)	0.0123 (0.0076)	0.1163 (0.1141)	-0.0272 (0.0175)	0.0436 (0.0406)	-0.0074 (0.0105)
Corp. controls	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Prefect.-industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1771	1774	1774	1771	1541	1773
R^2	0.4413	0.0056	0.1018	0.2915	0.3046	0.3369

Panel C: Pricing *Loan level*	(1) Δ Loan amount	(2) Δ Spread	(3) Δ Loan amount	(4) Δ Spread
TAX_i	-0.1274* (0.0593)	0.1398*** (0.0281)	-0.3205** (0.0946)	0.2759*** (0.0092)
Bank controls	Yes	Yes	Yes	Yes
Corp.-Cluster FE	Yes	Yes	Yes	Yes
N	253	253	107	107
R^2	0.8070	0.8193	0.8334	0.7954

Table 8 | Robustness II

Panel A of this table reports results of ordinary least squares regressions. The dependent variables are percentage growth in credit (Column 1, 3) and a dummy variable that is one 1 if the growth in credit is in the lowest quartile and zero otherwise (Column 2, 4). Column 1 and 2 report results for the estimated effect of tax on credit supply for a sample of 3035 bank-corporate combinations excluding Tokyo-based corporates. Robust standard errors clustered at the bank-corporate level are reported in parentheses. Column 3 and 4 report results for a sample of 3091 local industry clusters. Robust standard errors clustered at the bank-local-industry-cluster level are reported in parentheses. We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 2) using first-differenced data and control for corporate credit demand using corporate fixed effects. The independent variable of interest is *TAX*. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Panel B of this table reports the results of ordinary least squares regressions using a sample of 123 banks spanning the period April 1997 to March 2002. The dependent variables are change in loans to total assets (Column 1), risk-weighted assets to total assets (Column 2), debt to total assets (Column 3), natural logarithm of total assets (Column 4), natural logarithm of corporate loans (Column 5), natural logarithm of retail loans (Column 6). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 1) using first-differenced data. The independent variable of interest is TAX^{emp} defined as the number of Tokyo-based employees relative to the total number of domestic employees multiplied by the statutory tax rate of 3%. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Robust standard errors clustered at the bank level are reported in parentheses. Panel C of this table reports the results of ordinary least squares regressions using a sample of 5,036 bank-corporate combinations. The dependent variables are percentage growth in credit (Column 1, 3, 5) and a dummy variable that equals one if the growth in credit is in the lowest quartile and zero otherwise (Column 2, 4, 6). Column 3 and 4 report results for the estimated effect of tax on credit supply conditional on borrower size. Column 5 and 6 report results for the estimated effect of tax on credit supply conditional on borrower risk. We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 2) using first-differenced data and control for corporate credit demand using corporate fixed effects. The independent variable of interest is TAX^{emp} defined as the number of Tokyo-based employees relative to the total number of domestic employees multiplied by the statutory tax rate of 3%. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Robust standard errors clustered at the bank-corporate level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

Panel A *Loan level*	(1) ΔCredit	(2) Large decrease in credit	(3) ΔCredit	(4) Large decrease in credit
TAX_i	-0.0595**	0.0492***	-0.0515*	0.0533***
	(0.0284)	(0.0169)	(0.0291)	(0.0153)
Bank controls	Yes	Yes	Yes	Yes
Corporate FE	Yes	Yes	-	-
Corp.-Cluster FE	-	-	Yes	Yes
N	2740	3035	3090	3091
R^2	0.5536	0.5074	0.2995	0.3260

Panel B *Bank level*	(1) ΔLoans/TA	(2) ΔRWA/TA	(3) ΔLeverage	(4) ΔAssets	(5) ΔCorp. loans	(6) ΔRetail loans
TAX_i^{emp}	-0.0257***	-0.0220***	0.0033**	0.0352	-0.5721**	-0.3340***
	(0.0084)	(0.0074)	(0.0014)	(0.0236)	(0.2448)	(0.0927)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
N	123	122	123	123	123	120
R^2	0.2925	0.3211	0.0984	0.0220	0.3378	0.3069

Panel C *Loan level*	(1) ΔCredit	(2) Large decrease in credit	(3) ΔCredit	(4) Large decrease in credit	(5) ΔCredit	(6) Large decrease in credit
TAX_i^{emp}	-0.0384**	0.0252***	-0.0566***	0.0366***	-0.0258*	0.0086
	(0.0171)	(0.0094)	(0.0196)	(0.0128)	(0.0153)	(0.0112)
$TAX_i^{emp} \times size_j^D$			0.0385**	-0.0238*		
			(0.0191)	(0.0135)		
$TAX_i^{emp} \times risk_j^D$					-0.0268	0.0354**
					(0.0171)	(0.0135)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Corporate FE	Yes	Yes	Yes	Yes	Yes	Yes
N	5030	5036	5030	5036	5030	5036

R^2	0.5591	0.5325	0.5599	0.5331	0.5594	0.5334

Appendix

In this section, we provide additional robustness tests.

A.1 Matched samples

Bank level:

To better control for variation in local demand conditions that potentially bias the reported tax effect on banks, we perform a nearest neighbour matching procedure. To construct the matched set of banks, we first use locational criteria in order to ensure that banks face the same external environment. Specifically, we restrict the sample of banks to those with headquarters (HQs) in proximity of Tokyo (we include all banks with HQs in the Kanto, Kansai and Chubu region). Subject to locational restrictions, we then select neighbouring banks that have similar business model characteristics. We match on bank control variables as reported in Table 3. We use the nearest neighbour matching procedure with replacement and take the closest two neighbours for each treated financial institution. This results in a sample of 17 treated and 19 control banks. Taking control observations as matches for more than one treated financial institutions has been shown to achieve better covariate balance and reduction in bias (Dehejia and Wahba, 2002). We then use the matched bank sample to re-estimate our model in Equation 1. Results reported in Table A1 suggest that our original results (as reported in Table 4 Panel A) are robust to using a matched sample of banks.

Corporate level:

To alleviate concerns that our corporate-level results are driven by corporate characteristics other than the corporate exposure to the bank tax via their existing banking relationships, we match corporates from the treatment group with similar corporates from the control group. We match on pre-treatment levels of the corporate control variables (comprising: corporate size, leverage, liquidity, return on assets, sales growth, and Tobin's Q) as well as industry and location. We estimate the propensity score with a Probit model conditioning on all the covariates and use the nearest-neighbor matching algorithm which pairs each treated corporate with the closest corporate in the control group. We set the number of neighbors to two and allow observations in the control group to be used in several matches. Our matched sample contains 1,412 corporates (868 treated and 563 control corporates) from 69 industries. We estimate Equation 3 using our corporate level dependent variables. The results are reported in Table A1, Panel B. The coefficients support the robustness of our baseline regression results reported in Table 6, Panel A and C.

Table A1 | Matched samples

Panel A of this table reports the results of ordinary least squares regressions using a sample of banks matched using nearest neighbour with replacement criteria (NN=2). The dependent variables are change in loans to total assets (Column 1), risk-weighted assets to total assets (Column 2), debt to total assets (Column 3), natural logarithm of total assets (Column 4), natural logarithm of corporate loans (Column 5), natural logarithm of retail loans (Column 6). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 1) using first-differenced data. The independent variable of interest is *TAX*. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity, capital injection dummy, merger dummy. Robust standard errors clustered at the bank level are reported in parentheses. Panel B of this table reports the results of ordinary least square regressions using a sample of 1417 corporates matched using nearest neighbour with replacement criteria (NN=2). The dependent variables are growth of bank debt (Column 1), commercial paper (Column 2), bond debt (Column 3), total debt (Column 4), employment (Column 5), investment rate (Column 6). We average each dependent variable in the two years prior to, and following the introduction of the tax. We run the regression (Eq. 3) using first-differenced data. The independent variable of interest is *CTAX*, a measure of corporate exposure to the Ishihara tax. Corporate controls are leverage, liquidity, size, ROA, sales growth, and Tobin's Q. A set of prefecture-industry fixed effects are included. Robust standard errors clustered at the corporate level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

Panel A NN=2 *Bank level*	(1) ΔLoans/TA	(2) ΔRWA/TA	(3) ΔLeverage	(4) ΔAssets	(5) ΔCorp. loans	(6) ΔRetail loans
TAX_i	-0.0295** (0.0115)	-0.0313*** (0.0077)	0.0023** (0.0010)	0.0203 (0.0310)	-0.2762** (0.1234)	-0.3933** (0.1791)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
N	34	34	36	36	36	33
R^2	0.5997	0.8075	0.0738	0.0122	0.4099	0.4982

Panel B NN=2 *Corporate level*	(1) ΔBank Debt	(2) ΔCommercial paper	(3) ΔBonds	(4) ΔTotal Debt	(5) ΔEmployment	(6) ΔInvestment rate
$CTAX_j$	-0.0962** (0.0444)	-0.0216 (0.0145)	0.1856* (0.1017)	-0.0402** (0.0183)	-0.0257 (0.0426)	-0.0193** (0.0087)
Corp. controls	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Prefect.-industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1416	1417	1417	1416	1291	1417
R^2	0.3095	0.1391	0.0983	0.3316	0.2615	0.3764

A.2 Tax repeal | Loan and Corporate level

To complement our analysis at the bank level, we examine whether the tax reversal effects (see Section 4.1.2) are evident at the loan and corporate level.

As previously, we define April 2001 to March 2002 as the pre-treatment period, and April 2002 to March 2003 as the treatment period. We then estimate Equation 2 using our loan level dataset. Table A2 Panel A reports the results. The estimated coefficient in Column 1 is positive and significant at the 5% level whereas the coefficient in Column 2 is negative and significant at the 10% level. The results suggest that banks increase lending to our set of corporate borrowers in response to the tax reversal.

As a next step, we examine how corporate borrowers respond to the reversal. In order to do so, we first re-measure our corporate tax exposure variable in order to take into account any changes in corporates' loan portfolios that took place during the Ishihara bank tax imposition. Specifically, we measure w_{ij}^{repeal} to capture corporate dependency on a given bank in the pre-repeal period from March 2001 to March 2002. We then derive CEX_j^{repeal} using the same approach as outlined in Section 5.1. Finally, we divide our sample of corporates into treated and control entities by classifying corporates with an above median CEX_j^{repeal} as treated and those below median exposure as corporates in the control group. Using the $CEX_j^{D\ repeal}$ dummy, we re-run our regression as in Equation 3 (Section 5.2). Table A2 Panel B reports the estimates. The coefficient in Column 1 and 4 are positive and significant at the 5% level. The results suggest that corporate borrowers increase bank debt in response to the tax repeal. Overall, the results point to a rebound in corporate borrowing in the form of bank debt and provide further support for our baseline findings, which suggest a supply-side driven contraction in bank credit.

Table A2 | Tax Repeal – Loan and Corporate Level

Panel A of this table reports the results of ordinary least squares regressions using a sample of 3,565 bank-corporate combinations. The dependent variables are percentage growth in credit (Column 1) and a dummy variable that equals one if the growth in credit is the lowest quartile and zero otherwise (Column 2). We run the regression (Eq.2) using first-differenced data and control for corporate credit demand using corporate fixed effects. The independent variables of interest is TAX^{repeal}. Bank controls are size, capital, net interest income as a share of revenue, deposit funding, ROA, loan risk, liquidity. Robust standard errors clustered at the bank level are reported in parentheses. Panel B of this table reports the results of ordinary least squares regressions using a sample of 1776 corporates. The dependent variables are growth of bank debt (Column 1), commercial paper (Column 2), bonds (Column 3), total debt (Column 4), employment (Column 5), investment rate (Column 6). We run the regression (Eq. 3) using first-differenced data. The independent variable of interest is $CTAX^{repeal}$, a measure of corporate exposure to the repeal of the Ishihara tax. Corporate controls include leverage, liquidity, size, ROA, sales growth, and Tobin's Q. A set of prefecture-industry fixed effects are included. Robust standard errors clustered at the corporate level are reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level respectively.

Panel A: *Loan level*	(1) ΔCredit	(2) Large decrease in credit
TAX_i^{repeal}	0.1815**	-0.0808*
	(0.0805)	(0.0463)
Bank controls	Yes	Yes
Corporate FE	Yes	Yes
N	3219	3565
R^2	0.5195	0.5381

Panel B: *Corporate level*	(1) Δ Bank Debt	(2) Δ Com.paper	(3) Δ Bonds	(4) Δ Total Debt	(5) Δ Employ.	(6) Δ Invest.
$CTAX_j^{repeal}$	0.0461**	-0.0038	-0.1876	0.0418**	0.0125	-0.0030
	(0.0192)	(0.0224)	(0.2024)	(0.0180)	(0.0245)	(0.0066)
Corp. controls	Yes	Yes	Yes	Yes	Yes	Yes
Prefecture FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Prefect.-industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1776	1776	1776	1776	1764	1779
R^2	0.3532	0.6999	0.0704	0.3887	0.4034	0.4126