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Abstract

This paper investigates how the integration of local banking markets affects the credit and economic cycle of local economies by using both a data set on the branch network of nation-wide city banks and a prefecture-level panel data set on the formation and collapse of the real estate bubble in Japan. The empirical results show that the presence of city banks does not seem to have lessened the effects of local financial shocks on local economies. On the contrary, we find evidence that nation-wide city banks aggressively transmitted financial shocks that originated from major cities to local peripheral economies. These results suggest a dark side of large nation-wide banks: they can be a source of financial and economic volatility when they elect to take concentrated risk and spread out the impacts of large financial shocks to peripheral economies.

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Abstract

This paper investigates how the integration of local banking markets affects the credit and economic cycle of local economies by using both a data set on the branch network of nation-wide city banks and a prefecture-level panel data set on the formation and collapse of the real estate bubble in Japan. The empirical results show that the presence of city banks does not seem to have lessened the effects of local financial shocks on local economies. On the contrary, we find evidence that nation-wide city banks aggressively transmitted financial shocks that originated from major cities to local peripheral economies. These results suggest a dark side of large nation-wide banks: they can be a source of financial and economic volatility when they elect to take concentrated risk and spread out the impacts of large financial shocks to peripheral economies.

1. Introduction

The relation between banking integration and the vulnerability of economies to financial shocks has been one of the most important issues in the realm of macroeconomics and finance. In theory, geographical diversification of banking across local economic boundaries could cause both higher and lower volatility in the economy. On the one hand, the financial health of large diversified banks does not depend on idiosyncratic local conditions as much as the health of local banks does. Hence, the large diversified banks might be able to take up the slack when local financial shocks (e.g., land price shocks) undermine the health of local banks and their ability to satisfy local financing needs. In this case, the presence of large diversified banks helps mitigate a local credit crunch.

On the other hand, adverse financial shocks reduce the value of borrowers' collateral and thus worsen their creditworthiness, which might prompt large financial institutions to shift capital away from the affected market to the other markets where the perceived quality of borrowers is higher. Hence, large institutions' access to a large pool of borrowers in different geographical areas might raise the likelihood of a "flight to quality", which, in turn, might result in a volatile flow of capital from one economy to the others and potentially amplify the local credit cycle.

Furthermore, if large financial institutions choose to take concentrated risk in one or two markets, financial shocks that originate from those markets can undermine their financial soundness and, as a consequence, impair their ability to supply credit in other markets. That is, banking consolidation may well be a source of volatility in local credit markets if large institutions fail to manage risk properly.[1]

[1] Two relevant issues on the risk management of large institutions are worth pointing out. First, geographical diversification does not always lead to a reduction in insolvency risk because banks might face offsetting incentives.

The empirical literature on this issue is enormous. To start with, a series of historical studies show that integrated banking systems are better: during the Great Depression, banking systems with geographically diversified banks tended to be more stable than unit banking systems (e.g., Grossman, 1994; Mitchener, 2005) and also banking instability was strongly correlated with the contraction of credit and output (Bernanke, 1983; Calomiris and Mason, 2003).

The empirical work based on branching deregulation in the U.S. also corroborates the historical experience, suggesting that banking consolidation reduced the risk of a localized credit squeeze. The analysis of firm-level data shows that banking integration loosened the borrowing constraints of bank-dependent firms and lowered firm volatility in non-financial sectors (Correa and Suarez, 2007; Correa, 2008). At a macro-level, the integration of the local banking system is shown to be positively correlated with long-run local economic performance (Jayaratne and Strahan, 1996; Clarke, 2004) and negatively correlated with volatility of local income and consumption (Morgan, Rime, and Strahan, 2004; Demyanyk, Ostergaard, and Sørensen, 2007).

While much of the literature supports the positive effects of banking integration, several recent studies also show its dark side. Peek and Rosengren (1997, 2000) find that U.S. branches of Japanese banks reduced loan supply and reallocated funds back to Japan in response to the financial collapse in Japan in 1990s, which caused a significant economic downturn in U.S. real estate markets. Ashcraft (2005) takes a close look at the failure of two large bank holding companies, First City Bancorporation and First Republic Bank Corporation. The former failed

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Demsetz and Strahan (1997) show that although geographical diversification allows large bank holding companies to reduce the risk of insolvency in principle, these diversified institutions, in reality, exhibit a strong tendency to operate with greater leverage and pursue riskier lending, which, in turn, partially offsets the stabilizing effects of diversification. Moreover, large financial institutions might enjoy conjectural guarantees of the government since the government has strong incentives to rescue those large institutions whose failure is likely to pose a system risk. Such too-big-to-fail policy might promote moral hazard problems and raises banks' incentive to take excessive risk (Morgan and Stiroh, 2005; Furfine, 2006; Stern and Feldman, 2004; Penas and Unal, 2004; O'Hara and Shaw, 1990).

due to loan losses on Iraqi banks during the First Gulf War while the latter failed due to the FDIC's unilateral decision not to renew financial assistance. Ashcraft (2005) documents that local economic output declined when the subsidiaries of these failed banks were also closed down.

More recently, Chava and Purnanandam (2008) examine the exogenous shock to the U.S. banking system during the Russian crisis in the fall of 1998 and find that U.S. domestic firms that were more dependent on banks with large exposure to the shock suffered from the larger valuation loss. Similarly, Cetorelli and Goldberg (2008) investigate the liquidity constraints across domestically and globally-oriented banks and find that while globally-oriented banks rely on internal capital markets to help smooth the shock, such internal capital markets also contribute to the international propagation of domestic liquidity shocks. Hence, while it is commonly thought that monetary shocks affect foreign economies through the interest rate channel (e.g. Mackowiak, 2007, di Giovanni and Shambaugh, 2008), these results suggest the presence of an alternative bank lending channel in which these shocks can be transmitted internationally.

This paper makes a contribution to this literature by examining both the possible negative and positive effects of banking integration on local credit and economic cycles with panel data of Japan's prefectures from 1980 to 2003. Like Morgan, Rime and Strahan (2004) and Demyanyk, Ostergaard, and Sørensen (2007), we explore whether the presence of nation-wide city banks mitigates adverse effects of local financial shocks on local credit conditions and economies. In addition, like Peek and Rosengren (1997, 2000), Ashcraft (2005), Chava and Purnanandam (2008), and Cetorelli and Goldberg (2008), we examine whether nation-wide banks spread out the effects of financial shocks in the locality of their headquarters to peripheral local economies.

We undertake this task by making use of the information on the branch network of city banks and changes in land prices of commercial sites of each prefecture and the major cities. Our data set contains rich cross-sectional and time series variation in the banking structure and land price movements that allows us to estimate the effects of both local and major city land price shocks on local credit conditions and also to test whether the size of these effects depends on the local presence of city banks. If nation-wide city banks absorb local financial shocks as suggested by Morgan, Rime and Strahan (2004) and Demyanyk, Ostergaard, and Sørensen (2007) in the U.S. experience, we should observe that the credit condition of financially integrated prefectures with a large presence of city banks to be less sensitive to local idiosyncratic financial shocks. Similarly, if nation-wide city banks helped to transmit financial shocks from cities to other economies as documented by Peek and Rosengren (1997, 2000), Ashcraft (2005), Chava and Purnanandam (2008), and Cetorelli and Goldberg (2008), we should find the credit condition of financially integrated prefectures to be more sensitive to financial shocks of the cities.

In addition, we attempt to shed light on the real causal effects of the bank lending channel on local economies. Although the *presence* of the bank lending channel is widely accepted in finance/macroeconomic literature (e.g., Bernanke, 1995), there remains a considerable debate on its *economic importance* as recent studies show only small or negligible effects of loan supply on output in the case of U.S. economy (Driscoll, 2004, Ashcraft, 2006). We estimate the elasticity of output to loan supply in Japan by exploiting the fact that the exposure of each prefecture to land price shocks of the major cities is plausibly exogenous to local loan demand after controlling for its exposure to local land price shocks. We wish to make a contribution to this debate.

To briefly summarize our findings, Japan's banking experience during 1981-2003 highlights a dark side of banking consolidation. We find that local loan supply was more sensitive to city land price shocks in prefectures where city banks had extensive branch operations. The change in local loan supply, when instrumented with the interaction of the land price shocks of the major cities and the share of city bank branches, had a statistically significant and economically important impact on local economies: we find the elasticity to be about 30-40%. That is, the presence of nation-wide city banks seems to have added volatility to local credit and economic cycle in the Japanese case. Moreover, the loan supply shock had larger effects on small business firms while large business firms were largely unaffected. These results suggest that the results are not spurious since in theory, the loan supply shock should affect only those opaque small firms with limited ability to raise funds from uninformed investors. Finally, city banks seem not to have utilized internal capital markets to help mitigate a local credit crunch.

The rest of the paper is organized as follows: Section 2 describes our data and empirical strategy. Section 3 presents the baseline results, followed by robustness checks in section 4. Section 5 concludes with a discussion of our findings in relation to the literature.

2. Data and Empirical Strategy

A. Land Prices

Our primary interest is in testing whether the presence of city banks reduces the effects of local financial shocks on local credit conditions and economic performance, and also whether the presence of city banks transmits financial shocks from cities to local economies. For this paper, we use price indices of commercial sites in each prefecture as a measure of local financial shocks

and the price index of commercial sites in six major cities (Tokyo, Yokohama, Nagoya, Osaka, Kyoto and Kobe) as a measure of city financial shocks.

Changes in real estate markets, in theory, can have significant effects on financial intermediations and real economy. Since one of the primary functions of banks is to screen and monitor borrowers, banks develop expertise in compiling relevant information to accurately evaluate borrowers and also maintain close long-term lending relationships with clients (Sharpe, 1990; Diamond, 1984, 1991; Rajan, 1992). However, since small firms disclose little information and it is difficult for banks to correctly assess their creditworthiness, small firms are often required to offer real estate collateral to bridge the informational gap. Thus, real estate often works as a buffer against borrowing constraints and mitigates the problem of informational asymmetry between banks and firms.

Given the importance of real estate in overcoming information asymmetry in credit markets, large changes in land prices may significantly affect small business lending and ultimately performance of small business firms. In addition, when the likelihood of loan default rises, the value of bank assets (and thus bank equity) becomes more closely tied to the value of the collateral. As a result, when the land market collapses, it will adversely affect the financing conditions of banks and their ability to extend credit.

The empirical literature on the bank lending channel in Japan is broadly consistent with this theory. The land prices in Japan changed dramatically from the mid 1980s to 1990s. Banks' financial soundness during this period depended critically on the dramatic change in land prices since their assets, especially loans, were closely tied with land values in the form of collateral.[2]

[2] Bayoumi (2001) use VAR to show that the disruption in financial intermediation caused by the collapse of the domestic asset market was the main cause of Japan's stagnant economy in the 1990s. Using more disaggregated bank-level data, Gan (2007), Watanabe (2007), and Ogawa and Kitasaka (2000) show that the large exposure to real estate markets was a major determinant of the decline in loan supply of Japanese banks.

Table 1 shows the movement of land prices in 47 prefectures and the six major cities during the sample period 1981-2003. From 1981, the land prices rapidly increased until it peeked out in 1991 and then it sharply declined after the collapse of the bubble economy in 1991. The important feature, for the purpose of our research design, is that the degree of volatility varies, significantly, across prefectures. In particular, land price changes are more prominent in urbanized areas compared to rural areas. The land prices in economically large prefectures such as Tokyo, Aichi and Osaka were tripled over 1981-1991 and dropped down to one-third of its peek over 1991-2003. In contrast, the land prices in remote prefectures such as Iwate, Shimane, Saga are less volatile and rose only by 50 percent and decreased by 30 percent.

Moreover, the statistical pattern of the movement of land prices has geographical dimensions. Figure 1 illustrates various degrees of the land price decline over 1991-2003 for 47 prefectures in a map. Those six major prefectures bordered with red lines and their close peripheral prefectures experienced more severe declines compared to remote rural areas.

These land prices are obtained from the Japan Statistical Yearbook by Japan Statistics Bureau. Since we are using the land price index of the six major cities as the land price shock to city banks, we exclude six prefectures where those cities are located in order to avoid an endogeneity problem in the regression analysis that follows.[3]

B. Banking Integration

As a measure of banking integration, we use a proportion of city bank branches in prefecture *i* to total branches of city banks and regional banks in prefecture *i*. This data is drawn from Nikkin Shiryo Nenpo (Annual Report on Japan's Financial Institutions) published by the Japan Financial News.

[3] Six excluded prefectures are Tokyo, Kanagawa, Aichi, Osaka, Kyoto and Hyogo.

Table 2 shows the average city bank share in 47 prefectures over the periods of 1981-1991 and 1991-2003. The city bank share differs noticeably across prefectures. Figure 2 displays the average city bank share over 1991-2003 for 47 prefectures in a map. Again, while the share of city banks is acutely high in urbanized prefectures and their peripheral prefectures where city bank mainly operate, the share of city banks is fairly low in remote areas where regional banks have high presence.

C. Local Lending and Output

We use the data on bank loans and output at a prefecture-level to match our data on the land price index and banking structure. Private loan data is from Kinyu Keizai Tokei Geppo (Monthly Report of Recent Economic and Financial Developments) released by Bank of Japan. Local output is from Kenmin Keizai Keisan Nenpo (Annual Report of Prefectural Economy) by the Cabinet Office. The summary statistics of our data is presented in Table A1 in Appendix.

D. Empirical Strategies

We examine the empirical relationship between land price shocks and loans:

$$Loan_{it} = \alpha_i + \alpha_t + \alpha_1 \Delta LocalLand_{it} + \alpha_2 \Delta LocalLand_{it} * CityBankShare_{it} + \alpha_3 \Delta CityLand_{it} * CityBankShare_{it} + \varepsilon_{it} \quad (1)$$

Subscript i indicates the prefecture and t indicates the year. A parameter α_i represents prefecture-specific effects that capture unobserved prefecture-specific (time-invariant) factors that affect loan demand in prefecture i. α_t represents year-specific effects that capture economy-wide shocks. *Loan* is annual local private loan growth. *ΔLocalLand* is annual local land price growth. *ΔLocalLand*CityBankShare* is an interaction of the local land price growth and the city bank

share. *ΔCityLand*CityBankShare* is an interaction of the land price growth of the major cities and the city bank share. Since the city land price growth does not vary across prefectures, we cannot estimate its average effects; i.e., it is automatically captured by time-specific effects. We estimate this equation for the period of 1981-2003 and adjust the standard errors for serial correlation within prefecture over time (Bertrand, Duflo, and Mullainathan, 2004).[4]

As changes in local land prices affect both borrowers' creditworthiness and local banks' financial conditions, we expect *Loan* to be positively correlated with *ΔLocalLand*. The interaction of the local land price growth and the city bank share captures the effects of the presence of city banks on sensitivity of local credit conditions to local financial shocks. A priori, the sign of this coefficient is ambiguous. On the one hand, since city banks lend nationally, they can quickly reallocate capital to a local economy in which local banks are too financially constrained to meet local financing needs. In this case, we expect the coefficient on *ΔLocalLand*CityBankShare* to be negative. On the other hand, city bank can also reallocate capital away from economically weak prefectures to strong ones if the land price shocks decrease profitability of those lending opportunities, which, in turn, increases the sensitivity of credit conditions to local land price fluctuations. In this case, we expect the coefficient on *ΔLocalLand*CityBankShare* to be positive.

The interaction of the city land price growth and the city bank share, *ΔCityLand*CityBankShare*, captures the possible detrimental effects of city bank presence on the vulnerability of local credit conditions to city land price shocks. If city banks are forced to withdraw funds from local branches to meet a funding shortage caused by the land price shocks of cities, prefectures with the higher share of city banks may be more vulnerable to city land

[4] We use *cluster* option in STATA to calculate standard errors that are robust to any arbitrary within prefecture correlation.

price shocks unless regional banks take the slack of abandoned lending opportunities. In this case, we should observe a positive coefficient on $\Delta CityLand*CityBankShare$.

Equation (1) investigates whether or not Japan's city banks effectively transmitted financial shocks from the major cities to the credit markets in peripheral economies. The shift in the supply of bank loans, however, does not necessarily have real effects on local economies, as it depends on the financing opportunities of local borrowers that were served by city banks; i.e., if these borrowers can raise funds from non-bank lenders to make up for a funding shortfall, then a reduction in loan supply from city banks should have little real effects. In fact, Driscoll (2004) and Ashcraft (2006) find that bank lending channel has minimal real effects in the U.S., using state-level panel data. More relevant to this paper is Ford et al. (2003), which argues that as financial markets have been developed, Japanese firms have become less bank-dependent and able to replace a decline in loan supply with alternative financing methods to fund investment opportunities so that loan supply shocks do not affect real economic output. Thus, we examine whether a disruption of credit supply in local economies indeed has a real effect by estimating the following reduced-form equation:

$$GDP_{it} = \beta_i + \beta_t + \beta_1 \Delta LocalLand_{it} + \beta_2 \Delta LocalLand_{it} * CityBankShare_{it} + \beta_3 \Delta CityLand_{it} * CityBankShare_{it} + \nu_{it} \quad (2)$$

GDP represents the growth rate of local economic output. If financial shocks that city banks transmit have real effects, if any, on output of local economies, then the coefficient on the interaction of city land price growth and the city bank share should be positive.

We also make use of plausibly exogenous variation in bank lending created by city land price shocks to estimate the causal effects of the bank lending channel on real output:

$$Loan_{it} = \alpha_i + \alpha_t + \alpha_1 \Delta LocalLand_{it} + \alpha_2 \Delta LocalLand_{it} * CityBankShare_{it} + \alpha_3 \Delta CityLand_{it} * CityBankShare_{it} + \varepsilon_{it} \quad (3)$$

$$GDP_{it} = \gamma_i + \gamma_t + \gamma_1 \widehat{Loan_{it}} + \gamma_2 \Delta LocalLand_{it} + \gamma_3 \Delta LocalLand_{it} * CityBankShare_{it} + \upsilon_{it} \quad (4)$$

Equations (3) and (4) are the first and second stage of an instrumental variable (IV) regression that relates the local credit supply shocks transmitted by city banks to local economic performance. We use Limited Information Maximum Likelihood (LIML) method as it is shown to suffer less from weak instrument problems, compared to Two Stage Least Squares (TSLS) (Stock and Yogo, 2002). The results of Equation (4) give the elasticity of output with respect to loan supply.

3. Baseline Results

Table 3 reports the results of fixed-effect regressions of loan growth (Equations (1)) in columns 1-2, output growth (Equation (2)) in columns 3-4 and an IV regression (Equation (3) and (4)) in column 5. The results show that the coefficients on *ΔLocal Land Price* are positive and statistically significant in the equations for loan growth (columns 1-2). This implies that local collateral shocks had direct effects on local lending presumably because the value of collateral affected both the willingness and ability of banks to provide loans.

The coefficient on *ΔLocal Land Price*City Bank Share* is positive but not statistically significant in the equation for loan growth (column 2). This shows that when local collateral shocks occurred, city banks did not mitigate the local land price shocks by pumping more capital into the local economy but instead they may have reallocated capital away from those weak prefectures to strong ones to pursue more profitable lending opportunities. The coefficient on *ΔCity Land Price*City Bank Share* is positive and statistically significant, which suggests that

when collateral shocks occurred in cities, city banks reacted to the shocks by reducing loan supply in peripheral local economies, and thus aggressively transmitted the adverse effects of the shocks across geographical boundaries.

The magnitude of this coefficient is large enough to be economically meaningful. Compare a prefecture with the smallest presence of city banks (e.g., Aomori and Yamagata) with a prefecture with relatively large presence of city banks (e.g., Chiba and Hokkaido). For the former prefectures, city bank share is about 1% over 1991-2003, which implies that as the price index of commercial site in the major cities declined by 197.5% from the peak in 1991 to trough in 2003, bank lending declined only by 0.5%. In contrast, the latter prefectures where city bank share is about 30%, the same financial shocks in the cities led to 15% decline in bank lending.

The reduced-form equations for output growth yield consistent results. The coefficients on *ΔLocal Land Price* are positive and statistically significant, reflecting the presence of the collateral channel: the negative shock to the value of collateral will result in a decrease in output. The coefficient on *ΔLocal Land Price*City Bank Share* is positive but insignificant while the coefficient on *ΔCity Land Price*City Bank Share* is positive and statistically significant (column 4). These results are consistent with the view that the negative shocks transmitted by city banks have real effects on local economies.

The results of the IV regression (Panels A and B in column 5) are in accordance with those of the reduced-from equations (columns 3-4). The coefficient on *Loan*, which is instrumented with *ΔCity Land Price*City Bank Share*, is positive and statistically significant, suggesting that the negative shock in local credit markets caused by transmission of the city land price shocks by city banks indeed decreased local economic output.

Moreover, the estimated elasticity of output with respect to loan supply is about 40%, which is again large enough to be economically important. These estimates contrast starkly to those found in Driscoll (2004) and Ashcraft (2006), which use the U.S. data to find that the bank lending channel does not have important economic effects. There are several possible sources of such a difference in estimated elasticity. For one, the Japanese economy is more bank-dependent than the U.S. economy. Another is that the size of financial shocks and the vulnerability of financial and non-financial firms to financial shocks in Japan during this particular period were likely to be larger than the U.S. counterparts during the period that Driscoll (2004) and Ashcraft (2006) examine.

4. Robustness Checks

A possible criticism of the baseline specifications might be that they fail to control for heterogeneity in the synchronicity of economic cycles between local prefectures and cities. One might conjecture that some local economies are more synchronized with urban economies in cities simply because their economic performance depends heavily on the demand from cities. Although we cannot completely rule out the possibility that our results are driven by the heterogeneity in trade linkages, we make various attempts to address these concerns in this section.

A. Geographical Distance

An alternative story that accounts for our results is that financially integrated prefectures might have closer trade linkages with cities than financially isolated prefectures. Ideally, we would like to use data on the volume of intra-national trade between prefectures to account for

the trade linkages. Unfortunately, no such data are available. However, international trade literature suggests that geographical distance is one of the most important determinants of economic interactions between countries (e.g., Helpman and Krugman, 1985; Deardorff, 1998).

This stylized fact, if it is true for intra-national trade within Japan, is somewhat worrisome to us because city banks tend to have more branches around the metropolitan areas (Figure 2) so that prefectures nearby the major cities have higher shares of city banks relative to other remotely located prefectures. In the meantime, prefectures nearby the major cities may have common business opportunities and economic trading flows with those large cities.

To correct for this potential bias, we construct three measures of geographical distance.[5] The first measure is straight distance between prefecture *i* and each of the six major cities. The second measure is the average distance between prefecture *i* and all of six major cities calculated as follows:

$$\begin{aligned} DISTANCE(AVG\_CITY) = {}& \tfrac{1}{6}\{DISTANCE(TOKYO) + DISTANCE(YOKOHAMA) \\ & + DISTANCE(NAGOYA) + DISTANCE(OSAKA) \\ & + DISTANCE(KYOTO) + DISTANCE(KOBE)\} \end{aligned}$$

The third measure is the minimum distance to the closest city from prefecture *i* calculated as follows:

$$\begin{aligned} DISTANCE(CLOSEST\_CITY) = \min\{ & DISTANCE(TOKYO), DISTANCE(YOKOHAMA) \\ & , DISTANCE(NAGOYA), DISTANCE(OSAKA) \\ & , DISTANCE(KYOTO), DISTANCE(KOBE)\} \end{aligned}$$

[5] Distance between prefectures is defined as the straight geographical distance between *kencho shozaichi* (the locations of the prefectural government). It is obtained from google map (http://maps.google.com/).

We interact these distance measures with the output growth of the corresponding cities to capture the trade linkages. We expect that the output of prefectures closer to cities responds more elastically to output fluctuations in cities; that is, the coefficient on the interaction of the distance measure and the city output growth should be negative.

Table 4 reports the results of the IV regressions.[6] First of all, notice that the interactions of the distance measures and output have negative coefficients (columns 2-3 and 5-6) and also statistically significant (columns 5). This is consistent to our prior expectation that the further a prefecture is from the cities, the less economic correlation there is between the prefecture and the cities. These results are reassuring in that our distance variables are likely to be capturing some of the unobserved heterogeneity in synchronization of business cycles between local peripheral economies and cites.

Our main results are statistically robust even after including these additional distance controls. The coefficients on *ΔLocal Land Price* and *ΔCity Land Price*City Bank Share* remain statistically significant with positive signs (columns 1-3). Loan growth instrumented by the interaction of the land price growth of the major cities and the city bank share has a positive and statistically significant effect on local economic output (columns 4-6). These coefficients are also similar in magnitudes to those obtained in the baseline model reported in Table 3. In sum, the statistical relationship between banking integration and sensitivity of the local credit and output cycle to city land price shocks is unlikely to be driven by unobserved heterogeneity in trade linkages.

B. Similarity in GDP between Prefectures

[6] The results of reduced-form regressions of income growth are reported in Table A2 in Appendix. The results are qualitatively similar to those in Table 3.

International trade literature also shows that countries with similar income tend to trade more (Helpman and Krugman, 1985). Our data suggest that prefectures close to the large major prefectures have a relatively high level of GDP per capita (Figure 3) just as they have relatively high presence of nation-wide city banks (Figure 2). Again, if income similarity is an important determinant of intra-national trade linkages within Japan, our results might be biased due to a close correlation between banking integration and unobserved trade linkages with the major cities.

To address the issue, we calculate the absolute difference in GDP per capita between each prefecture and Tokyo, Kanagawa, Aichi, Kyoto, Osaka and Hyogo. This variable is again interacted with the output growth of the cities to capture heterogeneity in trade linkages. We expect that the prefectures that are similar to cities in terms of income levels have stronger trade linkages, and as a result, their output fluctuation is more closely related to that of cities (i.e., the coefficient on the interaction of the income difference and the output growth in cities should be negative).

Tables 5 reports the results of the IV regressions with these additional controls.[7] Even after including the controls, the results largely conform to the main findings from the baseline model that land price shocks in the major cities are transmitted through city banks and have a significant impact on lending (columns 1-2), which in turn has a statistically significant positive correlation with local economic output (columns 3-4). The coefficient on the interaction of the income difference and the output growth of cities turns out to be negative as expected.

C. Contemporaneous (Spatial) Correlation

[7] The results of the reduced-form regression of the income growth are reported in Table A3 in Appendix. The results are qualitatively similar to those in Table 3.

Thus far, we assume that error terms are independent across prefectures. However, if unobservable factors are contemporaneously (or spatially) correlated across prefectures, then each observation in the data contains less information, which needs to be incorporated when estimating the standard errors of the coefficients. In Table 6, we show the results with standard error corrected for possible spatial correlation by utilizing parametric panel corrected standard errors (Beck and Katz, 1995) and non-parametric Driscoll-Kraay standard errors (Dricoll and Kraay, 1998). These adjustments of standard errors for contemporaneous correlations do not materially alter the results.

D. Impact on Small Business Firms

The literature on relationship lending shows that small opaque firms depend on a long-term relationship with banks for external finance precisely because they are not able to overcome an adverse selection problem in arm length financial transaction (Diamond, 1984, 1991; Petersen and Rajan, 1994; Berger and Udell, 1995). The main cost of a close exclusive relationship with a single bank, however, is that firms will have limited financing options when their banks are unwilling or unable to extend credit (Sharpe, 1990; Rajan, 1992). This theoretical consideration helps us check whether the correlation between output and loans is also causation. Since large firms have more financing options than small firms, we should observe that it is small businesses, not large businesses, which respond sensitively to the financial cycle.

One important consideration is that banking literature has shown that large banks have comparative disadvantages in collecting "soft information" relative to small banks and thus depend largely on publicly available information when making lending decisions (Berger, Klapper, and Udell, 2001; Berger, Miller, Petersen, Rajan, and Stein, 2005). In Japan, however,

as large firms shifted from bank financing to open market financing due to development and liberalization of financial markets, city banks have increased small business lending significantly. In particular, the proportion of small business lending of city banks has, in fact, increased by more than twenty percentage points over 1977-1995 (Ogawa and Kitasaka, 2000). Thus, this particular development in Japan's corporate financing implies that the shocks to large city bank might have a significant impact on small business firms.

Table 7 reports the results of the IV regressions for both small and large business firms.[8] Dependent variables are the growth rate of the number of small and large business firms in each prefecture.[9] Since the data on the number of small and large business firms are available every five years from 1981 to 2001, all of other growth variables are recalculated into five-year frequency.

The results are generally in line with our expectation that the coefficients on *LOAN* are positive and statistically significant for growth of small business firms with the controls (Panel B, columns 2-3) while they are insignificant for growth of large business firms (Panel B, columns 4-6), suggesting that the land price shock of the major cities transmitted by city banks had severe adverse impacts on small business firms but not on large business firms.

These results also indicate that regional banks did not seem to provide loans to the abandoned small business firms that were somehow dependent on city banks and negatively affected by the credit crunch. This could occur if those opaque city-bank-dependent-borrowers do not have a close tie with small banks and thus small banks are unwilling to extend credit due to its informational asymmetry.

[8] The results of the reduced-form equations are reported in Table A4.
[9] We define small business firms as firms with less than or equal to fifty employees and large business as firms with more than fifty employees. We also experimented with different cut-off points (30 and 100 employees) for the robustness check. The results are qualitatively similar (Tables A5 and A6)

5. Conclusion

Large financial institutions are often considered a source of financial and economic stability. They have geographically diversified assets, have better access to large markets for liquidity, and thus are less vulnerable to local idiosyncratic shocks compared to unit banks that operate locally. These institutions, however, can be a source of instability if they manage risk poorly and, as a consequence, cut back on loan supply in local economies during economic downturn.

This paper uses a panel data set of Japan's prefectures from 1981 to 2003 and presents a series of evidence that indicates a dark side of large financial institutions. We find that the presence of city banks does not seem to have lessened the effects of local financial shocks on local economies. On the contrary, we find evidence that nation-wide city banks aggressively transmitted financial shocks that originated from the major cities to local peripheral economies. Furthermore, the financial shocks transmitted by city banks had severe adverse effects on small business firms. These results suggest that large financial institutions can be a source of financial and economic volatility when they elect to take concentrated risk and spread out the impacts of financial shocks across geographical and economic boundaries.

Our findings contrast sharply with Morgan, Rime and Strahan (2004) and Demyanyk, Ostergaard, and Sørensen (2007) which show that banking integration contributed to a reduction in economic volatility in the U.S. One can speculate on why Japanese experience differs so starkly from the U.S. experience. In theory, Japan's city banks should have been able to mitigate the shock by raising external funds in open markets, thereby continuing to supply loans to viable

borrowers.[10] However, in the case of Japan, Japan's city banks were not managing risk properly when there were large financial shocks. Thus, it might have been a combination of large financial shocks and lax risk management that distinguished the Japanese experience.

Furthermore, the strong "home bias" of Japanese banks may also have contributed to the seemingly unnatural allocation of capital. Caballero, Hoshi and Kashyap (2008) and Peek and Rosengren (2005) document that Japanese banks reduced lending for relatively viable borrowers and reallocated it to so-called zombie firms that are affiliated with the banks in cross-shareholdings (i.e., *keiretsu* group). Peek and Rosengren (2000) also show that Japanese banks reduced significant supplies of loans in the U.S. real estate markets in response to the collapse of the bubble in Japan although the U.S. borrowers were financially stronger and there were more profitable lending opportunities in the U.S. Hence, our results might also be a by-product of peculiar corporate governance structure of Japanese banks that favored bank-affiliated borrowers within a business group at the expense of small independent firms.

As a final note, the evidence presented in this paper does not necessarily discourage banking integration nor promote segmented banking systems. A large literature on banking integration suggests, rather strongly, that competitive financial system tend to have positive effect on capital allocation in the long run (e.g., Jayaratne and Strahan, 1996; Guiso, Sapienza, and Zingales, 2004; Bertrand, Schoar, and Thesmar, 2007).

[10] The empirical work on the bank lending channel in the U.S. corroborates such a view (Kishan and Opiela, 2000; Kashyap and Stein, 2000; Jayaratne and Morgan, 2000).

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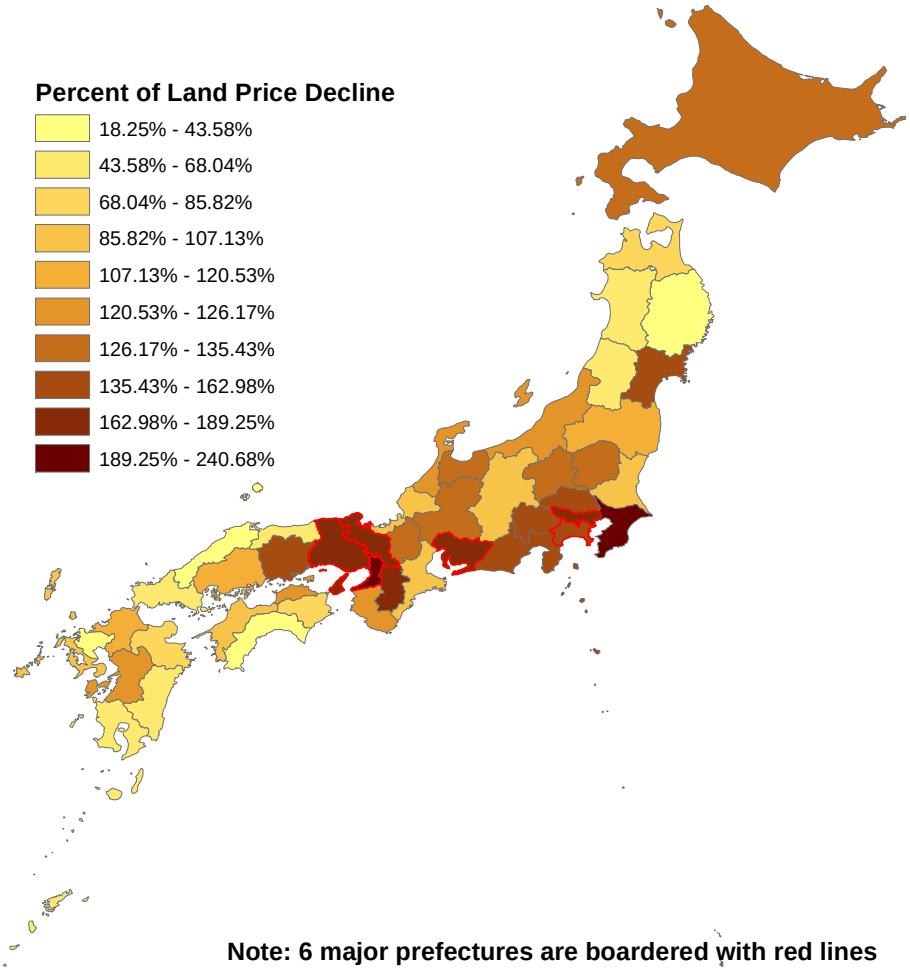
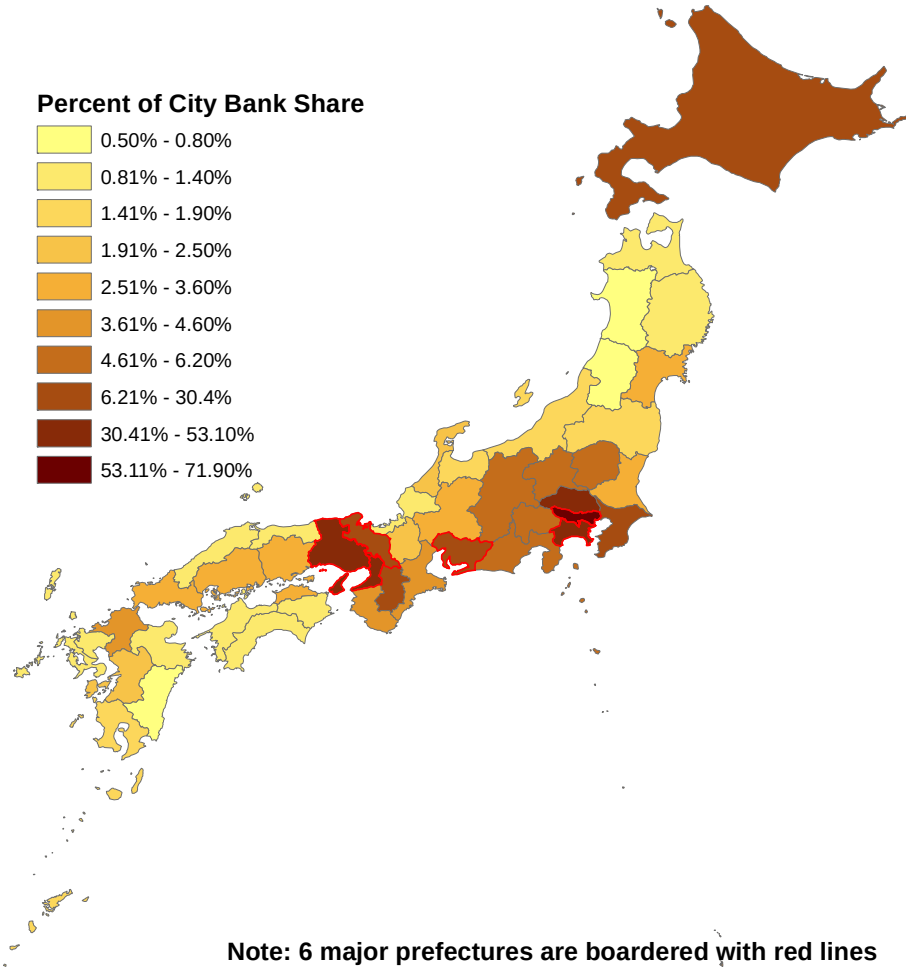
Figure 1
Land Price Decline over 1991-2003



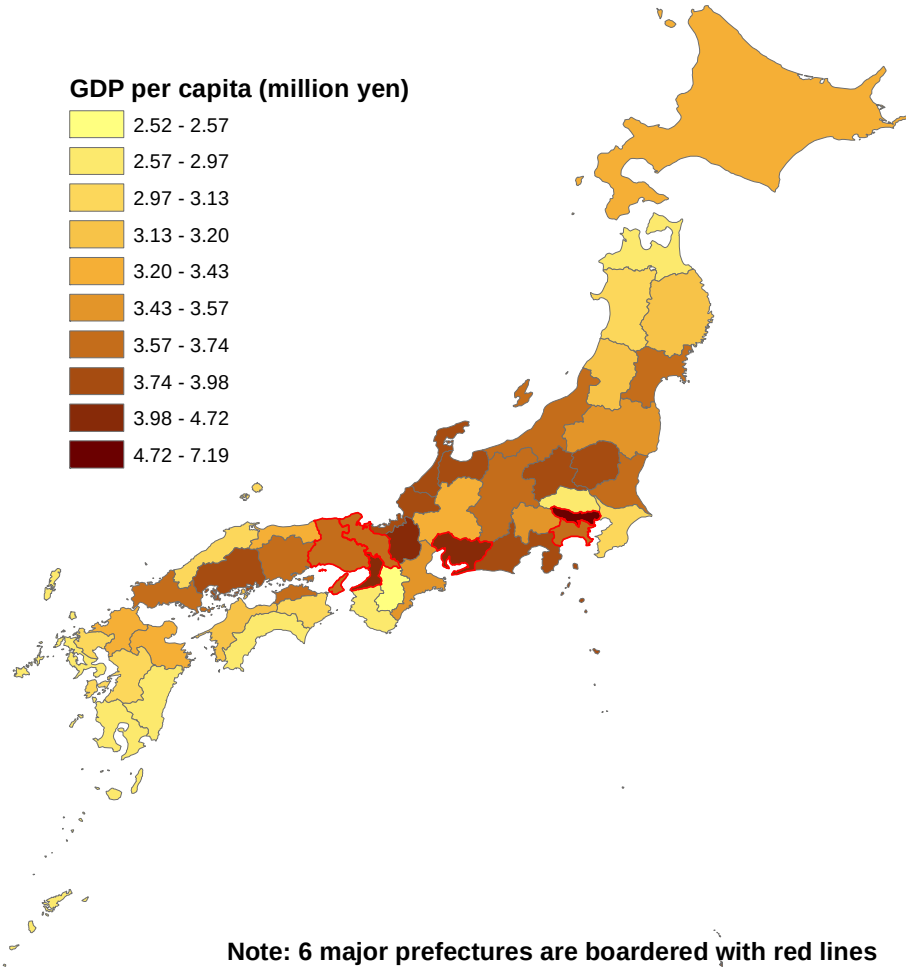
Note: 6 major prefectures are boardered with red lines

Figure 2
City Bank Share over 1991-2003



Note: 6 major prefectures are boardered with red lines

Figure 3
GDP per capita over 1991-2003



Note: 6 major prefectures are boardered with red lines

Table 1
Land price growth over 1980-1991 and 1991-2003 (six major prefectures are bolded in red)

Prefecture Code	Name	1980-1991	1991-2003
1	hokkaido	138.5%	-133.2%
2	aomori	55.2%	-81.5%
3	iwate	48.0%	-33.5%
4	miyagi	208.7%	-153.5%
5	akita	51.7%	-60.7%
6	yamagata	79.0%	-58.1%
7	fukushima	124.0%	-119.9%
8	ibaraki	109.5%	-102.3%
9	tochigi	120.5%	-129.2%
10	gunma	141.8%	-130.6%
11	saitama	191.4%	-163.0%
12	chiba	215.8%	-219.8%
13	**tokyo**	**238.5%**	**-179.7%**
14	**kanagawa**	**203.4%**	**-159.4%**
15	niigata	133.4%	-126.2%
16	toyama	138.6%	-133.4%
17	ishikawa	135.4%	-125.7%
18	fukui	85.4%	-97.9%
19	yamanashi	149.2%	-154.1%
20	nagano	90.3%	-107.1%
21	gifu	115.9%	-128.5%
22	shizuoka	174.4%	-153.3%
23	**aichi**	**241.3%**	**-186.3%**
24	mie	123.6%	-103.8%
25	shiga	170.4%	-135.4%
26	**kyoto**	**210.6%**	**-189.3%**
27	**osaka**	**259.8%**	**-240.7%**
28	**hyogo**	**173.5%**	**-169.7%**
29	nara	209.1%	-169.2%
30	wakayama	96.4%	-122.7%
31	tottori	105.1%	-52.9%
32	shimane	49.6%	-18.3%
33	okayama	126.9%	-147.7%
34	hiroshima	157.8%	-120.5%
35	yamaguchi	104.9%	-53.5%
36	tokushima	46.8%	-73.2%
37	kagawa	95.9%	-124.8%
38	ehime	100.2%	-102.1%
39	kochi	72.2%	-43.6%
40	fukuoka	194.8%	-117.8%
41	saga	54.5%	-38.2%
42	nagasaki	113.5%	-103.1%
43	kumamoto	150.6%	-122.9%
44	oita	103.3%	-85.8%
45	miyazaki	74.3%	-60.9%
46	kagoshima	68.8%	-68.0%
47	okinawa	191.7%	-130.0%
-	**Average**	**124.0%**	**-122.9%**
-	**6 major cities**	**182.3%**	**-197.5%**

Table 2
City bank share over 1980-1991 and 1991-2003 (six major prefectures are bolded in red)

Prefecture Code	Name	1980-1991	1991-2003
1	hokkaido	30.20%	19.00%
2	aomori	1.10%	1.00%
3	iwate	1.10%	0.90%
4	miyagi	4.00%	3.40%
5	akita	0.70%	0.60%
6	yamagata	0.90%	0.80%
7	fukushima	2.10%	1.80%
8	ibaraki	5.20%	3.40%
9	tochigi	8.30%	5.10%
10	gunma	9.60%	6.20%
11	saitama	58.60%	53.10%
12	chiba	28.10%	25.90%
13	**tokyo**	**69.20%**	**71.90%**
14	**kanagawa**	**44.70%**	**45.40%**
15	niigata	2.50%	1.80%
16	toyama	1.80%	1.50%
17	ishikawa	2.30%	2.10%
18	fukui	1.20%	1.10%
19	yamanashi	8.60%	5.70%
20	nagano	6.90%	5.30%
21	gifu	4.70%	3.60%
22	shizuoka	6.70%	5.90%
23	**aichi**	**33.90%**	**30.40%**
24	mie	5.20%	4.40%
25	shiga	3.70%	2.50%
26	**kyoto**	**24.00%**	**20.90%**
27	**osaka**	**41.60%**	**40.90%**
28	**hyogo**	**39.30%**	**36.60%**
29	nara	16.80%	16.30%
30	wakayama	5.20%	4.60%
31	tottori	0.80%	1.10%
32	shimane	1.90%	1.00%
33	okayama	4.10%	2.90%
34	hiroshima	4.90%	3.40%
35	yamaguchi	3.50%	3.00%
36	tokushima	1.20%	1.10%
37	kagawa	2.70%	3.00%
38	ehime	1.60%	1.40%
39	kochi	1.40%	1.30%
40	fukuoka	5.20%	3.90%
41	saga	1.60%	1.40%
42	nagasaki	1.70%	1.30%
43	kumamoto	2.40%	2.20%
44	oita	1.10%	1.10%
45	miyazaki	0.60%	0.60%
46	kagoshima	2.50%	1.90%
47	okinawa	0.30%	0.50%
-	**Average**	**3.70%**	**3.00%**

Table 3

Relationship between land prices, city bank share, loans and output from 1981-2003

Columns 1-4 report the results of fixed-effect regressions and Panels A and B in column 5 report the results of the first stage and second stage of an IV regression. *LOAN* and *GDP* represent growth of local loan and output, respectively. Δ*Local Land Price* is growth of local land price index and Δ*City Land Price* is growth of land price index for six major cities. *City Bank Share* is a ratio of the number of city bank branches in a prefecture to total branches of city banks and regional banks in a prefecture. Standard errors are adjusted for clustering within each prefecture. F-Statistics in column 5 is Kleibergen-Paap rk Wald F statistic (weak identification test).

	(1)	(2)	(3)	(4)	(5)
	Fixed-Effect Regression				**Panel A (1st Stage)**
Dependent Variable	LOAN	LOAN	GDP	GDP	LOAN
ΔLocal Land Price	0.0772***	0.0569***	0.0220***	0.0142**	0.0569***
	(0.0164)	(0.0151)	(0.00637)	(0.00628)	(0.0151)
ΔLocal Land Price*City Bank Share		0.0380		0.0128	0.0380
		(0.0794)		(0.0376)	(0.0794)
ΔCity Land Price*City Bank Share		0.261**		0.103*	0.261**
		(0.121)		(0.0560)	(0.121)
Constant	0.00173	0.000984	0.00295*	0.00267	
	(0.00316)	(0.00304)	(0.00175)	(0.00173)	
R-squared	0.895	0.897	0.714	0.717	0.897
F-Statistic	348.1	288.3	279.6	303.3	4.662
					Panel B (2nd Stage)
Dependent Variable					GDP
LOAN					0.395***
					(0.0998)
ΔLocal Land Price					-0.00827
					(0.00820)
ΔLocal Land Price*City Bank Share					-0.00218
					(0.0458)
Number of prefecture	41	41	41	41	41
Observations	943	943	943	943	943

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table 4

Relationship between land prices, city bank share, loans and output with distance controls from 1981-2003 (Panel Fixed-Effect IV)

LOAN and *GDP* represents growth of private loans and GDP. DISTANCE(TOKYO, YOKOHAMA, NAGOYA, KYOTO, OSAKA, KOBE) represents the distance to those cities in the parenthesis from each prefecture. DISTANCE(CLOSEST_CITY, AVG_CITY) is the distance to the closest city out of the six major cities from each prefecture and the average distance of the six major cities, respectively. GDP(CLOSEST_CITY, AVG_CITY) is output of the closest major city and the average output of the six major cities, respectively. The reported F-Statistics in columns 1-3 are Kleibergen-Paap rk Wald F statistic (weak identification test).

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A (1st Stage of IV Regression)			**Panel B (2nd Stage of IV Regression)**		
Dependent Variable	LOAN	LOAN	LOAN	GDP	GDP	GDP
ΔCity Land Price*City Bank Share	0.241**	0.249**	0.263**			
	(0.106)	(0.0967)	(0.102)			
LOAN				0.328***	0.379***	0.419***
				(0.113)	(0.109)	(0.104)
ΔLocal Land Price	0.0545***	0.0540***	0.0558***	-0.00368	-0.00838	-0.00976
	(0.0152)	(0.0137)	(0.0140)	(0.00854)	(0.00817)	(0.00796)
ΔLocal Land Price*City Bank Share	0.0384	0.0339	0.0248	-0.00168	-0.00305	-0.00934
	(0.0719)	(0.0686)	(0.0705)	(0.0455)	(0.0464)	(0.0484)
DISTANCE(TOKYO)*GDP(TOKYO)	-0.000118			3.22e-05		
	(0.000374)			(7.88e-05)		
DISTANCE(YOKOHAMA)*GDP(YOKOHAMA)	8.71e-05			0.000266***		
	(0.000352)			(9.75e-05)		
DISTANCE(NAGOYA)*GDP(NAGOYA)	-0.000332			0.000239		
	(0.000314)			(0.000167)		
DISTANCE(KYOTO)*GDP(KYOTO)	-0.000148			-0.000103		
	(0.000241)			(0.000128)		
DISTANCE(OSAKA)*GDP(OSAKA)	0.000180			-0.000163		
	(0.000478)			(0.000155)		
DISTANCE(KOBE)*GDP(KOBE)	-9.77e-05			6.01e-05		
	(0.000611)			(0.000174)		
DISTANCE(AVG_CITY)*GDP(AVG_CITY)		-0.000423			-0.000155*	
		(0.000327)			(8.88e-05)	
GDP(CLOSEST_CITY)			-0.0236			-0.0718
			(0.113)			(0.0752)
DISTANCE(CLOSEST_CITY)*GDP(CLOSEST_CITY)			-0.000281			-9.49e-05
			(0.000451)			(0.000149)
F-Statistic	5.213	6.628	6.592			
Observations	943	943	943	943	943	943

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table 5

Relationship between land prices, city bank share, loans and output with distance and GDP controls from 1981-2003 (Panel Fixed-Effect IV)

LOAN and *GDP* represent growth of private loans and GDP. GDP(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO) represents annual output growth of the prefecture in the parenthesis. DISTANCE(CLOSEST_CITY) is distance to the closest city out of the six major cities from each prefecture and GDP(CLOSEST_CITY) is output of the closest major city. DIFF[GDPpercapita(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO)] is the absolute difference in GDP per capital between each prefecture and the major prefecture in the parenthesis. The reported F-Statistics are Kleibergen-Paap rk Wald F statistic (weak identification test).

	(1)	(2)	(3)	(4)
	Panel A (1st Stage)		**Panel B (2nd Stage)**	
Dependent Variable	LOAN	LOAN	GDP	GDP
ΔCity Land Price*City Bank Share	0.233**	0.239**		
	(0.107)	(0.103)		
LOAN			0.362***	0.394***
			(0.123)	(0.113)
ΔLocal Land Price	0.0416***	0.0423***	-0.0104	-0.0111
	(0.0138)	(0.0136)	(0.00835)	(0.00817)
ΔLocal Land Price*City Bank Share	0.102	0.0957	0.0188	0.00952
	(0.0782)	(0.0754)	(0.0530)	(0.0568)
GDP(CLOSEST_CITY)		-0.0461		-0.0794
		(0.123)		(0.0751)
DISTANCE(CLOSEST_CITY)*GDP(CLOSEST_CITY)		-5.30e-05		-2.99e-05
		(0.000454)		(0.000145)
DIFF[GDPpercapita(TOKYO)]*GDP(TOKYO)	-0.430*	-0.411*	-0.0939	-0.0622
	(0.247)	(0.205)	(0.132)	(0.129)
DIFF[GDPpercapita(KANAGAWA)]*GDP(KANAGAWA)	0.197	0.189	0.259**	0.239**
	(0.194)	(0.199)	(0.117)	(0.121)
DIFF[GDPpercapita(AICHI)]*GDP(AICHI)	-0.152*	-0.142	-0.178**	-0.163**
	(0.0806)	(0.0980)	(0.0695)	(0.0785)
DIFF[GDPpercapita(KYOTO)]*GDP(KYOTO)	0.0453	0.0319	-0.140	-0.159
	(0.123)	(0.112)	(0.110)	(0.115)
DIFF[GDPpercapita(OSAKA)]*GDP(OSAKA)	-0.00932	-0.0118	-0.0277	-0.0285
	(0.169)	(0.155)	(0.0781)	(0.0760)
DIFF[GDPpercapita(HYOGO)]*GDP(HYOGO)	-0.0189	-0.00570	-0.00472	0.00950
	(0.418)	(0.388)	(0.157)	(0.157)
R-squared	0.901	0.901	0.646	0.628
F-Statistic	4.734	5.415		
Number of prefecture	41	41	41	41
Observations	943	943	943	943

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table 6

Relationship between land prices, city bank share, loans and output with standard errors adjusted for contemporaneous correlation from 1981-2003

Columns 1-4 report the results of panel corrected standard errors. Columns 1-4 report the results of Driscoll-Kraay standard errors. *LOAN* and *GDP* represent growth of local loan and output, respectively. Δ*Local Land Price* is growth of local land price index and Δ*City Land Price* is growth of land price index for six major cities. *City Bank Share* is a ratio of the number of city bank branches in a prefecture to total branches of city banks and regional banks in a prefecture.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel-Corrected Standard Errors				Driscoll-Kraay Standard Errors			
Dependent Variable	LOAN	LOAN	GDP	GDP	LOAN	LOAN	GDP	GDP
ΔLocal Land Price	0.0772***	0.0569**	0.0220***	0.0142*	0.0772***	0.0569***	0.0220***	0.0142***
	(0.0229)	(0.0225)	(0.00797)	(0.00855)	(0.0146)	(0.0129)	(0.00514)	(0.00522)
ΔLocal Land Price*City Bank Share		0.0380		0.0128		0.0380		0.0128
		(0.143)		(0.0392)		(0.0839)		(0.0267)
ΔCity Land Price*City Bank Share		0.261*		0.103**		0.261*		0.103***
		(0.157)		(0.0410)		(0.149)		(0.0281)
Constant	-0.00854	-0.0110	-0.000797	-0.00173	-0.00854	-0.0110	-0.000797	-0.00173
	(0.00824)	(0.00878)	(0.00247)	(0.00291)	(0.00682)	(0.00909)	(0.00251)	(0.00345)
Observations	943	943	943	943	943	943	943	943
Number of Prefectures	41	41	41	41	41	41	41	41
R-squared	0.895	0.898	0.718	0.721	0.895	0.898	0.718	0.721

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table 7

Relationship between land prices, city bank share, loans and small (less than and equal to 50 employees) and large business firm growth with distance and GDP controls from 1981-2001 (Panel Fixed-Effect IV)

LOAN represents the growth of private loans. *SMALL* and *LARGE* represent the growth of the number of small and large business firms, respectively (small firms are those with less than and equal to 50 employees). DISTANCE CONTROL shows whether or not the estimated equation includes distance controls (the interaction of the distance to the closest city and its GDP). GDP CONTROL shows whether or not the estimated equation includes GDP controls (absolute difference between prefectures and the six major cities). The first stage results for LARGE are not reported since they are identical to Panel A. The reported F-Statistics are Kleibergen-Paap rk Wald F statistic (weak identification test).

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A (1st Stage of IV Regression)					
Dependent Variable	LOAN	LOAN	LOAN			
ΔCity Land Price*City Bank Share	0.224	0.300*	0.303*			
	(0.183)	(0.153)	(0.156)			
ΔLocal Land Price	0.0387**	0.0399***	0.0202			
	(0.0163)	(0.0137)	(0.0156)			
ΔLocal Land Price*City Bank Share	0.0433	-0.0752	-0.0496			
	(0.236)	(0.192)	(0.202)			
DISTANCE CONTROL	NO	YES	YES			
GDP CONTROL	NO	NO	YES			
R-squared	0.788	0.802	0.833			
F-Statistic	1.509	3.840	3.750			
	Panel B (2nd Stage of IV Regression)					
Dependent Variable	SMALL50	SMALL50	SMALL50	LARGE50	LARGE50	LARGE50
LOAN	0.870	0.695**	0.684**	0.628	0.179	0.0749
	(0.595)	(0.332)	(0.299)	(0.584)	(0.569)	(0.551)
ΔLocal Land Price	-0.0376	-0.0319	-0.0278	-0.00582	0.00304	-0.0147
	(0.0322)	(0.0224)	(0.0213)	(0.0414)	(0.0369)	(0.0334)
ΔLocal Land Price*City Bank Share	0.0752	0.137	0.126	0.377**	0.451**	0.449**
	(0.187)	(0.0950)	(0.0940)	(0.175)	(0.186)	(0.200)
DISTANCE CONTROL	NO	YES	YES	NO	YES	YES
GDP CONTROL	NO	NO	YES	NO	NO	YES
Number of prefecture	41	41	41	41	41	41
Observations	164	164	164	164	164	164

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Appendix

Table A1
Summary Statistics

Variable	Mean	Standard Deviation			Minimum	Maximum	Observations	
		overall	between	within				
ΔLocal Land Price	.00542	.15804	.01114	.15766	-.78170	.89627	N =	943
ΔCity Land Price	-.00659	.18513	0	.18514	-.27779	.34899	N =	943
City Bank Share	.05552	.09863	.09784	.01946	0	.59453	N =	943
LOAN	.03680	.09932	.00804	.09900	-.42664	.54553	N =	943
GDP	.03072	.03391	.00410	.033668	-.06717	.16826	N =	943
DISTANCE(CLOSEST_CITY)	268.37	239.20	242.05	0	8.0292	1187.3	N =	943
DISTANCE(AVG_CITY)	427.30	245.40	248.31	0	154.26	1344.6	N =	943
DIFF[GDPpercapita(TOKYO)]	3.3928	.78748	.37160	.69662	1.4580	4.8201	N =	943
DIFF[GDPpercapita(KANAGAWA)]	.40509	.28740	.25384	.14025	.00016	1.2329	N =	943
DIFF[GDPpercapita(AICHI)]	1.2496	.43437	.37160	.23200	.26230	2.4106	N =	943
DIFF[GDPpercapita(KYOTO)]	.38216	.27508	.25054	.11985	.00074	1.2018	N =	943
DIFF[GDPpercapita(OSAKA)]	.99735	.43525	.37160	.23362	.02761	2.2072	N =	943
DIFF[GDPpercapita(HYOGO)]	.38394	.28690	.23729	.16528	.00013	1.3784	N =	943
Growth of Small Business Firms	-.00594	.03735	.01619	.03373	-.07910	.10657	N =	164
Growth of Large Business Firms	.06838	.13201	.05127	.12185	-.24512	.47692	N =	164

Table A2
Relationship between land prices, city bank share and output with distance controls from 1981-2003 (Panel Fixed-Effect)
DISTANCE(TOKYO, YOKOHAMA, NAGOYA, KYOTO, OSAKA, KOBE) and GDP(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO) represent the distance to the place from each prefecture and output of the place, respectively. DISTANCE(CLOSEST_CITY) is the distance to the closest city out of the six major cities from each prefecture and GDP(CLOSEST_CITY) is the output of the closest major city. DISTANCE(AVG_CITY) is the average distance to all the six major cities from each prefecture and GDP(AVG_CITY) is the average output of the six major cities.

	(1)	(2)	(3)
Dependent Variable	GDP	GDP	GDP
ΔCity Land Price*City Bank Share	0.0142**	0.0121*	0.0136**
	(0.00660)	(0.00622)	(0.00609)
ΔLocal Land Price	0.0109	0.00979	0.00103
	(0.0355)	(0.0342)	(0.0353)
ΔLocal Land Price*City Bank Share	0.0791*	0.0942**	0.110**
	(0.0410)	(0.0420)	(0.0450)
DISTANCE(TOKYO)*GDP(TOKYO)	-6.45e-06		
	(0.000107)		
DISTANCE(YOKOHAMA)*GDP(YOKOHAMA)	-0.000238**		
	(0.000110)		
DISTANCE(NAGOYA)*GDP(NAGOYA)	0.000130		
	(0.000151)		
DISTANCE(KYOTO)*GDP(KYOTO)	-0.000151		
	(0.000104)		
DISTANCE(OSAKA)*GDP(OSAKA)	-0.000104		
	(0.000119)		
DISTANCE(KOBE)*GDP(KOBE)	2.81e-05		
	(6.46e-05)		
DISTANCE(AVG_CITY)*GDP(AVG_CITY)		0.000315***	
		(8.79e-05)	
GDP(CLOSEST_CITY)			-0.0817
			(0.0568)
DISTANCE(CLOSEST_CITY)*GDP(CLOSEST_CITY)			0.000213***
			(6.27e-05)
Number of prefecture	41	41	41
Observations	943	943	943

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table A3
Relationship between land prices, city bank share and output with distance and GDP controls from 1981-2003 (Panel Fixed-Effect)

GDP(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO) represents annual output growth of the prefecture in the parenthesis. DISTANCE(CLOSEST_CITY) is the distance to the closest city out of the six major cities from each prefecture and GDP(CLOSEST_CITY) is the output of the closest major city. DIFF[GDPpercapita(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO)] is the absolute difference in GDP per capital between each prefecture and the major prefecture in the parenthesis.

	(1)	(2)
Dependent Variable	GDP	GDP
ΔCity Land Price*City Bank Share	0.0843	0.0940*
	(0.0520)	(0.0471)
ΔLocal Land Price	0.00465	0.00561
	(0.00677)	(0.00683)
ΔLocal Land Price*City Bank Share	0.0559	0.0472
	(0.0340)	(0.0331)
GDP(CLOSEST_CITY)		-0.0976
		(0.0587)
DISTANCE(CLOSEST_CITY)*GDP(CLOSEST_CITY)		-5.08e-05
		(8.99e-05)
DIFF[GDPpercapita(TOKYO)]*GDP(TOKYO)	-0.249***	-0.224**
	(0.0895)	(0.0858)
DIFF[GDPpercapita(KANAGAWA)]*GDP(KANAGAWA)	0.330***	0.313***
	(0.110)	(0.111)
DIFF[GDPpercapita(AICHI)]*GDP(AICHI)	-0.233***	-0.219***
	(0.0558)	(0.0558)
DIFF[GDPpercapita(KYOTO)]*GDP(KYOTO)	-0.124	-0.146
	(0.106)	(0.110)
DIFF[GDPpercapita(OSAKA)]*GDP(OSAKA)	-0.0310	-0.0331
	(0.0798)	(0.0759)
DIFF[GDPpercapita(HYOGO)]*GDP(HYOGO)	-0.0115	0.00726
	(0.0735)	(0.0753)
R-squared	0.737	0.740
F-Statistic	768.1	1075
Number of prefecture	41	41
Observations	943	943

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table A4

Relationship between land prices, city bank share and small (less than and equal to 50 employees) and large business firm growth with distance and GDP controls from 1981-2001 (Panel Fixed-Effect)

SMALL50 and *LARGE50* represent the growth of the number of small and large business firms, respectively (small firms are those with less than and equal to 50 employees). GDP(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO) represents annual output growth of the prefecture in the parenthesis. DISTANCE(CLOSEST_CITY) is the distance to the closest city out of the six major cities from each prefecture and GDP(CLOSEST_CITY) is the output of the closest major city.
DIFF[GDPpercapita(TOKYO, KNAGAWA, AICHI, KYOTO, OSAKA, HYOGO)] is the absolute difference in GDP per capital between each prefecture and the major prefecture in the parenthesis.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	SMALL50	SMALL50	SMALL50	LARGE50	LARGE50	LARGE50
ΔCity Land Price*City Bank Share	0.195***	0.208***	0.207***	0.141	0.0536	0.0227
	(0.0513)	(0.0535)	(0.0631)	(0.220)	(0.198)	(0.185)
ΔLocal Land Price	-0.00388	-0.00417	-0.0140	0.0185	0.0102	-0.0132
	(0.0124)	(0.0129)	(0.0150)	(0.0271)	(0.0275)	(0.0319)
ΔLocal Land Price*City Bank Share	0.113	0.0847	0.0918	0.404	0.437*	0.445*
	(0.0672)	(0.0797)	(0.0915)	(0.271)	(0.252)	(0.241)
GDP(CLOSEST_CITY)		0.0228	-0.0124		0.406**	0.568***
		(0.0688)	(0.0627)		(0.168)	(0.169)
DISTANCE(CLOSEST_CITY)*GDP(CLOSEST_CITY)		-0.000140	-1.41e-05		-0.000241	-0.000503
		(0.000217)	(0.000190)		(0.000296)	(0.000330)
DIFF[GDPpercapita(TOKYO)]*GDP(TOKYO)			-0.614**			-1.171*
			(0.228)			(0.622)
DIFF[GDPpercapita(KANAGAWA)]*GDP(KANAGAWA)			0.116			-0.248
			(0.297)			(0.844)
DIFF[GDPpercapita(AICHI)]*GDP(AICHI)			-2.048***			-3.224
			(0.625)			(1.975)
DIFF[GDPpercapita(KYOTO)]*GDP(KYOTO)			-0.796***			-0.941*
			(0.235)			(0.541)
DIFF[GDPpercapita(OSAKA)]*GDP(OSAKA)			3.368***			7.406**
			(1.127)			(3.356)
DIFF[GDPpercapita(HYOGO)]*GDP(HYOGO)			0.638**			0.524
			(0.273)			(0.793)
Constant	-0.0547***	-0.0551***	-0.0461***	0.00495	0.0122*	0.0339
	(0.00227)	(0.00237)	(0.0120)	(0.00561)	(0.00611)	(0.0318)
R-squared	0.877	0.878	0.903	0.732	0.746	0.767
F-Statistic	126.8	108.2	127.8	81.49	61.53	53.55
Number of prefecture	41	41	41	41	41	41
Observations	164	164	164	164	164	164

*** p<0.01, ** p<0.05, * p<0.1
Standard errors in parentheses

Table A5

Relationship between land prices, city bank share and small (less than and equal to 30 employees) and large business firm growth with distance and GDP controls from 1981-2001 (Panel Fixed-Effect IV)

SMALL30 and *LARGE30* represent the growth of the number of small and large business firms, respectively (small firms are those with less than 30 employees). DISTANCE CONTROL shows whether or not the estimated equation includes distance controls (the interaction of the distance to the closest city and its GDP). GDP CONTROL shows whether or not the estimated equation includes GDP controls (absolute difference between prefectures and the six major cities). The first stage results for LARGE are not reported since they are identical to Panel A.

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel B (2nd Stage of IV Regression)					
Dependent Variable	SMALL30	SMALL30	SMALL30	LARGE30	LARGE30	LARGE30
LOAN	0.882	0.701**	0.688**	0.865*	0.584	0.555
	(0.618)	(0.343)	(0.306)	(0.474)	(0.418)	(0.360)
ΔLocal Land Price	-0.0390	-0.0331	-0.0282	0.0167	0.0224	0.00256
	(0.0329)	(0.0227)	(0.0215)	(0.0387)	(0.0329)	(0.0344)
ΔLocal Land Price*City Bank Share	0.0687	0.133	0.120	0.288*	0.337**	0.348**
	(0.195)	(0.0976)	(0.0958)	(0.156)	(0.172)	(0.177)
DISTANCE CONTROL	NO	YES	YES	NO	YES	YES
GDP CONTROL	NO	NO	YES	NO	NO	YES
Number of prefecture	41	41	41	41	41	41
Observations	164	164	164	164	164	164

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

Table A6

Relationship between land prices, city bank share and small (less than and equal to 100 employees) and large business firm growth with distance and GDP controls from 1981-2001 (Panel Fixed-Effect IV)

SMALL100 and *LARGE100* represent the growth of the number of small and large business firms, respectively (small firms are those with less than and equal to 100 employees). DISTANCE CONTROL shows whether or not the estimated equation includes distance controls (the interaction of the distance to the closest city and its GDP). GDP CONTROL shows whether or not the estimated equation includes GDP controls (absolute difference between prefectures and the six major cities). The first stage results for LARGE are not reported since they are identical to Panel A.

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel B (2nd Stage of IV Regression)					
Dependent Variable	SMALL100	SMALL100	SMALL100	LARGE100	LARGE100	LARGE100
LOAN	0.867	0.688**	0.675**	-0.731	-0.678	-0.663
	(0.585)	(0.323)	(0.292)	(1.717)	(1.053)	(1.007)
ΔLocal Land Price	-0.0378	-0.0320	-0.0280	0.0910	0.0826	0.0363
	(0.0320)	(0.0222)	(0.0214)	(0.0818)	(0.0614)	(0.0589)
ΔLocal Land Price*City Bank Share	0.0825	0.145	0.133	0.165	0.0459	0.0456
	(0.184)	(0.0932)	(0.0925)	(0.549)	(0.327)	(0.340)
DISTANCE CONTROL	NO	YES	YES	NO	YES	YES
GDP CONTROL	NO	NO	YES	NO	NO	YES
Number of prefecture	41	41	41	41	41	41
Observations	164	164	164	164	164	164

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses