

The Effect of Bank Credit on Asset Prices:

Evidence from the Japanese Real Estate Boom during the 1980s

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Abstract

This paper studies whether bank credit fuels asset prices. Financial deregulation during the 1980s allowed keiretsus to obtain finance publicly and reduce their dependence on banks. Banks that lost these blue-chip customers increased their property lending, and serve as an instrument for the supply of real estate loans. Using this instrument, I find that a 0.01 increase in a prefecture's real estate loans as a share of total loans causes 14-20% higher land inflation compared with other prefectures over the 1981-1991 period. The timing of losses of keiretsu customers also coincides with subsequent land inflation in a prefecture.

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1 Introduction

The purpose of this paper is to determine whether bank credit affects asset prices. The Japanese real estate boom during the 1980s provides a unique episode to help answer this question. In particular, this paper studies the extent to which an exogenous shock to the supply of bank credit fuels land prices. I show that I have an instrument for the supply of real estate loans, which is the decrease in banks' loans to keiretsu firms beginning in the early 1980s. I then take advantage of the cross-sectional and time-series variation in Japan's 47 prefectures. Using this instrument, I find that a 0.01 increase in a prefecture's real estate loans as a share of total loans causes 14-20% higher land inflation over the 1981-1991 period. The timing of losses of keiretsu customers also coincides with subsequent land inflation in a prefecture.

There is consensus in the literature on Japan that a shock in the 1980s led banks to increase lending in the real estate sector. The regulatory change that decreased the demand for loans by keiretsus is a candidate for that shock. The first part of this paper shows that lending to keiretsus declined as a result of the financial deregulation, which enabled keiretsu firms to obtain financing from the public market. This supports the Hoshi and Kashyap (2000, 2001) (hereafter HK) hypothesis, which is that large and well-known firms (mostly keiretsus) substantially reduced their dependence on bank financing by issuing bonds during the 1980s. Therefore it was a choice by firms to move away from banks. In contrast, the "good opportunities" hypothesis would imply that banks chose to move away from keiretsu firms. Real estate may have been perceived to have good opportunities, rationalizing a shift of bank lending to the real estate sector during the 1980s¹. The results of extensive tests do not suggest that this was the case in Japan.

The regulatory change during the 1980s was not the first to change the financial landscape in Japan. The history of the Japanese financial system runs contrary to the popular opinion that it is unique in its emphasis on banks. This has been a relatively recent phenomenon. The history of the system evolved as an outcome of regulatory changes which in turn were endogenous to macroeconomic shocks. Among the more important shocks to the Japanese economy were World War II and the oil shocks in the 1970s (see Hoshi and Kashyap 2001). It is interesting that firms (including small and medium size enterprises) funded themselves mostly through the capital market from the Meiji restoration until the 1930s. For example, the share of bond and equity finance in the external sources of funds for non-financial firms reached 0.7 in 1935 (Ueda 1994). The government's motivation to restrict competition was a result of the 1930s and war. It was at this time that the government took control of the allocation of credit and used banks to implement its preference

towards funding the military. During the Japanese miracle period from the 1950s to the early 1970s, the government's priority shifted from the military to industry. As a result, the system did not revert to the prewar emphasis on capital markets. The savings restrictions on households guaranteed the flow of funds to the banks, which in turn channeled them to keiretsus.

It was only with the development of the Japanese corporate bond market that keiretsus decreased their demand for bank loans. I establish that this shock can be used to assess whether bank credit affects asset prices. The main part of the paper then explains the Japanese bubble in land prices and its differential impact across Japan's prefectures using the keiretsu loan shock as an instrument. When banks lost their keiretsu customers, they increased their lending to the real estate sector and that in turn fueled land prices.

Previous papers assessing why banks in Japan increased their real estate lending during the 1980s take land prices as given, overlooking the idea that the increase of bank credit in real estate may itself have contributed to aggregate land price inflation. In standard asset pricing models with no credit market imperfections, the willingness of banks to offer loans would have no impact on asset prices. Therefore, the presence of credit constraints is fundamental to the empirical analysis in this paper. Kiyotaki and Moore (1997) provide a useful frame of reference. They assign a dual role to assets: they are not just factors of production, but also serve as collateral for loans. As a result, credit limits are affected by asset prices. Therefore, a firm's borrowing capacity and its demand for credit will be affected by changes in asset prices. A positive productivity shock causes land prices to increase and raises the net worth of firms. This allows firms to borrow more, leading to a demand for land that increases with its price².

However, this paper is concerned with the effects of allowing for shocks to the supply of loans. In a separate note which extends the analysis in Kiyotaki and Moore (1997)³, I show that asset prices (and asset holdings) can also be affected by shocks to credit limits. A similar credit cycle is created when banks ease binding credit limits independently of firms' net worth, allowing them to borrow more, invest more in the asset, and hence drive up the price of the asset.

Gerlach and Peng (2005) note that there can be a role for credit in asset valuations, an idea which goes back to Kindleberger (1978). This is also in the spirit of Ito and Iwaisako (1996). In a setup with asymmetric information, they show that the extent to which banks are willing to extend credit matters for projects that require acquisition of land or stocks. Using a VAR, they find that total bank loans to real estate lead the aggregate real land price in Japan, while only current land price inflation helps explain the growth of bank loans. Gerlach and Peng find instead that the direction of influence goes from demand and property prices to bank credit when looking at aggregate data

from Hong Kong.

The main contribution of this paper is in isolating the effect of bank credit on real estate prices using an instrument for the supply of real estate loans. A second contribution is in applying the analysis to disaggregated data. The results are relevant to the current policy debate on land price inflation, and the role of banks in fueling real estate lending. The closest paper to this one is Peek and Rosengren (2000), which studies the effect of an exogenous negative loan supply shock (originating in Japan) on the United States. They find that the decline in Japanese bank lending contributed to a substantial decline in new construction projects in the US.

The rest of this paper is organized as follows. Section 2 tests whether the fall in keiretsu loans was driven by firms or banks. Having determined that the evidence supports the former, Section 3 assesses whether, and to what extent, bank credit affects land prices. Section 4 concludes.

2 The Fall in Lending to Keiretsus: Firm or Bank Choice?

Japan liberalized its financial system in the 1980s. As part of this deregulation, firms reduced their borrowing from banks. The Hoshi and Kashyap (HK) hypothesis is that large and well-known firms substantially reduced their dependence on bank financing by issuing bonds during the 1980s (with the market substituting reputation for monitoring). In contrast, the "good opportunities" hypothesis implies that banks chose to move away from keiretsus to the more promising real estate sector.

In this section, I briefly summarize existing evidence for the HK hypothesis, i.e. the idea that the development of the Japanese corporate bond market caused an exogenous fall in demand for bank loans, which then fueled an increase in bank real estate lending (as shown in Figure 1). I then present new evidence consistent with the HK hypothesis using both bank-level and firm-level data.

2.1 Previous Literature

Hoshi and Kashyap articulate their view in several papers, drawing several stylized facts from data on publicly traded Japanese firms (HK 2000 and 2001). First, there was a substantial decrease in bank borrowing among large firms, and particularly manufacturing firms. The ratio of bank debt to total assets for large manufacturing firms fell from 0.35 in the 1970s to below 0.15 by 1990. Second, firms replaced bank loans with bond financing. Third, the shift appears to have occurred relatively soon after they became eligible to do so. There was rationing in the corporate bond market prior to 1976. Beginning that year, a firm could issue as many bonds as it chose provided that it met specific

accounting criteria (see Appendix 1 and Table A3 for details). HK also find that banks which relied more heavily on customers with access to capital markets subsequently under-performed compared with other banks.

Hoshi (2001) tests the hypothesis in two steps using individual bank data. He finds that banks that increased the proportion of loans to the real estate sector during the 1980s ended up with a higher non-performing loan ratio in 1998. He then uses a panel of 150 banks to regress the change in a bank's real estate loan ratio on lagged changes in keiretsu loan ratios, controlling for land prices and year effects. Banks experiencing a greater decline in their keiretsu loan share subsequently increased their real estate loans during the 1980s. Although this offers support for the HK view, it does not rule out the "good opportunities" view. It is better to distinguish between the two hypotheses using firm data and I will take this up in Section 2.2.3 below.

Hoshi, Kashyap and Scharfstein (1993) document that the share of bank debt for the 112 firms that were permitted to continuously issue convertible bonds from 1982 to 1989 was lower and increasingly so as compared with the remaining 424 firms in their sample. Weinstein and Yafeh (1998) emphasize the holdup problem of firms by banks prior to liberalization. They find that although close bank-firm ties increase the availability of capital to manufacturing firms, the associated cost of capital is higher. Much of the difference in capital use between affiliated and unaffiliated firms disappeared by 1981. They interpret this as evidence supporting the importance of the liberalization of the foreign exchange law in 1980.

Even if firms reduced their borrowing from banks in favor of bond markets, it does not fully explain the shift of banks to real estate. Faced with a decrease in demand for bank loans from keiretsus, other alternatives include looking for other loans, investing in government bonds, seeking foreign opportunities, or choosing to reduce deposit rates and shrink in size. These possibilities are considered in Section 2.2.2, but first I will summarize the existing literature.

Hoshi and Kashyap argue that gradual deregulation, combined with the policy of limited liability, can explain why banks did not shrink as they lost their keiretsu customers. One implication of the gradual deregulation was that households had limited savings options and continued to channel their funds to banks. When combined with interest rate controls to ensure positive profit margins and a policy of government deposit guarantees, banks attempted to make up through volume the decrease in margins during this period. The "convoy" system in Japan ensured that no bank was allowed to go bankrupt. Therefore the government assumed banks' credit risk. As the main bank system receded in importance, it was not effectively replaced with a proper regulatory system to evaluate and monitor risk-taking by banks. Further implications of deregulation are highlighted in

Appendix 1. Variations of these arguments are also raised by Kitigawa and Kurosawa (1994) and Cargill, Hutchison and Ito (1997), among others.

To explain why banks predominantly moved to real estate and not to other types of loans, government bonds or foreign opportunities, Hoshi (2001) argues that banks relied on collateralized loans because they lacked close knowledge of new customers. Land was considered the most secure collateral because its value had not fallen in the postwar period. Therefore a plausible explanation is that banks may (on average) have wrongly perceived low volatility in real estate. This view is echoed by Ueda (1994) who contends that banks actively competed for loans related to real estate because credit analysis was considered relatively easy as it consisted of forecasting future land prices, and these prices were expected to increase.

The actions of the Bank of Japan and the Ministry of Finance during the real estate boom are also interesting. Ueda (1994) argues that although the Bank of Japan and the Ministry of Finance were concerned about the increase in land prices, they did not try to stop it because the general price level was stable and they were unable to foresee the collapse. Only in April 1990 did they introduce quantitative controls limiting bank lending in real estate. Ito (2004) suggests that this action contributed to the end of the land bubble. This supports the contention that it was a bank-led real estate boom as opposed to one driven by real estate demand.

2.2 New Empirical Tests on Firm or Bank Choice

2.2.1 Stylized Evidence

I now present new evidence consistent with the HK hypothesis. Firm survey data provides insight into whether keiretsus chose to reduce bank loans or vice versa. The Bank of Japan conducts a quarterly survey of enterprises with questions on short-term economic conditions, known as the Tankan survey. One of the questions asks firms to assess the lending attitudes of financial institutions. Figure 2 shows the "diffusion" index for manufacturing and real estate & construction enterprises, respectively. Large manufacturing enterprises serve as a proxy for keiretsus. A higher value of the index indicates that more firms perceived accommodative lending conditions. If the "good opportunities" hypothesis were correct, it would be expected that the index (or its difference) for real estate and construction firms would be higher than that for large manufacturing firms during the 1980s. This is not the case. In fact, during the first part of the 1980s when the share of bank loans to keiretsus declined from around 0.15 to 0.05 (Figure 1), large manufacturing enterprises reported increasingly accommodative lending attitudes in contrast to the stable lending attitudes perceived

by construction and real estate firms.

Table 1 presents evidence on the source of flow of funds to the real estate market based on data reported in Cargill, Hutchison and Ito (1997). If large real estate companies with the ability to borrow in the bond market were fueling the boom, bank lending would not be expected to be the dominant means of financing real estate investment. It turns out that banks accounted for the principal source of funds (59 out of 120 trillion yen total at the peak of the boom in June 1991). Non-bank financial institutions accounted for another 50-55 trillion yen, insurance companies, credit unions and foreign banks accounted for 9.1 and only a residual of 2 came from the capital markets. It is important to note that a major share of non-bank financial institutions were specialized housing loan companies created as subsidiaries of banks in the 1970s (known as "jusen"). Therefore if we account for the indirect flow of funds from banks to real estate via non-banks, banks would account for the vast majority of the flow of funds to real estate (since 72 trillion yen is reported to be the flow of funds from banks to non-banks).

Table 1 also compares the behavior of foreign banks with that of Japanese banks. The flow of funds from foreign banks to real estate was 0.6 trillion yen compared with 59 trillion yen for domestic banks. This needs to be first normalized by a valid measure of their investments in Japan⁴. The flow of funds to real estate as a share of loans extended in fiscal year 1991 is 0.114 for domestically licensed banks compared with only 0.039 for foreign banks in Japan. This adds to the evidence against the "good opportunities" demand view, under which we would expect foreign banks to behave similarly to domestic banks.

2.2.2 Bank-level Evidence

A more stringent test can be carried out with individual bank balance sheet and income statement data. If the HK hypothesis were correct, then those banks that lost keiretsus would have excess funds. Under the alternative hypothesis, banks would actively seek funds to lend in the real estate sector, as the return on these loans was greater than the return on keiretsu loans. In this case, banks that increase their lending to the real estate sector would be expected to increase their deposit rates (and quantities of borrowed funds) compared with other banks. Regression results are shown in Table 2. Data on 150 banks for the years 1983-90 are used and following Hoshi (2001) all regressions are panel fixed effects that include year dummies and two lags of prefectural land inflation. Sample summary statistics are shown in Table A1. Columns (1) to (3) of Table 2 are estimated with the real estate loans to total loans ratio (first difference) as the dependent variable.

Column (1) is a similar model to that shown in Table 9.1 in Hoshi (2001). Four lags of the

keiretsu loan share (first difference) are included on the right hand side. The results are significant, indicating that those banks that lost more keiretsu loans subsequently increased their real estate lending. The estimates suggest that for a 0.01 annual decrease (over 4 years) in a bank's share of keiretsu loans to total loans, its lending in real estate increases by 0.0013 measured as a proportion of total loans. Column (2) adds four lags of the difference between loan and deposit rates to the model in column (1). Those banks that experienced falling margins subsequently increased their real estate lending, a point raised in the literature (e.g. Hoshi and Kashyap 2001; Ueda 1994).

Column (3) provides one test for whether banks that decreased their keiretsu loans and moved to real estate also increased their deposit rates to obtain funds. Therefore column (3) includes the interaction between the four lags of keiretsu loans with the contemporaneous change in the deposit rate. Under the null hypothesis of "good opportunities", the coefficients will be negative. There is no support for this hypothesis. It is possible to test whether these banks decreased their lending rates, but under the HK hypothesis, banks with excess funds are also predicted to decrease their lending rates. Further, the selection effect leads to an empirical problem with the lending side because banks with excess funds may not maintain a constant portfolio of credit risks, and their average lending rate can rise.

Column (4) provides a more direct test. It shows the estimates from a model with the deposit interest rate as the dependent variable. On the right hand side are the four lags of the keiretsu loan shares. The results, which are significant, indicate that those banks that lost keiretsu loans subsequently decreased their deposit rate relative to other banks, suggesting that they had excess funds. Therefore, the bank-level results do not support the hypothesis that there were good opportunities in real estate that rationalized a bank shift away from keiretsus⁵.

One potential criticism is that the results in Table 2 do not account for the different types of banks (although fixed effects are included and variables such as keiretsu loans are normalized by each bank's total loans). There may be institutional and size differences between city banks, long-term credit banks, trust banks, and regional banks that are not fully accounted for, and the results may be generated by a subset of the banks. For example, and as shown in the summary statistics in Table A1, city banks, followed by long-term and trust banks, are the largest banks. To account for this possibility, the basic regression in column (1) was repeated including dummies for the 5 different bank types (random effects had to be used instead of fixed effects because of the inclusion of bank-type dummies). The relation between a bank's loss of keiretsu loans and its increase in real estate lending is robust. In the interest of brevity, all of the robustness checks discussed in the remainder of this section are available on the author's website. I also repeated the regression using

only city banks, long-term and trust banks, and regional banks, respectively. The results do not appear to be driven by the larger city, long-term and trust banks, and are, in fact, stronger among the regional banks (although the degrees of freedom are reduced among the former because there are only 11 city banks and 10 long-term and trust banks). Finally, the results are robust to the different bank sizes⁶.

To address whether banks predominantly increased lending to the real estate market, sought other loans, invested in government bonds, or looked for foreign opportunities, I begin by regressing the (change) in the amount of loans to small firms as a share of total loans on the same variables shown in column (1) of Table 2. There is mixed evidence on the sign of the keiretsu loan shares. However, the sum is negative, indicating that banks which lost more keiretsu loans subsequently increased their lending to small firms. Banks could also increase their holdings of government bonds. I therefore replace the dependent variable with the change in government bonds (as a share of total assets) in a bank's own account. The results are mixed but the overall sum is negative, suggesting that those banks that lost keiretsu loans subsequently increased their holdings of government bonds. However, the results for government bonds and lending to small firms are weaker than the results for real estate lending.

A third option available to a bank facing an exogenous fall in keiretsus' demand for loans is to look for foreign opportunities. Unfortunately, the Nikkei NEEDS dataset does not contain data on Japanese banks' foreign loans or foreign investments. I therefore follow Hoshi (2001) in using the proportion of a bank's branches located overseas as a proxy measure. There is no statistical relationship between a bank's loss of keiretsu loans and a subsequent increase in its foreign activity as measured by its overseas branches.

Finally I regress loans to sectors other than real estate on the same right-hand side variables. The sectors are construction, non-bank financial institutions, agriculture, forestry and fishing, individuals & others, local governments, mining, manufacturing, services, transportation & telecommunication, utilities, and wholesale & retail industries. In fact, only loans to real estate increase when keiretsu loans decrease. The results confirm that keiretsu loans tended to be in sectors with "large" firms such as manufacturing, transportation & telecommunication, utilities, and wholesale & retail industries. Loans in these sectors were significantly and positively related to the lags of keiretsu loans. In contrast, there was little or no effect on loans in agriculture, forestry & fishing, individuals & others, local governments, mining, and service industries.

2.2.3 Firm-level Evidence

In this section, I examine whether firms chose to reduce bank loans using firm-level accounting data from the Development Bank of Japan (DBJ) Corporate Finance data set. This data set comprises companies listed on the Tokyo, Osaka, and Nagoya stock exchanges⁷. An eligible-to-issue time-varying dummy was created based on the bond issuance criteria (BIC) reported in Table A3. Table 3 reports the number of companies eligible to issue secured convertible bonds for each year from 1976 to 1990. The number steadily increased from a low of 65 companies in 1976 (0.22 of the total listed) to 1374 by 1990 (0.72 of the total listed). The top panel of Table 4 summarizes the average ratio of a firm's bank debt to its total bank and bond debt according to whether a firm was eligible to issue bonds or not. I use the term eligible to refer to those firms that later became eligible to issue convertible bonds throughout the 1982-89 period, following Hoshi et al (1993). In 1975 (the base year) when credit was still rationed, both eligible and ineligible firms had a bank debt ratio of approximately 0.89. By 1982, this ratio was 0.686 for eligible firms and remained 0.888 for ineligible firms. By 1989, the ratio was 0.426 for eligible firms and 0.757 for ineligible firms. It therefore appears that firms greatly reduced their dependence on bank debt upon qualifying to issue bonds.

More formal results are reported in Table 5, column (1). The dependent variable is a firm's bank debt to its total debt. The estimation is an unbalanced panel fixed effects from 1977 to 1991 for 1291 companies. The ratio of bank debt is regressed on the first lag of the eligible-to-issue dummy and year dummies. The eligibility dummy is significant at the 1% level and suggests that when a firm becomes eligible to issue, its share of bank debt falls by 0.07. Column (2) controls for other variables that a priori may be thought to affect the bank debt ratio such as firm accounting variables (leverage, collateral, total assets, and all the separate accounting variables used to determine bond issuance eligibility) and land inflation in the firm's prefecture. The latter is included to control for the possibility that high land inflation may be a measure of good opportunities in the prefecture's real estate. If so, firms located in that prefecture would experience a fall in their bank debt if their banks shifted lending to real estate. The coefficient remains significant at the 1% level, although it is reduced to 0.05⁸.

Evidence from the DBJ database is also consistent with the flow of funds figures to real estate reported in Table 1. The lower panel of Table 4 reports the ratio of a firm's bank debt to total debt for firms in the real estate, real estate & construction, and the manufacturing sector for comparison. The share of bank debt in 1976 is around 0.94 for real estate firms and 0.89 for manufacturing firms. By 1986, the share had declined to 0.59 for manufacturing firms but only to 0.85 for real estate

firms. Even by 1990 and at the peak of the boom, the major part of real estate firms' debt was owed to banks (0.73, and 0.66 among the subset of real estate firms fully eligible to issue bonds throughout the 1982-89 period). Therefore the evidence suggests that large real estate companies with the ability to borrow in the bond market were not fueling the boom. Bank lending remained the dominant means of financing real estate investment during the 1980s, even for relatively large companies. The DBJ database is composed of large companies as they are listed on Japan's major stock exchanges. The results would likely be even more pronounced if data were available on financing of smaller real estate companies⁹.

3 Shocks to the Supply of Bank Credit: Is There an Effect on Land Prices?

This section uses bank loans to keiretsu firms to instrument for the supply of real estate loans in order to determine whether bank credit influences land prices. The question is assessed by taking both cross-sectional and time-series' slices of the data on Japan's 47 prefectures. To briefly review the theory for potential causality running from bank credit to asset prices, in the presence of credit constraints, credit limits are affected by the price of assets used as collateral for loans. However, the extent to which banks are willing to finance projects that require the acquisition of assets also matters. Asset prices can be positively affected by slackened credit limits and an increase in available liquidity.

3.1 Empirical Estimation

Balance sheet data on 150 banks were compiled from the Nikkei NEEDS database. These data were used in section 2.2.2 when testing the HK hypothesis. The variables of interest in this section include loans disaggregated by sector (e.g. real estate), loans to keiretsu and listed firms, and the location of a bank's headquarters. The individual bank data is then aggregated by prefecture. Table A2 presents sample summary statistics. The maximum sample of the data is from 1976 to 1998. However the effective sample is from 1981 to 1993 because prefecture land prices are available beginning in 1980 and keiretsu loan numbers end in 1993. This is not constraining because the 1981 to 1993 sample is the relevant period to study the real estate boom.

Land price data is available from the annual prefectural land price survey, conducted by the Ministry of Land, Infrastructure and Transport on Japan's 47 prefectures and reported in the Japan

Statistical Yearbook. Figure 3 shows real land price inflation figures, which are expressed as annual rates. Averages for the country and the largest six cities are presented in Figure 3a. It is interesting that the country average lags the increase in land prices in the 6 largest cities. Both series lag the stock market (Nikkei index) which collapsed in 1990, compared with 1992 for land prices. Figure 3b presents prefecture-specific data for Tokyo and Osaka (the two largest cities), along with rates for Hokkaido and Okinawa (two prefectures at geographic opposite ends of Japan). There is considerable variation across prefectures, which can also be seen in the summary statistics in Table A2. The inflation rate peaked in Tokyo in the mid-1980s, compared with the early 1990s for Okinawa. The average annual real land price inflation rate over the period 1983 to 1993 was 6.4% Japan-wide, 10.8% for Tokyo, and 11.1% for Osaka.

Finally, information on prefectural demand conditions was obtained from the Japan Statistical Yearbook (various annual issues)¹⁰. Among the series available are population, job openings and applications, income per capita and so on. These are used to control for demand conditions that may also affect land prices.

In order to explain the Japanese real estate boom, the empirical estimation slices the data in two ways. The first view is to determine if prefectures where banks lost the most keiretsu loans as a share of total loans had the largest increase in land prices. This takes advantage of the cross-sectional variation. The second view is to determine if the timing of keiretsu losses coincides with the subsequent increase in a prefecture's land prices. This takes advantage of the time-series variation in the data. It is worth pointing out that even if lending is not limited to the prefecture the bank is headquartered in (and it is not), this would go against finding an effect on prefecture land prices¹¹. The cross-sectional regression takes the 1991-81 difference in the variables across the 47 prefectures,

$$\Delta \ln(\text{real land price}_{i,1991-81}) = \alpha_i + \beta \Delta \left(\frac{\text{keiretsu}}{\text{total loans}} \right)_{i,1991-81} + \gamma X_{i,1991-81} + \varepsilon_i, \quad (1)$$

where i indexes a prefecture, t indexes a year, and X are demand controls. In addition, land inflation is regressed on the variable of interest, the change in real estate loans, $\Delta \left(\frac{\text{real estate loans}}{\text{total loans}} \right)_{i,1991-81}$, where the latter is instrumented with $\Delta \left(\frac{\text{keiretsu}}{\text{total loans}} \right)_{i,1991-81}$.

The 1981-1993 time-series empirical estimation takes the fixed effects panel form,

$$\Delta \ln(\text{real land price}_{i,t}) = \alpha_i + \sum_{j=0}^4 \beta_j \Delta \left(\frac{\text{keiretsu}}{\text{total loans}} \right)_{i,t-j} + \text{year dummies} + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (2)$$

$$\Delta \ln(\text{real land price}_{i,t}) = \alpha_i + \beta \Delta \left(\frac{\text{real estate loans}}{\text{total loans}} \right)_{i,t} + \text{year dummies} + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where i indexes a prefecture, t indexes a year, X are demand controls, and $\Delta \left(\frac{\text{real estate loans}}{\text{total loans}} \right)_{i,t}$ is instrumented with $\Delta \left(\frac{\text{keiretsu}}{\text{total loans}} \right)_{i,t}$ and its four lags¹². Note that the dependent variable, land price inflation, is expressed as an annual rate compared with the cross-section regressions, in which inflation is expressed as the rate over the 1981-91 period.

3.2 Results

Table 6 reports the results of the cross-section regression, equation 1. For a 0.01 decrease in the share of keiretsu loans to total loans in a prefecture, land inflation increases by 4.7% (column (1)). This result is significant at the 1% level. Note that the average share of keiretsu loans is 0.06 during the estimated sample. Column (3) reports the IV results when instrumenting for the real estate loan share with the keiretsu loan share. The estimate is 20.3% and is significant at the 1% level. This suggests that prefectures whose banks experienced a greater loss in their proportion of keiretsu loans experienced a larger increase in real estate lending which fueled land inflation¹³. Column (5) repeats the analysis but for "risky" loans instead of real estate loans. Risky loans are defined as the sum of real estate, construction, and non-bank financial institution loans, which were used to proxy for risky loans by Hoshi (2001). As discussed in Section 2.2.1, a major part of non-bank financial institutions were the "jusen", which were housing loan subsidiaries of banks. Similar results are obtained: a 0.01 increase in the instrumented share of risky loans leads to 14.2% higher prefectural land inflation over the 1981-91 period.

It is interesting to contrast the OLS results to the IV results. Column (2) presents the regression of prefectural land inflation on a prefecture's difference in its real estate loan share over the 1981-91 period. Because the latter is not instrumented, the estimate of 11.5% higher inflation should be interpreted as a correlation. It is interesting that IV estimation implies an effect (20.3%) almost twice as large. A similar result is found with risky loans. That the coefficient is larger when using IV underlies the significance of keiretsu loans in identifying real estate lending and the latter's independent effect on land prices. One possible explanation is that a higher land price also reduces demand for land, which is the standard result if we ignore the positive effect on net worth coming from the relaxation of credit constraints. This biases the OLS coefficient downwards. Another possibility is that a higher land price increases people's expectation of future increases in land prices

(especially in a speculative setting). This leads to an increase in supply of land and construction, and mitigates the OLS estimate.

Columns (6) through (8) report robustness results by including differences of variables to control for demographic and economic differences across prefectures (such as job openings to applications, growth in income per capita, population growth, the unemployment rate, and CPI excluding rent). The (instrumented) real estate loan share remains significant at the 1% level but its effect on land inflation is now smaller in magnitude (14.9% compared with 20.3% previously). Similarly, the coefficient on the risky loan share is reduced but only to 13.5%. Apart from a prefecture's population and its job openings to applications ratio, the remaining macroeconomic controls are insignificant. This may be on account of the limited degrees of freedom and potential multicollinearity. Alternatively, demand factors may not have been central to the large increase in land inflation over the period.

Table 7 reports the results of regressions that take advantage of the time-series variation over the period 1981-1993, equations 2 and 3. The first column reports the simplest regression of the log difference in real prefectural land price regressed on the (first difference of) the keiretsu loan share and its 4 lags, allowing for prefecture fixed effects. The results are significant and imply that a 0.01 annual decrease (over 5 years) in the share of keiretsu loans to total loans leads to a subsequent 10% increase in a prefecture's annual land inflation rate. Column (2) includes year dummies. Although the significance and magnitude of the keiretsu loan loss is reduced, it is still the case that a fall of 0.01 in keiretsu loans leads to a 6% increase in land price inflation.

Column (3) reports the estimates for the simple regression without an instrument for the real estate loan share. The results confirm the correlation between the increase in land prices and real estate loans (3.3% higher inflation). Column (4) instruments the contemporaneous real estate loan share with the keiretsu loan share and its 4 lags. The coefficient on the real estate loans is much larger and coincides with 27% higher land inflation in a prefecture. However the result is significant only at the 13% level¹⁴. Columns (5) and (6) repeat the analysis for risky loans. A 0.01 increase in the instrumented risky loan share coincides with a 9.5% higher land inflation rate and is significant at the 10% level¹⁵.

Finally, demand controls are included in the regressions reported in columns (7) through (12). As in the cross-section regressions, prefecture-level controls are included (job openings to applications, growth in income per capita, population growth, the unemployment rate, CPI excluding rent, as well as the second lags of house rent and the ratio of rent to residential land price). Japan-wide macro controls are also included (changes in the unemployment rate, equity prices, and population). Many of these variables enter with the expected sign. For example, a larger growth in a prefecture's

population contributes to higher land inflation. A prefecture experiencing an increase in its job openings to applications ratio has higher land inflation etc. What is important is that the significance of the loss in keiretsu loans is robust to these changes: a 0.01 annual decrease in the share (over 5 years) contributes to approximately 6% higher land inflation. Note that this estimate is similar to that found in column (2) which only includes year dummies. The result is similar whether we look at column (7) or (8). Column (7) reports a random effects model because some of the prefecture controls are time-independent and therefore do not allow for prefecture fixed effects. Also omitted are the year dummies because the Japan-level controls are only time-varying with no cross-sectional variation.

Columns (9) and (10) show the IV regression for real estate loans reported in column (4), but re-estimated with demand controls. The magnitude is reduced to 15.7-17.3% higher inflation. The coefficient of 17.3% from the fixed effects model is not significant (in column (4) it was only significant at the 13% level). However, the associated random effects coefficient is 20.9% and is significant at the 5% level (the Hausman test chi-squared is 1.26 favoring the random effects model). Finally, columns (11) and (12) add demand controls to the IV regression for risky loans reported in column (6). The coefficient of 7.9% from the fixed effect model is only significant at the 16% level, while the random effects coefficient for the same model is 9.5% (similar to that reported in column (6)) and is significant at the 1.3% level.

From the panel regressions, it is evident that the timing of the keiretsu losses generally coincides with subsequent increases in land prices in a prefecture during the period from 1981 to 1993. A 0.01 increase in a prefecture's instrumented real estate loan share corresponds to a 15%-27% higher annual land inflation rate (and is significant for the Hausman preferred random effects model). More generally, a 0.01 instrumented increase in a prefecture's risky loan share (loans to real estate, construction and non-bank financial institutions) leads to a 6%-9.5% higher land inflation rate.

To get a better sense of the magnitude of the implied effect, it is worth comparing estimates with actual figures for Japan during the period from 1983 to 1993. The average over Japan's 47 prefectures of the share of keiretsu loans was 0.06, of real estates loans was 0.08, and of "risky" loans was 0.21. As for changes in these shares, the average for keiretsu loans was -0.002, for real estate loans was 0.002, and for "risky" loans was 0.007. At the same time, the average annual real land inflation rate in Japan was 6.4%. A simple calculation combining the coefficient estimates from model 7.3 (i.e. the one reported in Table 7, column (3)) and these average figures, implies that the average increase in real estate loans of 0.002 would lead to an increase in inflation of 0.8%. When using the IV coefficients from model 7.4, however, the implied inflation rate coming from real estate

lending is 6.18%, almost identical to the actual figure in Japan over the period. A figure of 6.17% is derived from risky lending from Model 7.6. Looking specifically at Tokyo, the implied inflation rate from model 7.4 is 16.6%, higher than the average actual inflation rate of 10.8%. Overall these results suggest a large but not unrealistic effect of bank credit on land prices.

Figure 4 shows the time-variation in the Japan-wide average land inflation rate and the predicted rates based on the simple regression using real estate loans (model 7.3) and on the instrumented real estate loans (model 7.4). The instrumented real estate lending by banks predicts the actual land inflation rate well (this is also the case for risky loans) and particularly during the 1980s, which is the relevant period. The predicted component tends to lead the actual rate during the boom. Note that the predicted land inflation coming from the uninstrumented real estate lending does not do a good job at capturing the actual path of land inflation.

4 Conclusion

Japan deregulated its financial system in the 1980s. The regulatory change that decreased the demand for loans by keiretsus led banks to increase lending in the real estate sector. I find evidence consistent with this explanation for the real estate boom. There is no support for the alternative that real estate had (or was perceived to have) good opportunities, rationalizing a shift of bank lending to real estate.

The Japanese real estate boom during the 1980s therefore provides the appropriate setting and some answers to the question of whether bank credit affects asset prices. I use a bank's loss of keiretsu loans as an instrument for the supply of real estate loans, and take advantage of both the cross-sectional and time-series variation in land prices in Japan's 47 prefectures. The main findings are twofold: First, a 0.01 increase in a prefecture's instrumented real estate loans as a share of total loans causes 14-20% higher land inflation over the 1981-1991 period. Second, the timing of keiretsu loan losses coincides with subsequent land inflation in a prefecture. In short, shocks to the supply of credit fuel land prices.

That the supply of credit can have such a considerable impact on asset prices has implications for both monetary and regulatory policy. If there were no imperfections in credit markets, banks' willingness to offer loans would have no impact on asset prices. The latter would only depend on the discounted flow of future income deriving from the asset. But in the presence of credit constraints and in the short run, a shock like incomplete financial deregulation can have an amplified effect on asset prices. This can be true even if financial liberalization were to ease credit market imperfections

in the long run. The case of Japan illustrates this. Japan underwent incomplete and slow financial deregulation over two decades. The resulting "over-banking" problem (as dubbed by HK), which has characterized the Japanese banking system is gradually being resolved as banks merge and shrink.

What lessons for monetary and regulatory policy can be drawn? If the process of liberalization in Japan had been faster and more complete, the wrong incentives would not have materialized to cause banks to shift lending disproportionately to real estate. Ito (2004) argues that the supervisory regime should have been strengthened in the 1980s to ensure stricter prudential guidelines (on real estate lending) when the regulatory regime began to allow for more competition. With the benefit of hindsight, such a move would have been justified. That said, central banks continue to struggle with appropriate policy when there is asset price inflation and little goods price inflation. For example, Bernanke and Gertler (2001) argue that central banks should respond to asset prices only to the extent to which they influence expected inflation. More research is needed, but the results of this paper suggest that banks can actively contribute to asset price inflation.

Notes

¹A third view emphasizes monetary factors which can be related to the "good opportunities" view. For example, Ueda (2000) argues that monetary policy was responsible for the wide swings in asset prices that caused increased bank lending towards real estate.

²It is for this reason that a positive productivity shock causes the constrained borrowers to demand more credit and invest more. In contrast, the first-best allocation is not affected and the only outcome is that agents increase their consumption.

³Available on author's website, <http://alum.mit.edu/www/namora>

⁴Foreign bank flow of funds data is only available at an aggregate level from the Bank of Japan but is sufficient for the purpose of this stylized comparison. Refer to "Detailed data of Flow of Funds Accounts" available from the Bank of Japan, <http://www.boj.or.jp/en>. It provides information on total loans extended by domestically licensed banks and foreign-owned banks in Japan, respectively, in the section "Loans by private financial institutions (Book value)".

⁵Other results (available on author's website, <http://alum.mit.edu/www/namora>) regressed quantity variables (such as the log first difference of total deposits and "borrowed money") on the four lags of the change in the keiretsu loan share as before. The results confirm that banks that lost keiretsu loans subsequently decreased their deposits as well.

⁶Regressions were run separately by bank size, with big banks defined as those belonging to the upper 85 percentile of the fraction of aggregate real bank assets over the period (23 banks), medium banks defined as those in the 60 to 85 percentile (37) and small banks accounting for the remaining banks (90). In fact, in a regression including the interaction of a bank's total assets with the (lagged) change in keiretsu loan share on the right-hand side, the estimates are insignificant except for the first lag with a positive coefficient. That is, the shift to real estate is stronger among the smaller banks that lost keiretsu loans.

⁷Note that the data were cleaned up for duplicate accounting periods in a given year by taking the average and, if there was a missing year, by taking the average over the previous and following year.

⁸Note that these results are conservative because many firms reported bond data as missing instead of zero in the DBJ database. When missing observations were replaced with zero, the results imply that the ratio of bank loans falls by approximately 0.10 once a firm qualifies to issue bonds. The magnitude is robust to the specification in column (2). Refer to the author's website for these results.

⁹The Ministry of Finance provides data on its website under the heading "Financial Statement

Statistics of Corporations by Industry, Quarterly" which includes unlisted and smaller companies. However data on firm financing is only provided by size distribution for the following aggregate categories: all industry, manufacturing and non-manufacturing.

¹⁰I would like to acknowledge Mr Akihiko Ito from the Japan Statistical Association who sent me some data missing from the Japan Statistical Yearbook.

¹¹These results are consistent with previous literature, which has found that banks tend to lend to companies located close to them (see Petersen and Rajan 2002). Among their findings is that banks are geographically closer than other lenders (even accounting for the fact that firms may have deposits with them.)

¹²Note that the variables for keiretsu loans and real estate loans are taken as a proportion of total loans. This is the approach taken by Hoshi (2001). The advantage compared with using growth rates is that the latter can exaggerate the importance of keiretsu loans if a bank starts from a low level. However, the conjecture that the significant effect of keiretsu loans on real estate loans may stem directly from the construction of the variables is not the case. First, the "total loans" measure used to normalize real estate loans comes from summing the 12 components of reported sectoral loans. In contrast, the "total loans" used for keiretsus comes from the total loans measure in a bank's balance sheet. More importantly, no mechanical relation was found when robustness checks were done on other sectoral loans regressed on the keiretsu loans. In fact, and as discussed in Section 2.2.2, only loans to real estate increase when keiretsu loans decrease.

¹³The regressions were also estimated excluding the Tokyo and Osaka prefectures. This is to counter the criticism that the coefficients might simply be capturing that the two largest prefectures had high land inflation rates (for some other reason) coupled with a larger share of loans to keiretsu firms. However, the results remain significant.

¹⁴It is worth mentioning that the Hausman test for all these models favors random effects over fixed effects (for example the Chi-squared value is 0.27 for the model in column (4)). Random effects is more efficient and the coefficient is estimated to be 18.6% and is significant at the 1.2% level. However, fixed effects are reported for ease of understanding the time dimension of the keiretsu shock.

¹⁵The random effects model is favored and results in a similar coefficient estimate of 9.3%, which is significant at the 1% level.

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Appendix 1

Financial Regulation and Deregulation in Japan

Banks and Households

The Japanese economy was characterized by interest rate controls (TIRAL), which were effective from 1947 until 1992. While these were controls on deposit rates, they were accompanied by loan rate restrictions to ensure that long-term credit banks earned profits. Certain implications of interest rate controls on banks' profitability have been highlighted by Hoshi and Kashyap (2001) and Kitagawa and Kurosawa (1994). Hoshi and Kashyap argue that the increase in fraction of assets lent out by banks during deregulation reflects their attempting to make up through volume the reduction in margins they received on loans. Kitagawa and Kurosawa echo this view that the objective of banks was not profit but scale and that the two may have been equivalent in Japan at the time. For example, because of the policy of ensured profit margins, as profit margins fell banks increased scale. Another distorting policy was the discount window guidance. The discount rate at which the Bank of Japan lent funds to banks was essentially a subsidy proportional to a bank's size. Aside from these incentives, there is the possibility that banks were directly maximizing scale due to social status, a branch manager's promotion ambitions and so on.

The Japanese banking system was also characterized by regulation limiting bank entry, branch growth restrictions (requiring permission from the Ministry of Finance), regional segmentation, and bank segmentation from non-banks. Ueda (1994) argues that long-term and trust banks were more severely affected by the loss of manufacturing firms because of their low branch to loan figure.

In addition to restrictions on banking activity, households had limited savings options. Slow deregulation meant that household savings moved to insurance and pension alternatives only gradually. The share of household funds at banks fell from 0.6-0.8 in 1960s and 1970s to 0.4-0.5 in the late 1980s. From 1980-86, 0.72 of the increase in savings was deposited at insurance companies and the rest at banks (Kitagawa and Kurosawa 1994). So although, as a share of GDP, deposits at banks did continue to increase during the 1980s, the overall increase in savings was even larger. The Big Bang in 1998 further deregulated the foreign exchange law and allowed residents to directly open accounts in foreign institutions abroad. This led to a large capital outflow (Cargill et al. 2000).

Firms

Corporate finance regulation was also extensive, and credit was rationed up to 1975. Restrictive bond issuance criteria (BIC) were in place from October 1976 to December 1990 and were based on accounting criteria (refer to Appendix Table 3). Only in 1990 were the accounting criteria removed and the criteria limited to a firm's rating (of BB or higher). These criteria applied to domestic secured convertible bonds, which were the principle source of public debt financing throughout the 1980s. The criteria also applied to foreign issues of convertible bonds (see Hoshi, Kashyap and Scharfstein 1993). Even fewer firms satisfied the criteria for unsecured bonds. In 1979, only two firms satisfied the BIC for domestic issues of unsecured straight bonds and unsecured convertible bonds (Matsushita Electric and Toyota Motors). By 1989, about 300 companies were eligible to issue unsecured straight bonds and 500 companies to issue unsecured convertible bonds (Hoshi et al. 1993 based on Nomura Securities).

The relaxation of the foreign exchange law in 1980 allowed firms to issue bonds in foreign markets without explicit government approval. This triggered the easing of the domestic BIC. Prior to 1980, only Japanese banks were allowed to manage firms' collateral as trustees for the bondholders and they were members of the bond issuance committee. This led to high fees charged by banks. The foreign exchange law revision in 1980 coupled with the increase in the supply of government bonds due to the oil shocks in the late 1970s helped relax domestic controls on bond finance. For example, total funds raised in overseas markets in 1981 exceeded 1.4 trillion Yen, almost three times the 1975-79 average of 560 million Yen. As a fraction of all securities issued by Japanese corporations, overseas issues rose from under 0.2 prior to 1980 to almost 0.5 by 1985 (Weinstein and Yafeh 1998).

	Domestic Banks	Insurance Companies	Credit Unions & Depository	Foreign Banks	Non - Banks	Capital Market residual (maximum 2)	Total to Real Estate
Direct Financing	59	3	5.5	0.6	50 - 55		120
Indirect lending activities through non- bank financial institutions	72	15	0.6	6.3			

Table 1
Flow of Funds to the Real Estate Market (trillions of yen)
June 1991

Note: Taken from Figure 5.6 in Cargill, Hutchison and Ito (1997), who obtained the data from the Ministry of Finance

	(1) ^a	(2)	(3)	(4)
	Dependent variable: first difference of: Real estate loans to total loans			Dependent variable: first difference of: Deposit interest rate
<i>Regressors</i>				
Prefecture land inflation, lag 1 ^b	0.0086** (0.0016)	0.0086** (0.0016)	0.0078** (0.0016)	-0.0024** (0.0006)
Prefecture land inflation, lag 2	-0.0013 (0.0017)	-0.0008 (0.0017)	-0.0005 (0.0017)	0.0015* (0.0006)
Year 1983	-0.0025* (0.0012)	-0.0024 (0.0012)	-0.0023 (0.0015)	-0.0095** (0.0004)
Year 1984	-0.0034** (0.0011)	-0.0015 (0.0013)	-0.0038** (0.0013)	-0.0062** (0.0004)
Year 1985	-0.0017 (0.0012)	-0.0017 (0.0013)	-0.0022 (0.0013)	-0.0049** (0.0004)
Year 1986	0.0016 (0.0012)	0.0026 (0.0013)	0.0014 (0.0013)	-0.0056** (0.0004)
Year 1987	0.0035** (0.0012)	0.0037** (0.0012)	0.0029 (0.0017)	-0.0113** (0.0004)
Year 1988	-0.0004 (0.0011)	0.0000 (0.0012)	-0.0004 (0.0015)	-0.0079** (0.0004)
Year 1989	0.0008 (0.0011)	0.0007 (0.0012)	0.0010 (0.0013)	-0.0058** (0.0004)
Keiretsu loan share, first diff, lag 1	-0.0163 (0.0088)	-0.0111 (0.0093)	-0.0060 (0.0100)	0.0019 (0.0033)
Keiretsu loan share, first diff, lag 2	-0.0464** (0.0110)	-0.0401** (0.0117)	-0.0253* (0.0126)	0.0222** (0.0041)
Keiretsu loan share, first diff, lag 3	-0.0358** (0.0114)	-0.0365** (0.0121)	-0.0272 (0.0146)	0.0115** (0.0043)
Keiretsu loan share, first diff, lag 4	-0.0341** (0.0109)	-0.0329** (0.0112)	0.0139 (0.0160)	0.0247** (0.0041)
Interest on loans - Interest on deposits to total assets (first diff, lag 1)		-0.1348 (0.1159)		
Interest on loans - Interest on deposits to total assets (first diff, lag 2)		-0.3510** (0.1235)		
Interest on loans - Interest on deposits to total assets (first diff, lag 3)		0.1011 (0.1276)		
Interest on loans - Interest on deposits to total assets (first diff, lag 4)		-0.2551* (0.1245)		
Deposit rate (first diff)			0.1373 (0.1037)	
Loan rate (first diff)			-0.1193 (0.0812)	
Deposit rate (first diff) * Keiretsu loan share (first diff, lag 1)			0.8638 (1.5868)	
Deposit rate (first diff) * Keiretsu loan share (first diff, lag 2)			1.7107 (1.1723)	
Deposit rate (first diff) * Keiretsu loan share (first diff, lag 3)			2.0725 (1.4613)	
Deposit rate (first diff) * Keiretsu loan share (first diff, lag 4)			-1.6570 (1.3753)	
Loan rate (first diff) * Keiretsu loan share (first diff, lag 1)			0.2324 (2.0113)	
Loan rate (first diff) * Keiretsu loan share (first diff, lag 2)			-0.3579 (1.0428)	
Loan rate (first diff) * Keiretsu loan share (first diff, lag 3)			-0.1702 (1.9285)	
Loan rate (first diff) * Keiretsu loan share (first diff, lag 4)			3.7731 (2.0532)	
Constant	0.0034** (0.0009)	0.0032** (0.0009)	0.0043** (0.0011)	0.0053** (0.0003)
Observations	1200	1200	1200	1200
Number of Banks	150	150	150	150
R-squared	0.11	0.12	0.13	0.49

Table 2
Bank Regressions: Real Estate Loans and Deposit Rates
1983-1990

Notes:

This table presents results from fixed effects regressions. Standard errors are reported in parentheses.

Asterisks (*) and (**) indicate significance at the 5 percent and 1 percent levels, respectively.

a. Column (1) is similar model to that in Hoshi (2001) Table 9 column 1

b. Prefecture land inflation refers to the land inflation in the prefecture (among 47 prefectures) in which a bank is headquartered.

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Number of companies eligible	65	378	422	496	559	616	671	675	727	799	819	855	1084	1247	1374
As a share of total companies (in %)	21.5	25.0	27.3	31.8	35.5	38.6	41.3	41.1	43.9	47.9	49.0	51.7	63.4	68.2	71.7

Table 3
Bond Issuance Eligibility for Domestic Secured Convertible Bonds

Note: The figures are from author's calculations based on the accounting criteria effective in Japan from October 1976-December 1990. These criteria are given in Table A3. The underlying accounting data comes from the Development Bank of Japan Corporate Finance Data Set for listed Japanese companies. Therefore "total companies" refers to the entire sample of companies with accounting data available in a given year. Note that convertible bonds were the principle source of public debt financing during the 1980s and these criteria were also applied to foreign issues of convertible bonds (refer to Hoshi, Kashyap and Scharfstein 1993).

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<i>By eligibility to issue convertible bonds throughout 1982 - 1989</i>															
Ineligible to issue	89.3	89.3	88.0	86.9	87.6	88.2	88.8	87.5	85.9	85.3	84.8	81.4	78.3	75.7	74.4
Partly eligible	93.2	91.2	85.6	82.9	82.0	83.6	82.3	80.8	78.1	73.5	70.4	66.0	63.0	60.5	57.7
Eligible	88.3	84.9	74.6	70.9	69.4	71.2	68.6	66.1	59.3	56.8	53.8	46.5	43.6	42.6	40.7
<i>By economic sector</i>															
Real Estate	93.8	89.1	89.1	89.0	89.2	89.3	87.6	88.3	79.9	84.7	84.8	80.3	67.9	71.6	72.6
Real Estate & Construction	94.0	91.2	90.2	88.5	87.8	89.7	88.4	89.2	85.4	87.3	78.5	68.9	63.1	67.8	68.6
Manufacturing	88.5	84.7	80.0	75.9	75.5	77.4	74.8	72.0	66.6	62.3	59.3	54.4	51.5	50.4	49.1
<i>Among firms eligible to issue bonds throughout 1982-1989</i>															
Real Estate	92.3	92.9	89.8	89.2	85.9	84.3	82.3	84.2	74.2	81.6	76.2	72.5	59.8	64.1	66.1
Real Estate & Construction	91.7	90.6	88.1	86.3	84.3	85.9	83.4	85.0	79.4	84.6	70.1	57.6	51.8	56.5	55.8
Manufacturing	84.9	79.2	71.4	66.3	66.3	67.9	64.0	61.2	53.3	50.0	46.8	39.7	37.0	37.2	36.2

Table 4
Ratio of firms' bank debt to total debt

Note: The figures are from author's calculations using the Development Bank of Japan Corporate Finance Dataset for listed non-financial companies by classifying companies according to eligibility to issue during the period from 1982-1989 and according to which sector they belonged. Eligible-to-issue bond criteria are shown in Table A3. A firm's total debt is calculated as the sum of outstanding short-term bank loans (DBJ code K1960) + long-term bank loans (K2350) + total outstanding bonds composed of straight bonds (K6850), convertible bonds (K6890), and warrant bonds (K6930). A firm's bank debt ratio is then calculated as the ratio of its short-term and long-term bank loans to its total debt. The calculations are based on all companies with accounting data available for each year during 1982-1989 (resulting in 371 companies). Refer to Table 3 for information on companies eligible to issue bonds (domestic secured convertible) during the period.

Dependent variable: Bank loans as a Share of a Firm's Total Debt	(1)	(2)
<i>Regressors</i>		
Eligible to issue bonds dummy (BIC), first lag	-0.0732** (0.0056)	-0.0499** (0.0079)
Year 1977	0.2871** (0.0203)	
Year 1978	0.2533** (0.0098)	
Year 1979	0.2345** (0.0096)	
Year 1980	0.2292** (0.0094)	
Year 1981	0.2484** (0.0092)	
Year 1982	0.2431** (0.0090)	0.2298** (0.0123)
Year 1983	0.2276** (0.0090)	0.2198** (0.0120)
Year 1984	0.1967** (0.0089)	0.1871** (0.0113)
Year 1985	0.1761** (0.0087)	0.1681** (0.0113)
Year 1986	0.1391** (0.0085)	0.1438** (0.0126)
Year 1987	0.0786** (0.0082)	0.0968** (0.0116)
Year 1988	0.0506** (0.0081)	0.0671** (0.0100)
Year 1989	0.0238** (0.0077)	0.0378** (0.0089)
Year 1990	0.0059 (0.0073)	0.0050 (0.0081)
Prefecture land inflation		-0.0044 (0.0146)
Prefecture land inflation, first lag		-0.0312* (0.0135)
Leverage (ratio of debt to assets), first lag		-0.4056** (0.0547)
Collateral (financial investments to assets), first lag		0.3339** (0.1002)
Total assets, first lag		7.72x10 ⁻¹¹ ** (1.87x10 ⁻¹¹)
<i>Variables used to determine bond issuance criteria from 1976-1990</i>		
Net worth, first lag		-2.13x10 ⁻¹⁰ * (8.28x10 ⁻¹¹)
Dividend per share, first lag		-0.0002 (0.0002)
Net worth to assets, first lag		-0.3454** (0.0660)
Net worth to paid-in-capital, first lag		0.0005 (0.0058)
Business profits to assets, first lag		-1.0428** (0.1136)
Ordinary after tax profit per share, first lag		0.0001 (0.0000)
Constant	0.5758** (0.0072)	0.8055** (0.0416)
Observations	9269	6273
Number of firms from DBJ database	1291	1138
R-squared	0.27	0.27

Table 5
Firm Regressions: Bond Issuance Eligibility and Bank Debt
1977-1991

Notes:

This table presents results from fixed effects regressions using a panel of firms from the Development Bank of Japan Corporate Finance Data Set. Standard errors are reported in parentheses. Asterisks (*) and (**) indicate significance at the 5 percent and 1 percent levels, respectively. The estimates are over the period 1977-1991 because the bond issuance accounting criteria were valid from October 1976 to December 1990. The other control variables are taken from the Development Bank of Japan Corporate Finance Data Set, except for prefecture land inflation which comes from the Statistical Yearbook of Japan and refers to the land inflation in the prefecture in which a firm is headquartered.

Dependent variable: Log difference in real prefectural land price between 1991 and 1981	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>All regressors are the difference between 1991 and 1981^a:</i>								
Keiretsu loan share	-4.6568** (0.7352)					-3.4475** (0.9895)		
Real estate loan share		11.4852** (2.1672)	20.3016** (4.6123)				14.8649** (4.8989)	
"Risky" loan share (loans to real estate & construction & non-bank financial institutions.)				4.4586* (1.6632)	14.2489** (5.0130)			13.5435 (7.5214)
<i>Macro controls^c</i>								
Prefecture population, in logs						3.6120** (0.9883)	0.8910 (1.3197)	3.8869 (2.1875)
Prefecture unemployment rate						-0.1376 (0.1940)	0.0878 (0.2183)	0.0019 (0.3484)
Prefecture income per capita, in logs						-0.0994 (0.7785)	1.1116 (0.9088)	-2.9717 (3.1228)
Prefecture job openings to applications						-0.2670 (0.1415)	-0.2694 (0.1740)	-0.0069 (0.3522)
Prefecture CPI excluding rent, in logs						0.3925 (3.3966)	4.0841 (2.7428)	-3.1615 (8.1607)
<i>Instrumenting for real estate or "risk" loan share with keiretsu loan share?</i>								
			Yes		Yes		Yes	Yes
Constant	0.8961** (0.0547)	0.7439** (0.0641)	0.5197** (0.1180)	0.6749** (0.1252)	-0.1180 (0.4103)	1.0232 (0.7128)	-0.5199 (0.7229)	1.8371 (2.0110)
Number of prefectures	47	47	47	47	47	47	47	47
R-squared	0.35	0.38	0.16	0.17	R-sq < 0 ^b	0.57	0.46	R-sq < 0 ^c

Table 6
The Effect of Bank Credit on Land Prices: The Prefecture Cross-Sectional View

Notes:

Robust standard errors are reported in parentheses and they are clustered by prefecture.

Asterisks (*) and (**) indicate significance at the 5 percent and 1 percent levels, respectively.

a. Except for Prefecture population and unemployment which are the difference between 1990 and 1980 due to data availability.

b. Note that in 2SLS the R-squared can sometimes be negative, even when a constant is included.

c. The controls are compiled from the Japan Statistical Yearbook, various issues.

Dependent variable: Log difference in real prefectural land price, annual	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Regressors</i>												
Keiretsu loan share, first difference	-3.3154** (0.6597)	-1.8019** (0.6186)					-1.1640* (0.5821)	-1.6448* (0.6716)				
Keiretsu loan share, first difference, lag 1	-3.3996** (0.7626)	-1.3002 (0.7270)					-1.0870 (0.6145)	-1.1346 (0.7686)				
Keiretsu loan share, first difference, lag 2	-2.4380** (0.7841)	-1.3379 (0.7532)					-1.3945* (0.5907)	-1.5180 (0.7913)				
Keiretsu loan share, first difference, lag 3	-0.9592 (0.7700)	-1.0184 (0.7347)					-1.1142 (0.5826)	-1.2089 (0.7718)				
Keiretsu loan share, first difference, lag 4	-0.1979 (0.6594)	-0.5232 (0.6168)					-0.7107 (0.5457)	-0.5973 (0.6527)				
Real estate loan share, first difference			3.3498* (1.3651)	27.0575 (18.0139)					15.6876* (6.5623)	17.3002 (15.6500)		
"Risky" loan share (loans to real estate & construction & non-bank financial institutions.)					1.6221* (0.7119)	9.4662 (5.0734)					6.3942* (2.7412)	7.9049 (5.5950)
<i>Year dummies?</i>		Yes	Yes	Yes	Yes	Yes		Yes		Yes		Yes
<i>Japan-wide macro controls</i>												
Japanese unemployment, first difference							-0.0883 (0.0687)		-0.0251 (0.0824)		-0.0682 (0.0738)	
Nikkei stock market, in logs, first difference							0.0344 (0.0656)		-0.1139 (0.0889)		-0.0296 (0.0699)	
Japan population, in logs, first difference							12.8641 (7.2285)		11.5327 (7.9958)		6.3481 (8.2479)	
<i>Prefecture-level controls</i>												
Population, in logs, 1990-80 difference							0.4116* (0.1694)		0.1872 (0.2135)		0.3193 (0.1857)	
Unemployment rate, 1990-80 difference							-0.0056 (0.0342)		0.0226 (0.0380)		0.0040 (0.0361)	
Income per capita, in logs, first difference							-0.0715 (0.3550)	0.1178 (0.3699)	0.3970 (0.4334)	0.5094 (0.5317)	0.1685 (0.3854)	0.3706 (0.4321)
Job openings to applications, first difference							0.3025** (0.0641)	0.1216 (0.0764)	0.2591** (0.0738)	0.1519 (0.0853)	0.2064* (0.0808)	0.1095 (0.0837)
CPI excluding rent, in logs, first difference							1.6192 (0.8577)	1.2422 (1.5712)	3.6304** (1.1620)	0.0248 (2.1293)	2.2733* (0.8901)	-1.1166 (2.4698)
House rent, in logs, first difference, lag 2							0.5511** (0.1197)	0.5271** (0.1258)	0.5152** (0.1350)	0.5803** (0.1480)	0.4580** (0.1369)	0.4867** (0.1373)
House rent to residential land price, lag 2							0.0082* (0.0032)	0.0147 (0.0078)	0.0061 (0.0034)	0.0069 (0.0117)	0.0048 (0.0031)	0.0086 (0.0097)
<i>Instrumenting for real estate or "risk" loan share with keiretsu loan share and its lags?</i>				Yes		Yes			Yes	Yes	Yes	Yes
Constant	0.0434** (0.0108)	-0.1385** (0.0247)	-0.1418** (0.0243)	-0.1898** (0.0473)	-0.1361** (0.0242)	-0.1412** (0.0269)	-0.1212** (0.0432)	-0.2166** (0.0603)	-0.1718** (0.0565)	-0.1847** (0.0711)	-0.1100* (0.0454)	-0.1608* (0.0754)
Observations	611	611	611	611	611	611	562	562	562	562	562	562
R-squared	0.05	0.28	0.27	0.14	0.27	0.11	0.26	0.32	0.17	0.19	0.19	0.2

Table 7
The Effect of Bank Credit on Land Prices: The Time-Series View
Prefecture Fixed Effects 1981-1993

Notes:

Standard errors are reported in parentheses. Asterisks (*) and (**) indicate significance at the 5 percent and 1 percent levels, respectively.

Regressions reported in columns 7,9, and 11 were estimated using random effects and no year dummies because the Japan-wide macro controls serve as an alternative time control while the prefectural-level population and unemployment difference over 1990-80 serve as prefecture fixed effects.

Panel of 150 banks	Mean			Std. Dev.	Minimum	Maximum
	1981 - 1991	1981	1991			
Keiretsu loans, as share of total	0.0690	0.1246	0.0399	0.1714	0.0000	1.76495 ^a
First difference	-0.0076	0.0012	0.0029	0.0426	-0.4997	0.3238
Real estate loans, as share of total	0.0853	0.0632	0.0973	0.0528	0.0000	0.3487
First difference	0.0032	0.0009	-0.0136	0.0112	-0.0474	0.0933
Real growth rate of real estate loans	0.1058	0.0262	0.0160	0.1180	-0.2921	0.8605
(Interest on loans & discounts - Interest on deposits) / total assets	0.0089	0.0052	0.0069	0.0066	-0.0187	0.0397
Net interest income / total assets	0.0180	0.0100	0.0149	0.0064	-0.0028	0.0309
Interest income on loans / total loans	0.0623	0.0411	0.0731	0.0117	0.0000	0.1081
Interest expense on deposits / total deposits	0.0387	0.0269	0.0506	0.0109	0.0008	0.1005
First difference	0.0028	0.0075	0.0162	0.0095	-0.0327	0.0577
Amount of loans to small borrowers / total loans	0.8597	0.9382	0.8627	0.2239	0.0000	2.2019
Government bonds in own account / total assets	0.0499	0.0539	0.0511	0.0228	0.0073	0.1496
Foreign branches / total branches	0.0145	0.0118	0.0187	0.0594	0.0000	0.6190
Total assets, in million Yen	3755744	1954148	6067036	8365080	54409	66600000
Total assets, real terms	39894	23291	60309	87065	648	676736
Total loans, in million Yen	1860464	886473	3224307	4025695	29878	35900000
Sectoral shares:						
Risky loans (real estate & construction & non-banks financial institutions)	0.2209	0.1723	0.2539	0.0727	0.0000	0.5172
First difference	0.0078	0.0045	-0.0137	0.0167	-0.0717	0.1476
Loans to Agriculture, Forestry and Fishery	0.0102	0.0117	0.0084	0.0091	0.0000	0.0472
Loans to Individuals & Others	0.1699	0.1673	0.2000	0.0501	0.0664	0.3995
Loans to Local Governments	0.0142	0.0162	0.0096	0.0187	0.0000	0.1099
Loans to Mining	0.0039	0.0043	0.0032	0.0037	0.0000	0.0329
Loans to Manufacturing	0.1975	0.2394	0.1571	0.0722	0.0371	0.4148
Loans to Services	0.1175	0.0890	0.1401	0.0403	0.0000	0.3540
Loans to Transportation & Telecommunication	0.0272	0.0262	0.0261	0.0173	0.0045	0.1658
Loans to Utilities	0.0099	0.0103	0.0073	0.0178	0.0000	0.1553
Loans to Wholesale & Retail Industries	0.2288	0.2632	0.1944	0.0580	0.0632	0.4099

By bank type	City	Long-term	Trust	Regional 1	Regional 2
Number of Banks	11	3	7	64	65
Fraction of Aggregate Bank Assets over period 1981-1991	0.505	0.106	0.086	0.222	0.081
<i>Means</i>					
Keiretsu loans, as share of total	0.1536	0.2601	0.6503	0.0447	0.0071
First difference	-0.0132	-0.0203	-0.1129	-0.0016	-0.0006
Real estate loans, as share of total	0.0784	0.1019	0.1603	0.0660	0.0965
First difference	0.0048	0.0082	0.0031	0.0022	0.0036
Real growth rate of real estate loans	0.1593	0.1059	0.0849	0.1011	0.1035
(Interest on loans & discounts - Interest on deposits) / total assets	-0.0013	0.0241	0.0001	0.0067	0.0130
Net interest income / total assets	0.0088	0.0063	0.0035	0.0186	0.0211
Interest income on loans / total loans	0.0646	0.0673	0.0656	0.0593	0.0643
Interest income on deposits / total deposits	0.0504	0.0647	0.0545	0.0361	0.0363
First difference	0.0038	0.0050	0.0045	0.0027	0.0026
Amount of loans to small borrowers / total loans	0.4968	0.3090	1.0199	0.8257	0.9627
Government bonds in own account / total assets	0.0264	0.0585	0.0606	0.0622	0.0403
Foreign branches / total branches	0.0940	0.2092	0.0641	0.0010	0.0001
Total assets, in million Yen	25900000	19900000	6992002	1947628	700784
Total assets, real terms	274548	211306	73818	20741	7478
Total loans, in million Yen	12000000	11300000	2643197	1055507	420130
Sectoral shares:					
Risky loans (real estate & construction & non-banks financial institutions)	0.1951	0.2589	0.3414	0.1927	0.2383
First difference	0.0089	0.0275	0.0200	0.0077	0.0055
Loans to Agriculture, Forestry and Fishery	0.0037	0.0030	0.0018	0.0133	0.0095
Loans to Individuals & Others	0.1540	0.1826	0.1311	0.1470	0.1987
Loans to Local Governments	0.0093	0.0001	0.0008	0.0264	0.0052
Loans to Mining	0.0060	0.0060	0.0035	0.0038	0.0036
Loans to Manufacturing	0.2471	0.2177	0.1811	0.2229	0.1649
Loans to Services	0.1011	0.0916	0.1093	0.1110	0.1288
Loans to Transportation & Telecommunication	0.0328	0.0613	0.0635	0.0229	0.0250
Loans to Utilities	0.0155	0.0836	0.0599	0.0086	0.0013
Loans to Wholesale & Retail Industries	0.2354	0.0952	0.1077	0.2513	0.2247

Table A1
Sample Statistics: 1981 - 1991, across banks

Notes:

Figures are from the Nikkei NEEDS database. The keiretsu loans were provided by Takeo Hoshi, who compiled them from *Keizai Chosakai, Kin'yu Kikan no Toyushi* (Investment and Loans by Financial Institutions), various issues.

a. Because the data source for keiretsu loans is different from that for total loans, the keiretsu loan "share" for some banks (particularly Trust banks in early 1980s) exceeds one.

Panel of 47 Prefectures	Mean			Std. Dev.	Minimum	Maximum
	1981 - 1991	1981	1991			
<i>Japanwide</i>						
Real land price index, average 6 largest cities	0.5548	0.3170	1.0239	0.2629	0.3170	1.0239
First difference	0.1085	0.0208	0.0074	0.0940	0.0074	0.2465
Real land price index, average all	0.8199	0.6841	1.0974	0.1289	0.6841	1.0974
First difference	0.0450	0.0221	0.0768	0.0346	0.0003	0.1077
<i>Prefecture specific</i>						
Real land price at the prefecture	1.4095	0.6257	2.4329	3.2744	0.0660	30.7996
First difference	0.1015	0.0807	0.0687	0.1812	-2.2563	2.3458
Keiretsu loans, as share of total in prefecture	0.0507	0.0658	0.0358	0.0472	0.0011	0.3711
First difference	-0.0026	0.0014	0.0018	0.0149	-0.1587	0.1529
Real estate loans, as share of total in prefecture	0.0708	0.0542	0.0796	0.0269	0.0238	0.1744
First difference	0.0023	0.0000	-0.0124	0.0074	-0.0300	0.0295
Real growth rate of real estate loans	0.0997	0.0182	0.0229	0.0879	-0.1232	0.4700
Risky loans (real estate & construction & non-banks financial institutions)	0.2007	0.1544	0.2354	0.0442	0.1143	0.3729
First difference	0.0076	0.0029	-0.0132	0.0125	-0.0624	0.0633
Number of banks headquartered in prefecture	3.1915	3.1915	3.1915	3.0462	1.0000	20.0000
Proportion of major banks in prefecture (city & long-term & trust banks)	0.0331	0.0331	0.0331	0.1248	0.0000	0.7500
Proportion of regional banks in prefecture (regional 1 & regional 2 banks)	0.9669	0.9669	0.9669	0.1248	0.2500	1.0000
Proportion of long-term & trust banks in prefecture	0.0112	0.0112	0.0112	0.0657	0.0000	0.4500
<i>Prefecture Macroeconomic controls</i>						
Population (in 1000s), in logs	7.5742	7.5396	7.5802	0.7155	6.4232	9.3806
Unemployment rate, in %	3.1454	2.4579	2.9663	1.0995	1.6281	7.7758
Job openings to applications	0.8756	0.6616	1.3663	0.4820	0.1314	2.4415
Income per capita (in 1000 yen), in logs	7.6421	7.4020	7.9021	0.2194	7.1624	8.4011
CPI excluding rent	4.4899	4.4072	4.5862	0.0530	4.3747	4.6592
House rent to residential land price	6.0427	6.4906	5.6299	2.7795	0.6457	14.8566

Table A2
Sample Statistics: 1981 - 1991, across prefectures

Notes:

Figures are from the Nikkei NEEDS database for bank data. The keiretsu loans were provided by Takeo Hoshi, who compiled them from Keizai Chosakai, Kin'yu Kikan no Toyushi (Investment and Loans by Financial Institutions), various issues. Japan-wide land prices are from the semi-annual Japan Real Estate Institute and prefecture land prices are from the annual July 1st Prefectural Land Price Survey. Prefectural macroeconomic controls are taken from the Japan Statistical Yearbook, various issues. Prefecture population and unemployment are provided for 1980 and 1990 because 1981 and 1991 are not available.

Effective October 1976 - July 1987

- A firm with net worth greater than 10 billion yen can issue if:
1. Dividend per share in the most recent accounting period exceeds 5 yen and
 2. Ordinary after-tax profit per share in the most recent accounting period is greater than 7 yen and
 3. One of the following 3 conditions is met:
 - a. Net worth ratio is greater than or equal to 0.15
 - b. Net worth / paid-in-capital is greater than or equal to 1.2
 - c. Business profits / total assets is greater than or equal to 0.04
- A firm with net worth greater than 6 billion yen but less than 10 billion yen can issue if:
1. Dividend per share in the most recent accounting period exceeds 5 yen and
 2. Ordinary after-tax profit per share in the most recent accounting period is greater than 7 yen and
 3. Two of the following 3 conditions are met:
 - a. Net worth ratio is greater than or equal to 0.2
 - b. Net worth / paid-in-capital is greater than or equal to 1.5
 - c. Business profits / total assets is greater than or equal to 0.05

Effective July 1987 - December 1990

- A firm with net worth greater than 10 billion yen can issue if:
1. Dividend per share in the most recent accounting period exceeds 5 yen and
 2. Ordinary after-tax profit per share in the most recent accounting period is greater than 7 yen and
 3. One of the following 3 conditions is met:
 - a. Net worth ratio is greater than or equal to 0.1
 - b. Net worth / paid-in-capital is greater than or equal to 1.2
 - c. Business profits / total assets is greater than or equal to 0.05
- A firm with net worth greater than 6 billion yen but less than 10 billion yen can issue if:
1. Dividend per share in the most recent accounting period exceeds 5 yen and
 2. Ordinary after-tax profit per share in the most recent accounting period is greater than 7 yen and
 3. Two of the following 3 conditions are met:
 - a. Net worth ratio is greater than or equal to 0.12
 - b. Net worth / paid-in-capital is greater than or equal to 1.5
 - c. Business profits / total assets is greater than or equal to 0.06
- A firm with net worth greater than 3 billion yen but less than 6 billion yen can issue if:
1. Dividend per share in the most recent accounting period exceeds 5 yen and
 2. Ordinary after-tax profit per share in the most recent accounting period is greater than 7 yen and
 3. Two of the following 3 conditions are met:
 - a. Net worth ratio is greater than or equal to 0.15
 - b. Net worth / paid-in-capital is greater than or equal to 2.0
 - c. Business profits / total assets is greater than or equal to 0.07
-

Table A3
Bond Issuance Criteria for Domestic Secured Convertible Bonds

Note: This table reports the criteria effective from 1976 to 1990 based on accounting figures and as reported in Hoshi, Kashyap and Scharfstein (1993). Note that criteria based on a firm's ratings became effective May 1989 whereby a firm with a BB rating or higher could issue bonds if its dividend per share were greater than 5 yen and its ordinary after-tax profit per share were greater than 7 yen. After December 1990, the accounting criteria ceased to be in effect and only the rating criteria were applicable. Therefore for the period May 1989-December 1990, the eligible-to-issue firms tabulated in Table 3 and based on only the accounting criteria are biased downwards.

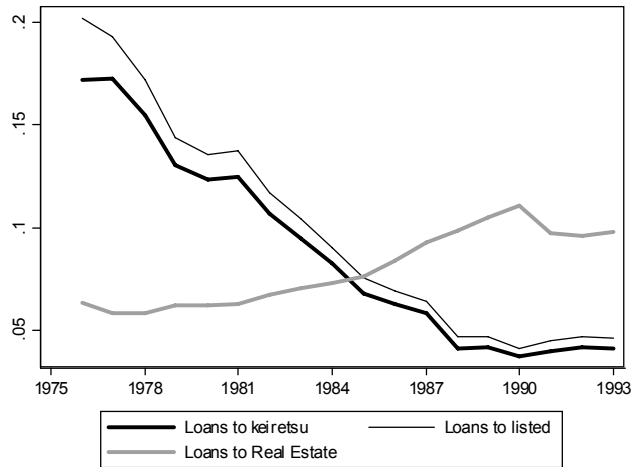


Figure 1:

Figure 1. Keiretsu Loans, Loans to Listed Firms, and Loans to Real Estate Sector
(as a share of total loans, all banks, average)

Notes:

Source: The keiretsu loans and loans to listed firms were provided by Takeo Hoshi, who compiled them from *Keizai Chosakai, Kin'yu Kikan no Toyushi* (Investment and Loans by Financial Institutions), various issues. The real estate loans and the total loans come from the Nikkei NEEDS database.

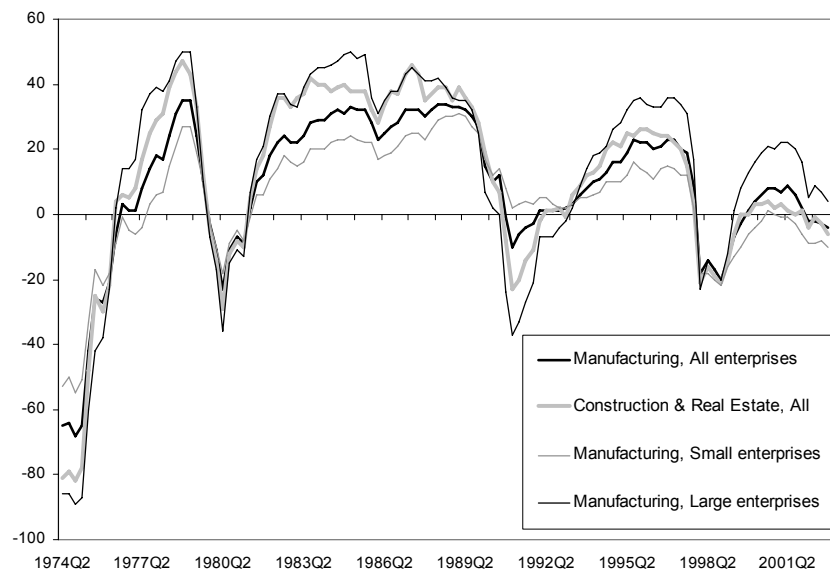


Figure 2:

Figure 2. Tankan Survey: Perception by enterprises of financial institutions' lending attitudes
(A higher number indicates perception of more relaxed conditions)

Notes:

Source: Bank of Japan, Research and Statistics Department, <http://www.boj.or.jp/en>

For judgement questions, the percentage share of the raw number of responding enterprises for each of the three choices is calculated. The diffusion index (DI) is calculated as following: $DI = \text{percentage share of enterprises responding for choice 1} - \text{percentage share of enterprises responding for choice 3}$. The choices for lending attitude were 1) Accommodative Choice 2) Not so severe and 3) Severe. Therefore if all the surveyed enterprises perceived the lending attitude to be accommodative, the index would be equal to 100 and vice versa.

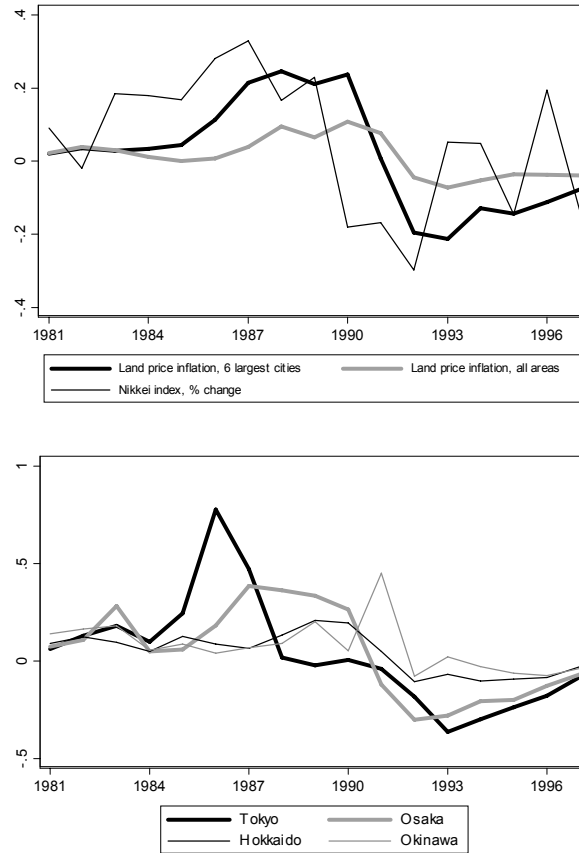


Figure 3:

Figure 3. Inflation

Figure 3a. Land price inflation and the Nikkei stock market index
 Figure 3b. Prefecture-level land price inflation (selected prefectures)

Notes:

Source: The Nikkei index (Nikkei Stock Average, TSE 225 issues, end of month) is from the Bank of Japan, <http://www.boj.or.jp/en>.

Land prices, all areas and 6 largest cities are from the Japan Statistical Yearbook's Table 17-12 Index of Urban Land Prices (1960-2003), which in turn are from the Japan Real Estate Institute (as of end-March).

Prefecture land prices are from the Japan Statistical Yearbook, various issues, which come from the annual July 1st Prefectural Land Price Survey carried out by the Land and Water Bureau, Ministry of Land, Infrastructure and Transport. The weighted average over 6 categories of land is taken: residential site, prospective housing land, commercial site, quasi-industrial site, industrial site, and housing land within urbanization control area.

Land price indices are divided by the GDP deflator to obtain real land prices, then the inflation rate is calculated as the annual log difference.

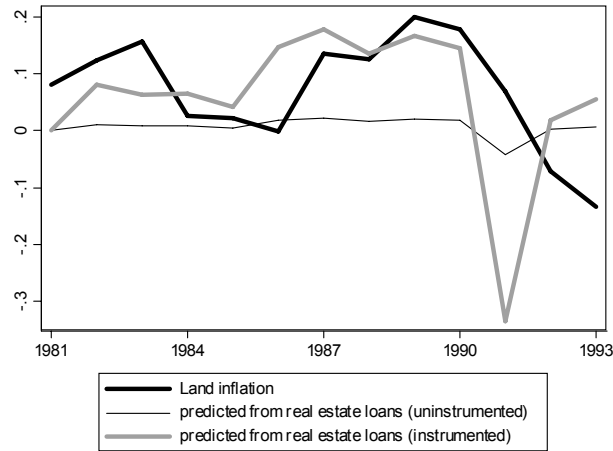


Figure 4:

Figure 4. The Japan Average Actual Land Inflation Rate and the Predicted Rate

Notes:

Source: Land inflation is the average over the 47 prefectures of the prefectural real land price inflation. The predicted inflation rate comes from Model 7.3 for the uninstrumented real estate loans and from Model 7.4 for the keiretsu-share instrumented real estate loans (refer to columns 3 and 4 in Table 7).