Convoy Regulation, Bank Management, and the Financial Crisis in Japan

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Introduction

The 1990s were a lost decade for the Japanese economy. This prolonged depression was rooted in the troubled financial system, which brought about a credit crunch and a resulting pessimism about growth opportunities. In 1999, the Japanese government decided to spend ¥67 trillion (13.2 percent of GDP) of public funds to try to overcome the country's financial crisis.

The period 1980-96 witnessed widespread financial deregulation for many of the world's economies. As a result of this increasingly competitive environment, 133 out of 181 IMF member countries experienced significant banking-sector problems, which were the worst seen since the Great Depression of the 1930s.[1] The problems experienced by the Japanese banking sector have many common characteristics with those in other IMF member countries. Financial market deregulation also appears to add to

1. Lindgren, Garcia, and Saal (1996).

the market's fragility.[2] In magnitude, the problems of Japan's banking industry rank among the most serious.

There are clear reasons why Japan experienced a financial crisis of this magnitude following financial deregulation. After World War II, regulations were implemented to try to safeguard the financial system. Unfortunately, they worked perniciously to induce banks to take excessive risks when the financial environment changed. Asset inflation in the late 1980s played a crucial role in this process. The financial structure of the Japanese economy and key policies—such as the collateral principle used in the bank loan approval process, and the importance of land prices as a source of collateral—also were important elements in explaining what happened.

In this essay, we first examine fundamental characteristics of the Japanese financial system under the government's convoy regulations, banks' reaction to deregulation, and how that reaction was related to the asset bubbles in the late 1980s. Then we present a theory of bank lending and collateral to explain the banks' lending behavior and the important role played by rising land prices. We go on to analyze empirically the relationship among land prices, bank loans, and funds raised in the capital market to assess what happened in the Japanese financial market during this period. The conclusion summarizes the main arguments.

Convoy Regulation and the Financial System

Convoy regulations were devised to safeguard the soundness of the Japanese financial system after World War II. Among the many regulations that suppressed competition among banks, regulation of deposit interest rates had the most profound impact. In order to ensure the effectiveness of regulation without reducing bank deposits, interest rates were regulated in all other markets as well. Restraints on interest rates and on corporate bond issuance in the capital market were implemented. The permitted size of corporate bond issues was strictly allocated among large firms by the Committee on Security Issues (Kisaikai), which was under control of the monetary authorities.

This system of funds allocation contributed to the high growth of the Japanese economy in the 1960s. On the basis of the collateral principle, permission for corporate bond issues was preferentially allocated to heavy industries and chemicals, which had large amounts of collateral, in the form of large factories, land, and production facilities. The ''income-doubling policy'' in the 1960s fostered the growth of heavy industries and chemicals, which had high income elasticities of demand in the export market at that time. Approval of a bond issue under the existing regulated

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2. Demirgüç-Kunt and Detragiache (1998).

Figure 4.1 The composition of financial assets of individuals in Japan (percent)

($1,184.3 trillion yen)
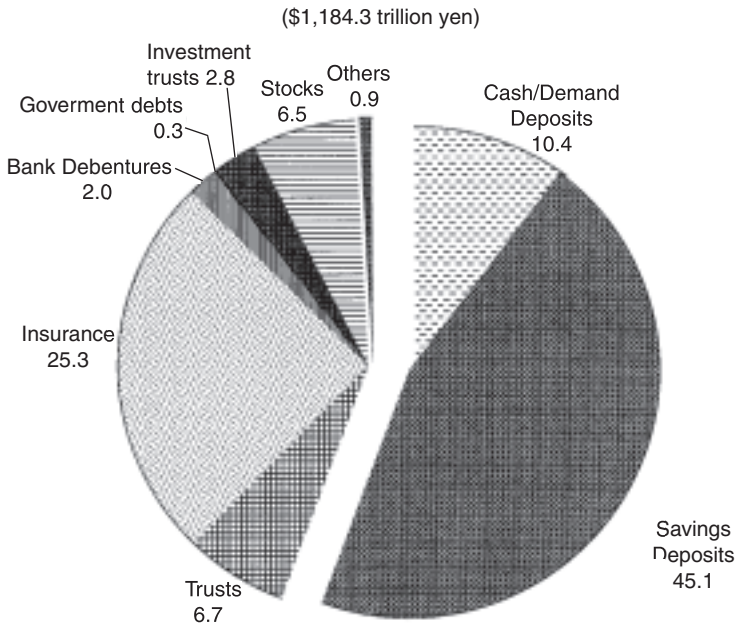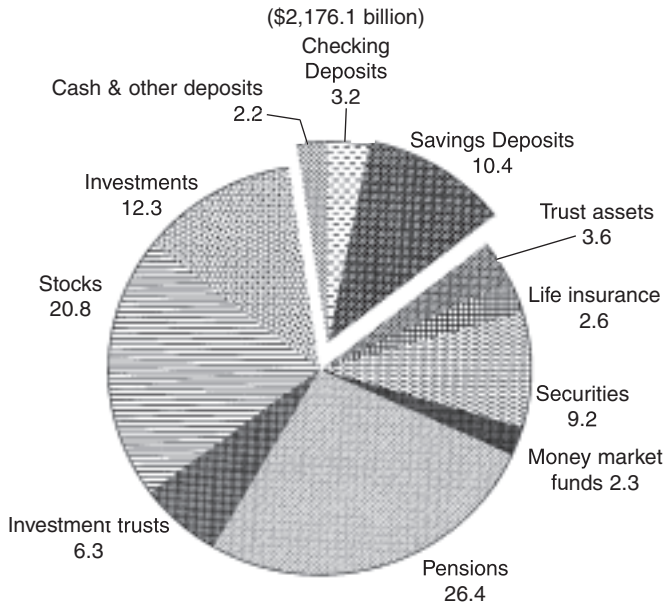

Note: As of the end of 1995.

Source: Nomura Investment Trust.

interest rate regime implied an allocation of a low-cost and long-term source of funds to these firms.

Since all defaulted corporate bonds were bought back by trustee banks, there were no defaults in which individual investors suffered losses. In practice, collateral was required to obtain bank guarantees on the corporate bonds. Thus, through the guarantee process, the collateral principle used in the bank loan market also affected the corporate bond market. The regulation of the primary market for corporate bonds and constraints on interest rates deprived the capital market of the opportunity to evaluate and price credit risk. This limited the growth of the capital market. Corporate bonds with higher risks, which required higher-risk premiums, were prohibited. As a result, "investor protection" regulation worked to protect the dominant share of banks in the Japanese financial market.

Figures 4.1 and 4.2 show the composition of financial assets of individuals in Japan and in the United States, respectively, as of the mid-1990s. The share of bank deposits was 55.5 percent in Japan, but only 16 percent in the United States. In the 1980s, the funds of the banking system increased dramatically due to the creation of new large deposit accounts that gave

**Figure 4.2   The composition of financial assets of individuals in
              the United States** (percent)

($2,176.1 billion)

Checking Deposits 3.2

Cash & other deposits 2.2

Savings Deposits 10.4

Investments 12.3

Trust assets 3.6

Stocks 20.8

Life insurance 2.6

Securities 9.2

Money market funds 2.3

Investment trusts 6.3

Pensions 26.4

Note: As of March 1996.

Source: Nomura Investment Trust.

higher interest rates. These increased deposits in the banks became a
principal cause of the bubble economy, because banks had to find borrow-
ers while large corporations went increasingly to capital markets directly
after deregulation. There was a mismatch between deregulation of corpo-
rate capital practices and ongoing limits on bank activities.

Thus, banks were the primary gatekeepers responsible for supplying
long-term funds to Japanese corporations. In order to obtain long-term
loans or bond guarantees, collateral was a critical ingredient. The domi-
nant source of collateral for Japanese corporations was real estate, espe-
cially land, and having this collateral then gave access to the financial
market.

With regulated interest rates, the banks' dominant capital market posi-
tion is a major source of their profits, which also insured their soundness
during the period of high growth, when the overall risk of the economy
was low. Since a bank's profits were proportional to the size of its out-
standing loans, all banks competed with each other to obtain larger deposit
balances, which could then be lent out as loans. This pattern of competition

Figure 4.3   Funds raised in the capital market

trillion yen
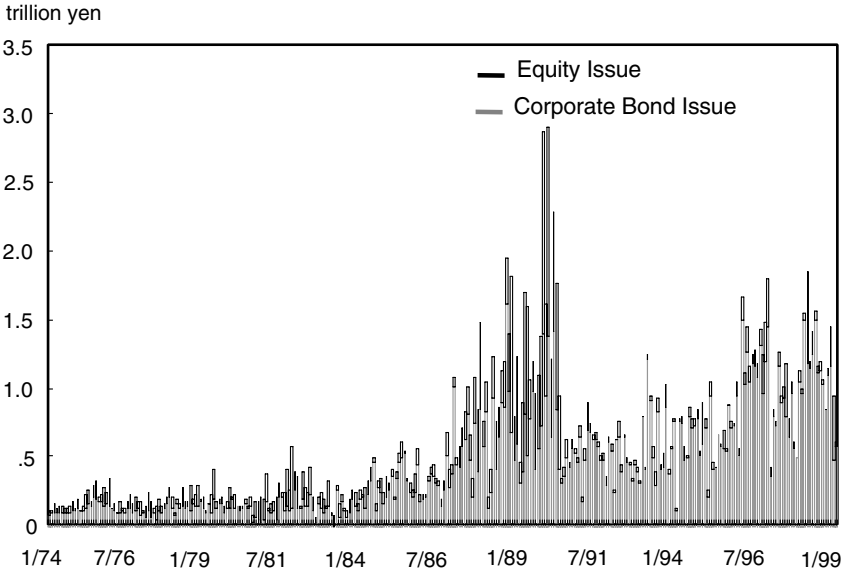
Sources: *Monthly Report on Public and Corporate Debts*, Monthly Statistics of Tokyo Stock Exchange.

among Japanese banks has a long tradition under the convoy regulations, which have been outstanding for several decades.

In the 1990s, risks in the Japanese economy markedly increased, and the banks' large share of the corporate loan market turned into a disadvantage. As stronger corporate borrowers turned to the bond market, banks were forced to make loans to less credible borrowers, and collateral was again an important criterion for loan approval. Naturally, the drastic fall in land prices had an extremely serious effect on the stability of the financial system. Thus, the crisis of the Japanese financial system in the 1990s was a result of the convoy regulations, which effectively safeguarded the financial system prior to deregulation.

Fund-Raising by Large Firms

The Japanese financial market in the second half of the 1980s was most evidently characterized by a rapid increase in capital market fund-raising by corporations in the face of progressive financial deregulation. Figure 4.3 shows the movement of fund-raising in the Japanese capital market and its growth rate relative to the same month of the previous year.

This enormous increase in capital-market fund-raising was brought about partly by equity issues at a time when stock prices were rapidly rising and partly by the emergence of new financial instruments, such as commercial paper, foreign debt issues, and unsecured corporate debentures.
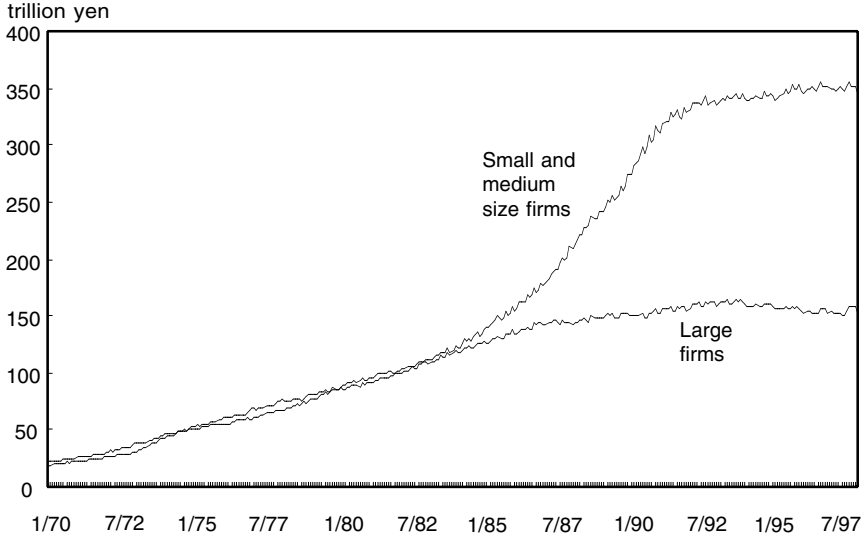
Under the convoy regulations, only large firms were allowed access to the capital market. These large firms raised more funds than they needed for capital investments from newly liberalized capital markets. Supported by soaring stock prices, large corporations issued equity, convertible bonds, and bonds with warrants at historically high prices and extremely low interest rates. They invested the new funds in assets that promised higher rates of return. These assets included certificates of deposit and foreign currency deposits, unregulated interest-rate accounts for large deposits, and financial instruments that benefited from soaring stock prices, such as special money trusts and trust funds.

Among all assets, real estate had the highest long-run rate of return up to 1990. The average annual rate of growth in land prices in the six largest Japanese cities was 12.7 percent from 1955 to 1990, and 23.1 percent from 1985 to 1990 (see figure 4.18 below). Large firms' investments in the domestic real estate and stock markets boosted the soaring prices in these markets, which were later labeled "asset bubbles." The increased land prices had a significant impact on the behavior of banks, as will be discussed below.

Large firms began to raise funds exclusively through security issues in the capital markets and reduced their borrowing from banks. They even used the funds they raised to repay outstanding bank loans. The declining growth rate of bank loans to large firms is shown in figures 4.4 and 4.5. This trend has been continuing since the early 1970s, when the Japanese economy shifted from a high-growth to a slower-growth period. The declining shares of long-term corporate loans held by long-term-credit banks and trust banks (whose customers were large firms) are shown in figure 4.6. Figure 4.7 shows the shares of loans secured by real estate across different groups of banks. It illustrates an accelerated fall in loan shares by long-term-credit banks and a steady increase in the share for regional banks (whose main customers were medium-sized and small firms). This contrast is clearer in figure 4.8, which shows the shares of secured loans using real estate as collateral.
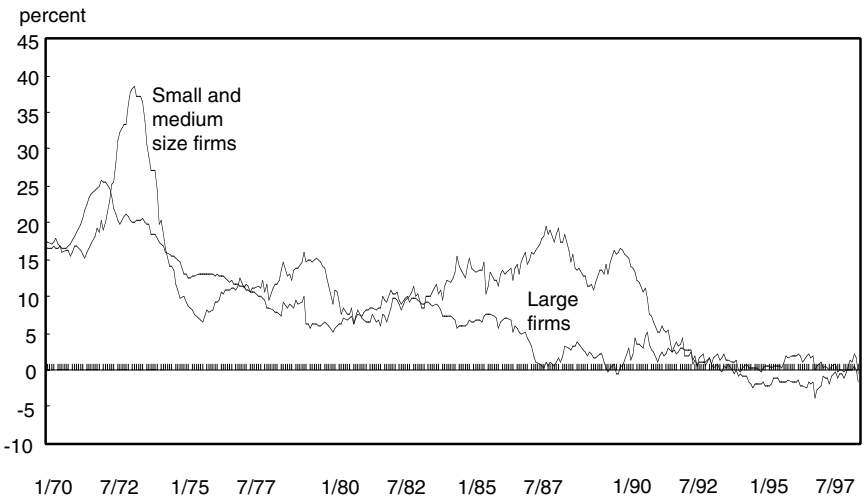
The figures highlight the fact that reduced demand by large firms for bank loans most seriously affected long-term-credit banks, which ultimately resulted in the nationalization in 1998 of two long-term-credit banks, Japan Credit Bank and Japan Long-Term Credit Bank. The long-term-credit banks were also adversely affected by the deregulation of interest rates in the capital market, which preceded the deregulation of deposit interest rates. Under the convoy regulations, long-term-credit banks could issue corporate bonds to raise low-cost long-term sources of

Figure 4.4   Bank loans by size of borrowers

trillion yen

Small and
medium
size firms

Large
firms

1/70   7/72   1/75   7/77   1/80   7/82   1/85   7/87   1/90   7/92   1/95   7/97

Source: Economic Statistics Monthly. Converted into a continuous data by the author.


Figure 4.5   Growth rates of bank loans

percent

Small and
medium
size firms

Large
firms

1/70   7/72   1/75   7/77   1/80   7/82   1/85   7/87   1/90   7/92   1/95   7/97

Source: Economic Statistics Monthly. Converted into continuous data by the author.

Figure 4.6 Share of long-term loans
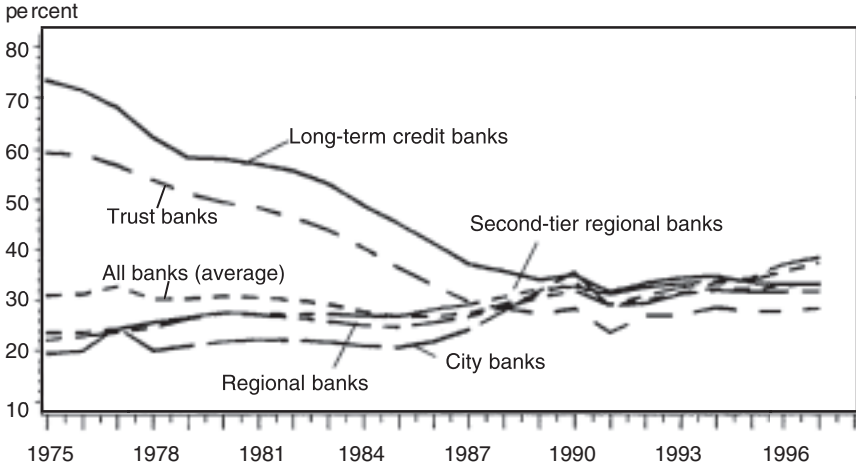
percent

Source: Calculated by the author based on *Bank Financial Data, Nikkei Electronic Economic Database System.*

Figure 4.7 Share of loans secured by real estate
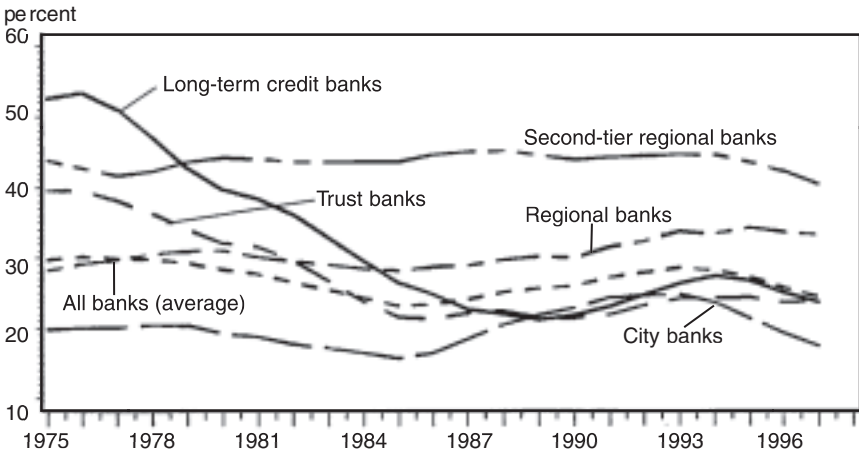
percent

Source: Calculated by the author based on *Bank Financial Data, Nikkei Electronic Economic Database System.*

**Figure 4.8 Share of loans secured by real estate in secured loans**
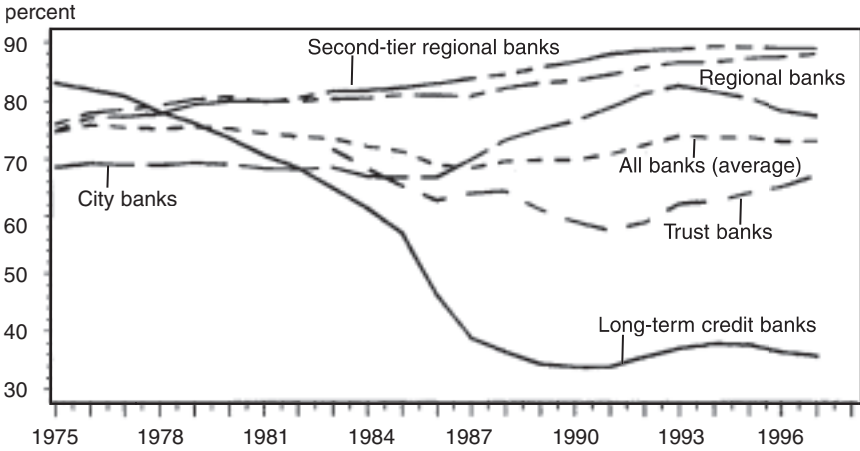
percent

Source: Calculated by the author based on *Bank Financial Data, Nikkei Electronic Economic Database System*.

funds, while other banks could not. On the other hand, long-term-credit banks were not allowed to take deposit accounts, and only had relationships with large firms. This is the reason why they had little or no access to small and medium-sized firms and individual customers, which were the province of the regional banks.

Once the liberalization of interest rates began in the capital market, however, the cost of funds of long-term-credit banks rose, before the rise in the cost of deposits of other banks. Since their main customers were large firms, the fall in loan demand was more serious. Long-term-credit banks eagerly hoped to enter the securities business to meet large firms' increased demand for funds from security offerings. Unfortunately, the process of deregulation was slow, because it was based on the policy of "measures to mitigate drastic changes" in the financial markets. Banks have been allowed to establish subsidiaries to enter the security business only since 1993. Even at that time, bank subsidiaries were not allowed to have a stock-trading business. Therefore, long-term-credit banks were very seriously affected by deregulation and were forced to find new borrowers while facing higher costs of funds. Although the situation is more or less the same for all groups of banks, the long-term-credit banks, which were most privileged under the convoy regulations, experienced the most damaging impacts of the slowly implemented financial deregulation process.

**Figure 4.9 Deposits of domestically licensed banks**

trillion yen
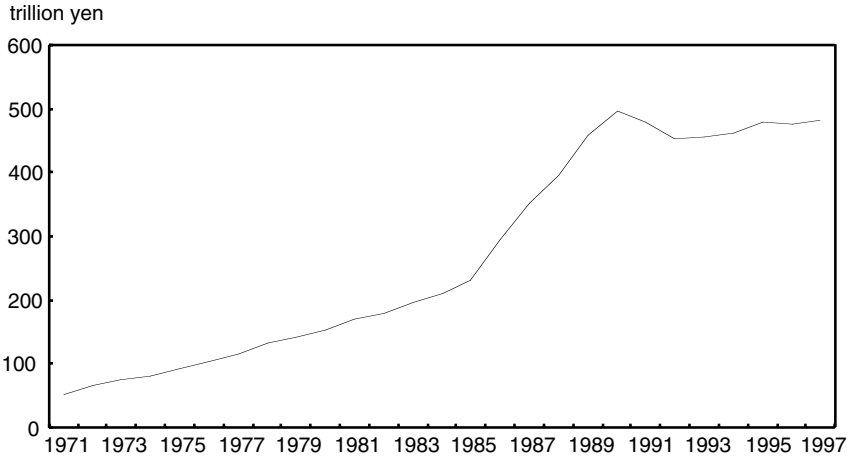
Source: *Economic Statistics Annual*, Bank of Japan.

Increased Bank Lending to Small and Medium-Sized Firms

When deposit interest rates were liberalized, starting with large deposits in 1985, bank deposit levels increased rapidly, as shown in figure 4.9. Bank fund-raising through newly allowed sources increased as well. From a naïve viewpoint, it was a wonderful opportunity for banks to increase their profit by making larger loans. On the other hand, loans demand by large firms declined sharply, squeezing banks' profit margins on loans to these customers. In the late 1980s, nearly all Japanese banks were feeling competitive pressures to find new loan customers.

There were five kinds of loans with which most banks expanded their portfolios: (1) to small and medium-sized firms, (2) to the real estate industry, (3) to the finance industry, (4) to individuals, and (5) to overseas investors. Figures 4.10 through 4.14 show the shares of loans going to each category. As shown in figures 4.15 and 4.16, the shift in loans from the manufacturing sector to the service sector also is a common trend among all these banks. The higher the initial share of large firms in their loan portfolios, the larger the shift of their lending patterns. The long-term-credit banks were forced to make the most drastic adjustments, given
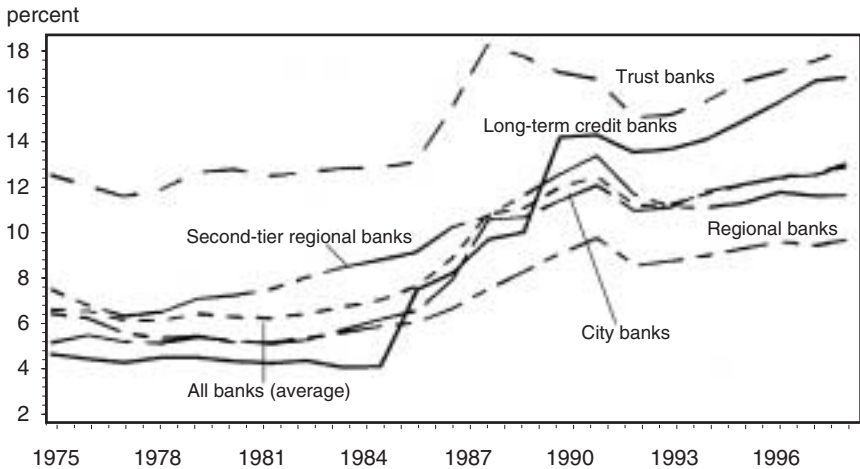
Figure 4.10 Share of loans to small and medium firms

percent
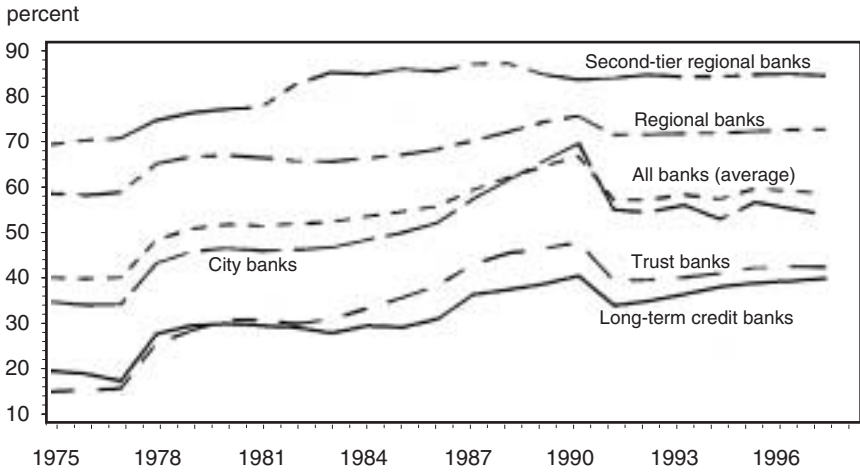
Note: From September 1977, the definition of small and medium firms was enlarged.
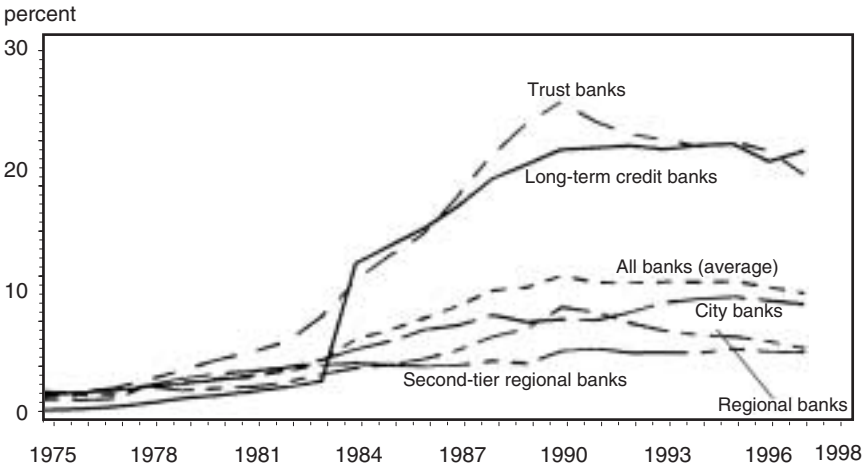
Source: Calculated by the author on the basis of *Bank Financial Data, Nikkei Electronic Economic Database System*.

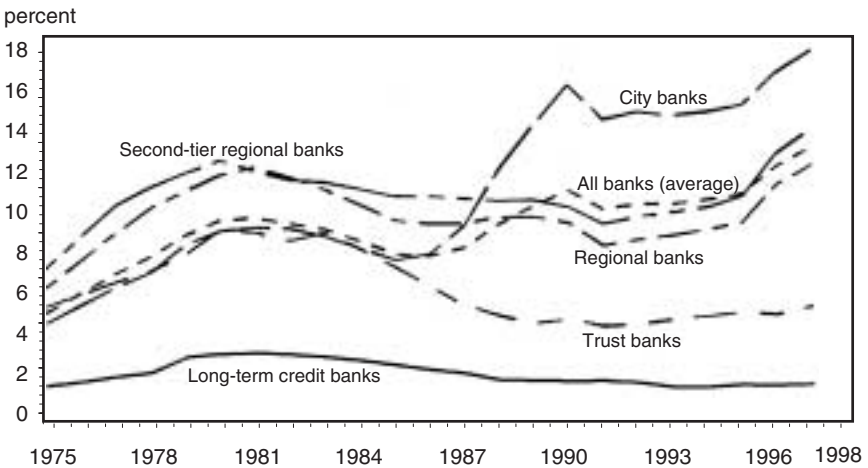**Figure 4.11 Share of loans to real estate industry**

percent

Source: Calculated by the author on the basis of *Bank Financial Data, Nikkei Electronic Economic Database System*.

**Figure 4.12 Share of loans to finance and insurance industries**

percent

Trust banks

Long-term credit banks

All banks (average)

City banks

Second-tier regional banks

Regional banks

Source: Calculated by the author on the basis of *Bank Financial Data, Nikkei Electronic Economic Database System.*

Figure 4.13 Share of mortgage loans to individuals

percent

City banks

Second-tier regional banks

All banks (average)

Regional banks

Trust banks

Long-term credit banks

Source: Calculated by the author based on *Bank Financial Data, Nikkei Electronic Economic Database System.*
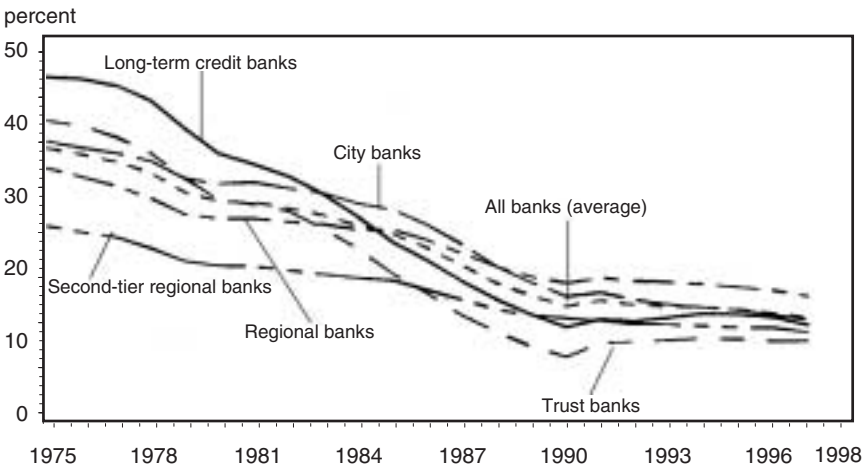
Figure 4.14   Shares of overseas loans

percent
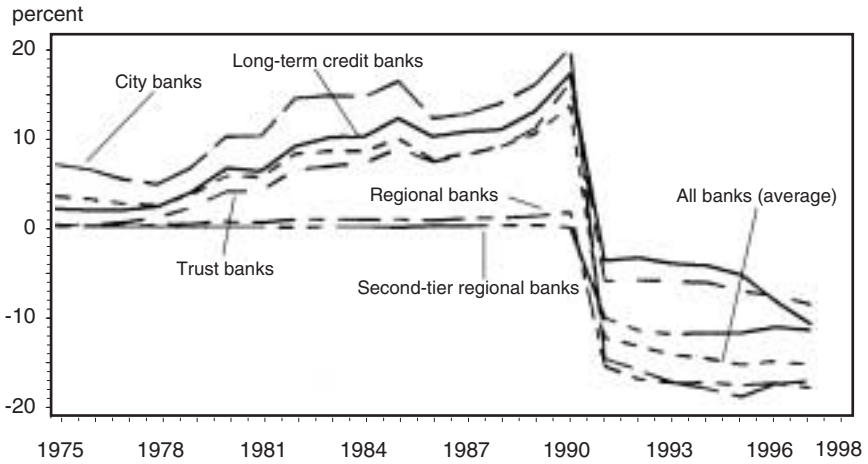
Note: In 1991, the definition of overseas loans was revised.

Source: Calculated by the author based on *Bank Financial Data, Nikkei Electronic Economic Database System.*

Figure 4.15   Share of loans to manufacturing industry

percent

Source: Calculated by the author on the basis of *Bank Financial Data, Nikkei Electronic Economic Database System.*

Figure 4.16   Share of loans to service industry
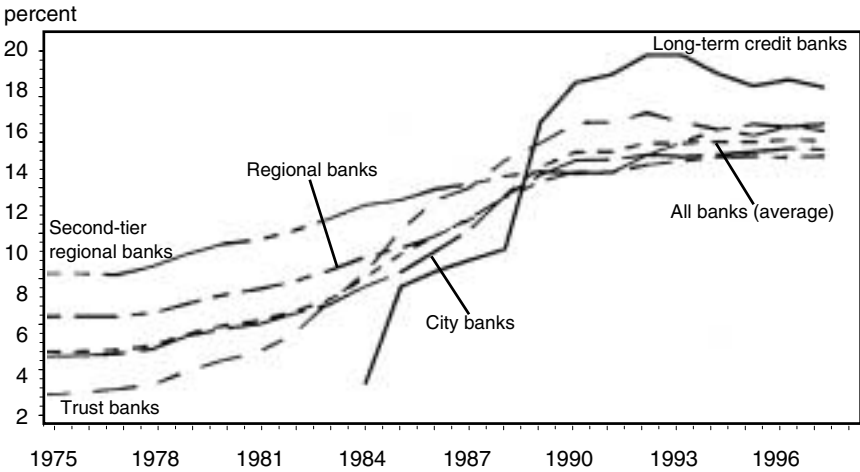
percent

continued regulatory restrictions against banks entering the security business.

Banks could enjoy higher profit margins for these new loans, but they clearly recognized the lower creditworthiness of these customers. In order to reduce their credit risks, banks made loans secured by real estate. Land had been the most profitable asset to hold for more than four decades following World War II. Securing loans by land had been a long tradition among Japanese banks for over a century, since the establishment of the modern banking system in the Meiji era.[3]

The soaring land and stock prices enhanced the creditworthiness of small and medium-sized firms, individuals with mortgages, the real estate industry, and nonbank financial institutions. Nonbank financial institutions expanded their own loans to the real estate industry and to residential mortgage borrowers. Long-term-credit banks did not have deposit accounts and consequently lacked easy access to small and medium-sized corporate customers. They increased loans to their 100-percent-owned financial subsidiaries, through which loans to the real estate industry increased drastically. This was a major cause of the financial failure of the two long-term-credit banks in 1998.

Until the early 1980s, it was a standard practice of banks to make loans for less than 60-70 percent of the market value of the land serving as collateral. In the late 1980s, when most people were convinced that a

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3. See Asakura (1978).

Figure 4.17 Nikkei stock averages
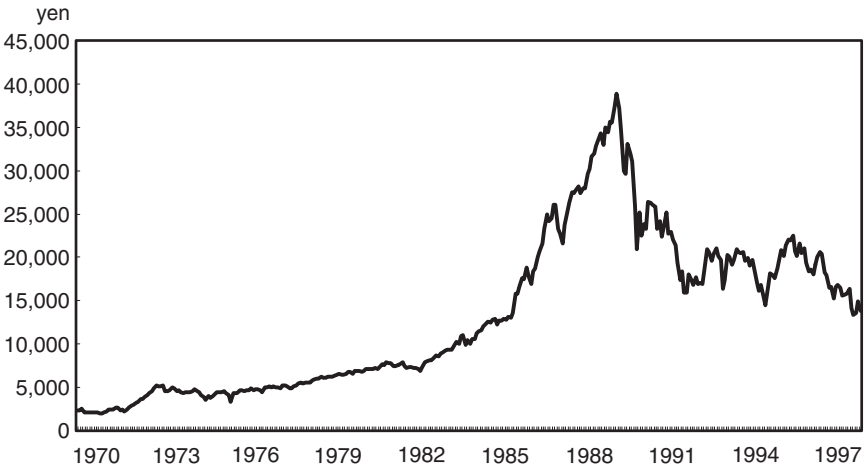
Source: *Economic Statistics Monthly*, Bank of Japan.

further rise in land prices was inevitable, it became common practice to lend up to the full market value of the land. A critical problem for the banks was a lack of diversification across sources of collateral. As long as most loans were secured by the borrower's landholdings, diversification across different industries had little meaning. Soaring land prices, the collateral principle, and bank competition for larger market shares as an extension of traditional bank behavior under the convoy regulations—together, these factors were the seeds for the financial crisis that occurred a decade later.

The Credit Crunch and the Financial Crisis

The bursting of the stock and real estate bubbles in 1990 fundamentally changed the Japanese financial market environment. Figures 4.17, 4.18, and 4.19 show stock prices, land prices for the six largest cities, and land prices for all of Japan, respectively.

The plunge in stock prices reduced the value of stocks held by banks, which was counted as a part of banks' equity capital on the basis of the Bank for International Settlements (BIS) equity capital regulation. Banks were forced to reduce the size of their loans to meet BIS capital regulation of 8 percent for internationally operating banks, and 4 percent for domestically operating banks, which caused a serious credit crunch in Japan. In addition to the stock market collapse, the credit crunch had a strong
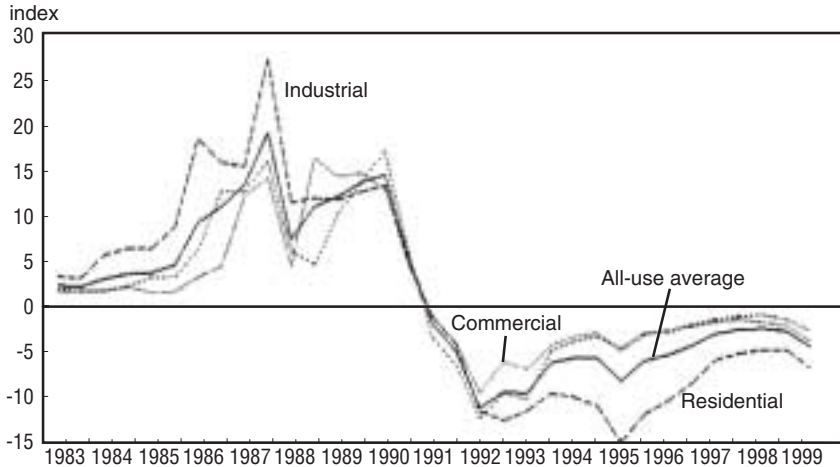
Figure 4.18a   Land prices of 6 largest cities
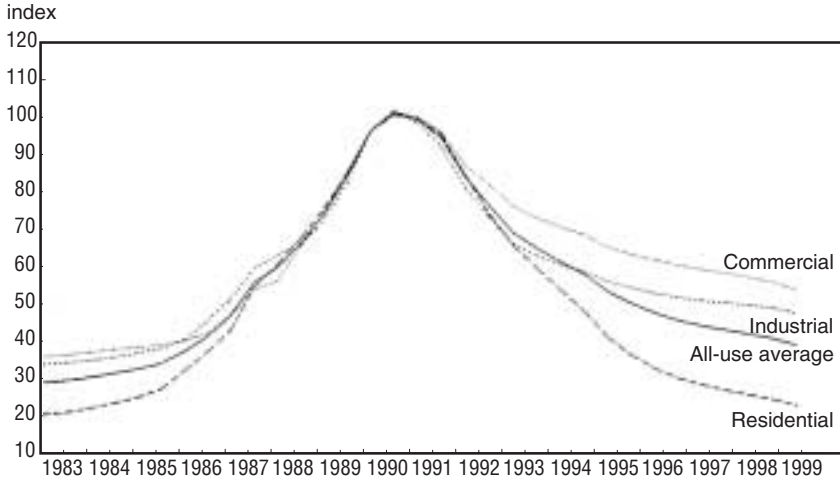
index

Note: The period for each year is noted as of March.

Source: Price Indexes of Urban Areas, Nippon Institute of Real Estate Research.

Figure 4.18b   Change of prices relative to 6 months earlier

index

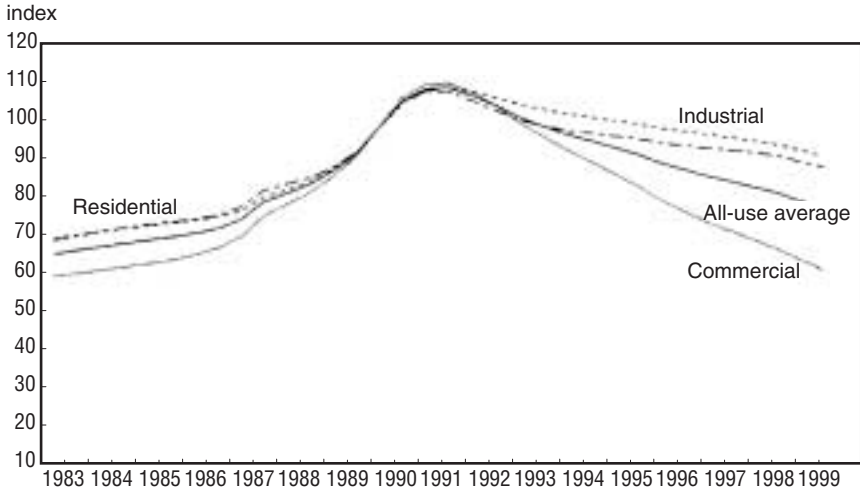Note: The period for each year is noted as of March.

Source: Price Indexes of Urban Areas, Nippon Institute of Real Estate Research.

negative impact on the whole industrial backbone of Japan. Fear of finan-
cial crisis further depressed expectations for the growth rate of the econ-
omy, which put further downward pressure on domestic asset prices.

As shown in figure 4.5 above, the fall in the loan growth rate after 1990
was especially drastic for small and medium-sized firms. The growth rate
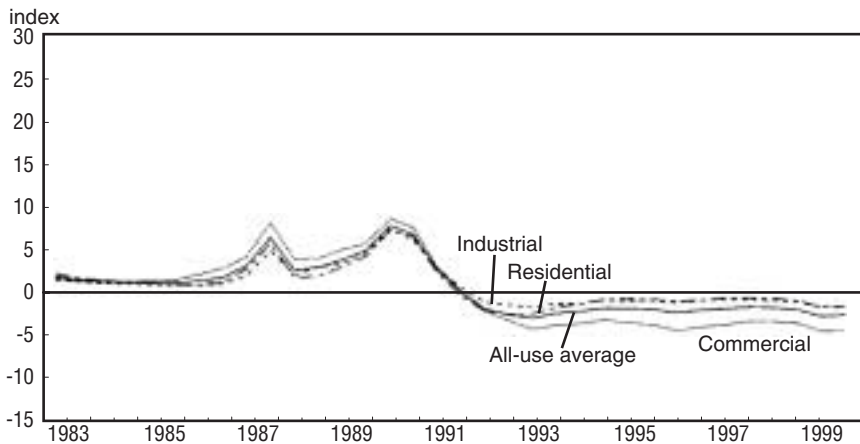
Figure 4.19a   Land prices for all of Japan

index

Industrial

Residential

All-use average

Commercial

1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999

Source: Price Indexes of Urban Areas, Nippon Institute of Real Estate Research.

Figure 4.19b   Land prices relative to 6 months earlier

index

Industrial

Residential

All-use average

Commercial

1983   1985   1987   1989   1991   1993   1995   1997   1999

Source: Price Indexes of Urban Areas, Nippon Institute of Real Estate Research.

of loans to large firms was negative in the mid-1990s. Due to the land price plunge, small and medium-sized firms lost their main source of collateral, substantially reducing their creditworthiness and loan access in the early 1990s.

As far as the credit crunch is concerned, the fall in stock prices is the prime cause. There is no question that the negative impact of the fall in stock prices to a level less than half its prior high-water mark had an extremely serious effect on the economy. With respect to the stability of

Figure 4.20   Share of loans secured by securities in secured loans
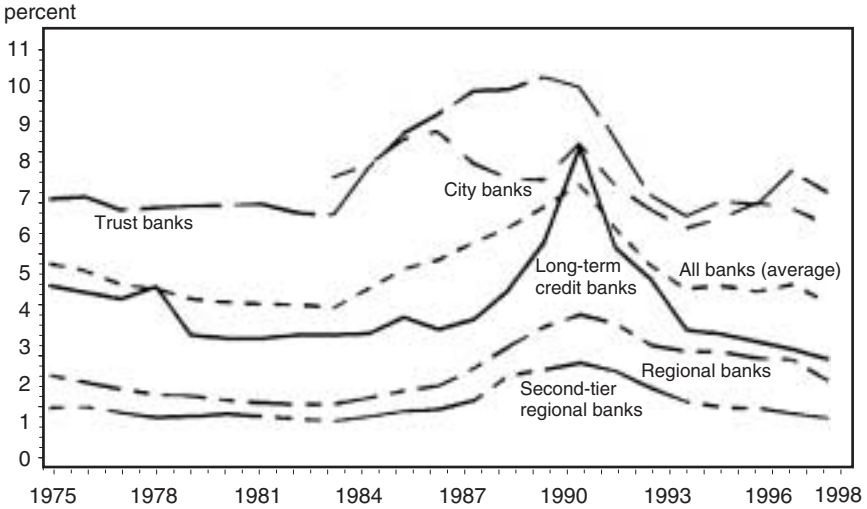
percent

Japan's financial system, however, the stock price crash had a much less serious impact than the fall in land prices.

The shares of loans secured by securities are shown in figure 4.20. It is far smaller than the share of loans secured by real estate, as shown in figure 4.8 above. Stocks are only a part of the securities used as collateral for bank loans. In this sense, a fall in land prices to a level one-third of their peak reduced the quality of a bank's loan portfolio tremendously. As of the end of 1999, land prices continued to fall. Worse than that, the land serving as collateral on defaulted loans could not be liquidated in this extremely depressed real estate market. Bad loans increased, and the underlying collateral could not be liquidated. Thus, banks were forced to further reduce their loan originations.

Since land served as an anchor of the Japanese credit system, the collapse of the real estate market brought about a crisis for the whole financial system. As a natural course of deregulation, less efficient banks were forced out of business. When everybody believes that the financial system itself is sound, failures of individual banks do not threaten the system. Since the collapse in land prices is a factor that affects the foundation of the credit system, this financial crisis is unlikely to end until the price of land stabilizes at some lower level. To facilitate Japan's economic recovery, policies to bring liquidity to the real estate market are needed, such as tax reform, securitization of real estate, and lifting building restrictions to make more efficient use of land and higher rates of return on real estate possible.

Land has historically had the highest rate of return in Japan's postwar regulated interest rate environment. It is also tax-attractive in that, when it is held by corporations, it is exempt from the inheritance tax, which is quite high in Japan. With deregulation of the financial market, the rates of return of all types of assets will be readjusted. The current fall in land prices may be part of a general realignment of asset rates of return in a globally deregulated economy.

The fundamental cause of the Japanese financial crisis is the excessive share of the financial market controlled by the banking sector, which requires collateral before loans can be originated. In a deregulated world with higher economic risks, the social system of risk taking has to be changed to a system of risk sharing among investors capable of evaluating and underwriting these risks. A deeper capital market and a reduced role for the banking system will be needed.

Comparison with US Experience

The important role of collateral in bank loans is universal.[4] Whenever and wherever, plunges in asset prices in the real estate market and the stock market seriously damage the financial system. Since the share of real estate in secured loans in Japan is higher than in the United States, the fall in real estate prices has a more profound impact on the Japanese financial system than in the United States. The US financial system may be more susceptible to changes in stock market conditions. This could explain why the Federal Reserve System intervened in the recent case of Long-Term Capital Management, despite the unpopular bailout policy.

In the late 1980s, nevertheless, the US financial market had the same experience with the fall of real estate prices, and many banks suffered from it. Fortunately, however, the real estate market recovered in the early 1990s, helping banks, savings and loans, and the Resolution Trust Corporation as well. The stable demand for multifamily housing; the securitization of real estate, especially the innovations in financial technology such as pass-through securities; the economic recovery; increasing stock prices—all favored the stability of the US financial system. Also in the United States, the recovery of the real estate market was a key element in ending the turmoil in the financial system in the 1980s.

A problem in the real estate market in Japan is that land prices have been determined not only by the present value of the expected yields

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4. The analysis of this section should not be misinterpreted. It is intended to explore the reason for Japan's delayed policy action to fix the problem, and not intended to endorse the policy actually taken.

but also by an expected capital gain. This overpricing makes securitization at the current price levels more difficult. Since buildings depreciate quickly in Japan, land without buildings has been most remunerative to hold. With falling land prices, the supply of land increased in the 1990s, which facilitated a further fall in prices.[5]

Before World War II, the large banks were not used to accepting land as collateral. For regional banks, land was a popular collateral, because there was no other eligible collateral in local areas. In the course of Japanese history, financial crises occurred each time land prices plunged, as in 1885, 1920, and 1927. In those days, agricultural land was an asset with a high rate of return due to the tenancy system. After agricultural land reform abolished the tenancy system (mandated by the occupation army after World War II), land without buildings became an important collateral for all groups of banks, because land prices increased in line with the high growth of the economy. The regulation of deposit interest rates encouraged a higher rate of return of landholdings. Land, more than equities, had been believed to be the safest collateral for bank loans.

The fall in land prices in the 1990s was the first large-scale adjustment of asset prices since World War II. Given the history of bank lending policy in Japan, it is not surprising that the drastic fall in land prices caused a financial crisis on a large scale. It is easy to blame the delay in policy response for the lack of restructuring of the financial system. However, the delay might partly be attributable as well to the recognition by the bank supervisory authority of the extraordinary scale of outstanding bad loans—a magnitude of debt whose rapid write-off would surely endanger the whole Japanese financial system. If the supervisors correctly recognized in the early 1990s the fact ''that in aggregate the entire Japanese banking industry or even that each of the 21 large banks were insolvent, which became common knowledge for private analysts in the late 1990s,''[6] what more could the supervisory authority have done at that time?

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5. Western observers may think that the situation was the same in the United States and accuse bank managers of not deciding to sell real estate at lower prices. Because of an expectation of a further fall in prices, however, the real estate market was frozen, and sales were not possible even at lower prices. Legal procedures related to the collateral right were another factor that delayed the liquidation process of real estate. Accounting rules were relevant as well. Once banks sold their real estate at lower prices, it revealed the losses that did not show up on their balance sheet as long as they held the assets and valued them at the purchase price. Moreover, sales of assets at very low prices could be interpreted by the market as a signal of a bank's financial difficulty and lead to a bank run, unless all other banks did the same thing. Therefore, the weaker a bank's financial position, the harder for it to sell assets at lower prices. This pattern of bank behavior, known as *Yokonarabi* (parallel behavior), is a result of the convoy regulation.

6. See chapter 3 of this volume, by Friedman.

In order to fix the financial system, even at the early stage of the early 1990s, a huge quantity of public funds was needed. This policy had been proposed by Kiichi Miyazawa, the prime minister at that time. But public opinion, and thus politicians, strongly opposed a policy that could render the impression of helping troubled banks by using public money. His proposal was simply ignored. It was evident that even the proposed amount of the public money was far less than needed, unless land prices stopped falling.

The policy of spending public money to fix the troubled financial system could not obtain political support unless the seriousness of the problem was well understood by the public. For this purpose, a full disclosure of the magnitude of bad loans was needed; this, however, could easily have triggered a financial panic. This dilemma was the prime cause of the supervisory authorities' forbearance policy, which eventually led to even more public money being needed to end the financial crisis.[7]

In retrospect, there is no question that the government should have acted at an earlier stage. In practice, however, a decision to spend an amount of public money equivalent to one year's total national budget could not be made without wide public support. The savings and loan association problem in the United States was far smaller in magnitude than the Japanese banking problem and did not directly endanger the payment system. Yet it took more than a decade as well to fix the problem. When the size of the problem is too big to handle, it is not easy to act quickly. If we attribute Japan's forbearance policy only to the poor performance of the politicians and the bureaucrats or some unique characteristics of Japan, it dwarfs the problem. The lesson we should learn is that the problem is common all over the world, and the social cost of the problem that stems from crises in a fractional reserve banking system can be huge, especially when that industry is protected over a long period of time. We need to work on the framing of a new type of banking system.

This course of events is a result of the convoy regulations, which lasted nearly a half-century in Japan and necessarily created vested interests among involved parties, which are consistent with the capture theory of regulation put forth by Stigler.[8] In order to change the long-established vested interests, it took time. As pointed out by Miller, a change in the political system is needed, promoting effective political competition that

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7. For example, Mr. Yoshimasa Nishimura, former chief of the banking bureau of the Ministry of Finance, wrote in 1999 that the MoF's fear of a possible financial panic was why a bailout was delayed for 5 years. See Yoshimasa Nishimura, Kinyugyosei no haiin (The Cause of the Failed Banking Policy), Tokyo, Bungeishunzyu, 1999, 112-15.

8. See Stigler (1964; 1971).

can make the public choice of alternative policies possible.[9] Japan needs to establish a financial system that is effectively motivated and regulated by the undistorted market mechanism.

A Theory of Bank Lending and Collateral

The Model

The above-mentioned behavior of banks in the late 1980s can be explained as simple profit-maximizing behavior according to the theory of bank lending, which explicitly takes the role of collateral into account.

A bank's expected profit (π^e) is defined by

$$\pi^e = (1 - p)(r - i)A + p\{(r - i) - (1 - \tau)\}A, \tag{1}$$

where p is the default loan probability, which is subjectively determined by the bank, r is the lending interest rate, i is the bank's cost of funds, and A is the loan amount. The loan demand (A) function is

$$D = A(r,\tau) \qquad \frac{\partial A}{\partial r} < 0, \quad \frac{\partial A}{\partial \tau} < 0 \tag{2}$$

and is a decreasing function of both lending rate (r) and the collateral rate (τ) defined as the proportion of a loan that the bank believes to be recoverable by disposing of the collateral in case of a default. So

$$\tau = \frac{\alpha W}{A}, \tag{3}$$

where a ($a < 1$) is the lender's discount rate on the market value of the collateral (W) to calculate the secured amount of a loan.

The variables τ, r, i, p all have to satisfy the following conditions:

$$\tau \geq 0 \tag{4}$$

$$r, i > 0 \tag{5}$$

$$r - i > 0 \tag{6}$$

$$1 > p \geq 0 \tag{7}$$

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9. See Miller (1993).

There are four different ways to solve this model, depending on the specification of which variables are under the lender's control. If both r and τ are control variables, then we can get the results that can explain the different lending patterns of different types of financial institutions.[10] In the following version of the model, we assume that the lending rate is fixed at a competitive level in the bank loan market.[11] An individual bank controls the collateral rate (τ), taking the borrower's default probability into account and indirectly determining the amount of loan (A) in order to maximize its profit. For simplicity, the cost of funds (i) is presumed to be given.

The first-order condition for profit maximization[12] is

$$\tau(1 - r)p = \eta\{(r - i) - p\}, \tag{8}$$

or

$$\tau = \frac{(r - i) - p}{(1 - \eta)p}, \tag{9}$$

where η is the elasticity of demand for loans with respect to τ and is defined as follows:

$$\eta = -\frac{\partial A}{\partial \tau}\frac{\tau}{A} > 0. \tag{10}$$

Since $\tau \geq 0$ from equations (4) and (8), the following relationship has to be satisfied:

$$\eta \gtrless 1 \text{ depending on } p \gtrless r - i. \tag{11}$$

Figure 4.21 illustrates the situation. $D(r, \tau)$ is a borrower's loan demand curve with respect to the collateral rate (τ). If it is a straight line, $\eta > 1$

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10. In this case, the optimum values are $r = \frac{(p + i)\epsilon}{\eta + \epsilon - 1}$, $\tau = \frac{(p + i)\eta}{p(\eta + \epsilon - 1)}$, where $\epsilon = -\frac{\partial A}{\partial r}\frac{r}{A} > 0$, and at the optimum point $\epsilon > 1$ always holds. This version of the model explains a variety of lending patterns by the types of borrowers for different financial institutions in terms of the parameters. See Shimizu (1997a, 38-57).

11. When r is a control variable with a given $\hat{o}$, the optimum condition for r is $r = \frac{\epsilon\{i + (1 - \tau)p\}}{\epsilon - 1}$.

12. The second-order condition is $-\frac{2\frac{\partial A}{\partial r}}{D''} < \frac{\partial^2 A}{\partial r^2} < -\frac{2\frac{\partial A}{\partial r}}{D'}$, where $D' = (r - i) - (1 - \tau)p > 0$, and $D'' = (r - i) - (1 - \tau)p < 0$. Since $\frac{\partial^2 A}{\partial r^2}$ is not far from zero, this condition is satisfied under normal conditions.

Figure 4.21 The collateral rate and the demand elasticity
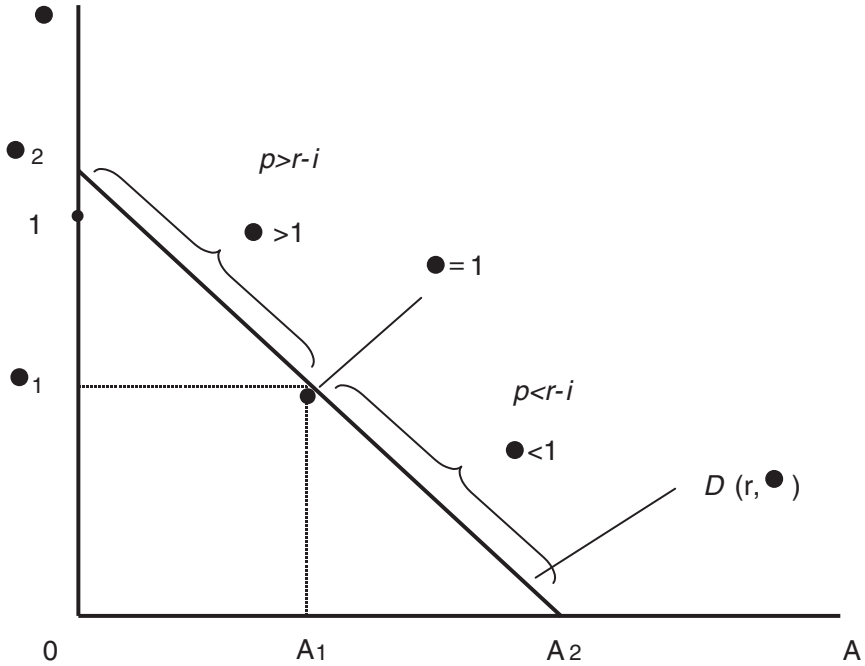
represents the upper half and $\eta < 1$ represents the lower half of the line. For borrowers whose default probability is higher than the bank's profit margin, a bank sets τ so that $\tau_1 < \tau < \tau_2$, and the amount of the loan is determined between 0 and A_1. On the other hand, for borrowers whose default probability is less than the bank's profit margin, τ is set between 0 and τ so that the amount of the loan is determined between A_1 and A_2. Even with the same demand curve and the same loan interest rate, a borrower with a lower default probability can get larger loans than a borrower with a higher default probability.

For a highly credible borrower whose default probability is zero ($p = 0$), $\eta = 0$ from equation (8). The only point that satisfies this condition is A_2. At this point, the maximum loan amount is at $\tau = 0$, and the collateral rate ceases to function as another price in the loan market. Standard models of bank lending that do not explicitly take the role of collateral into account are special cases of our model, in which all borrowers have a zero payoff in default. This model explains one reason a credible borrower can get a larger loan than a less credible borrower through the rationing mechanism of collateral.[13] The collateral rate set for less credible

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13. The result of traditional models that treat A as a direct control variable with a given r is obtained by solving equation (1) with respect to A as $r - i = (1 - \tau)p$, where the bank's profit margin is equal to its expected loss rate. If we disregard the collateral rate by

borrowers is higher than for more credible borrowers. In other words, a borrower who is charged a high collateral rate is regarded as having a high default probability.

We can easily find how τ reacts to changes in parameter values by checking the sign of the partial derivatives with respect to p, η, r, and i:
For $p > r - i$, thus $\eta > 1$,

$$\frac{\partial \tau}{\partial p} > 0, \quad \frac{\partial \tau}{\partial \eta} < 0, \quad \frac{\partial \tau}{\partial r} < 0, \quad \frac{\partial \tau}{\partial i} > 0. \tag{12}$$

For $p > r - i$, thus $\eta < 1$,

$$\frac{\partial \tau}{\partial p} < 0, \quad \frac{\partial \tau}{\partial \eta} > 0, \quad \frac{\partial \tau}{\partial r} > 0, \quad \frac{\partial \tau}{\partial i} < 0. \tag{13}$$

For a borrower whose default probability is higher than a bank's profit margin, the collateral rate will be increased if the default probability rises. If the default probability rises such that $p > \eta(r - i)$, then the collateral rate is set at more than 1 and a bank practically refuses to lend. On the other hand, the loan amount will be larger the lower the default probability, the higher the demand elasticity with respect to the collateral rate, the lower the loan rate, and the lower the cost of funds.

Conversely, the reaction of τ is completely opposite in the case of borrowers with low default probabilities, $p < r - i$. This asymmetry in a bank's reaction explains a lot of banks' lending behavior in the late 1980s.

Implications

If banks assess the default probability as lower for large firms and higher for small and medium-sized firms, this model explains the difference in the collateral rates for corporate borrowers of various sizes. Since banks recognized that the default probability of small and medium-sized firms is high, they charged these new borrowers a high collateral rate. If asset prices did not appreciate, the higher collateral rate imposed on small and medium-sized firms and the real estate industry would have severely limited new loans to these customers.

Unfortunately, in the late 1980s, soaring land and stock prices increased the perceived creditworthiness of these borrowers. In terms of the model, their demand curves with respect to the collateral rate shifted upward.

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setting $\tau = 0$, then $r - i = p$, and the loan amount is determined at $\eta = 1$. This is the optimum solution for a normal monopoly with a zero cost of production.

**Figure 4.22 Small and medium-sized firms: Increased demand**
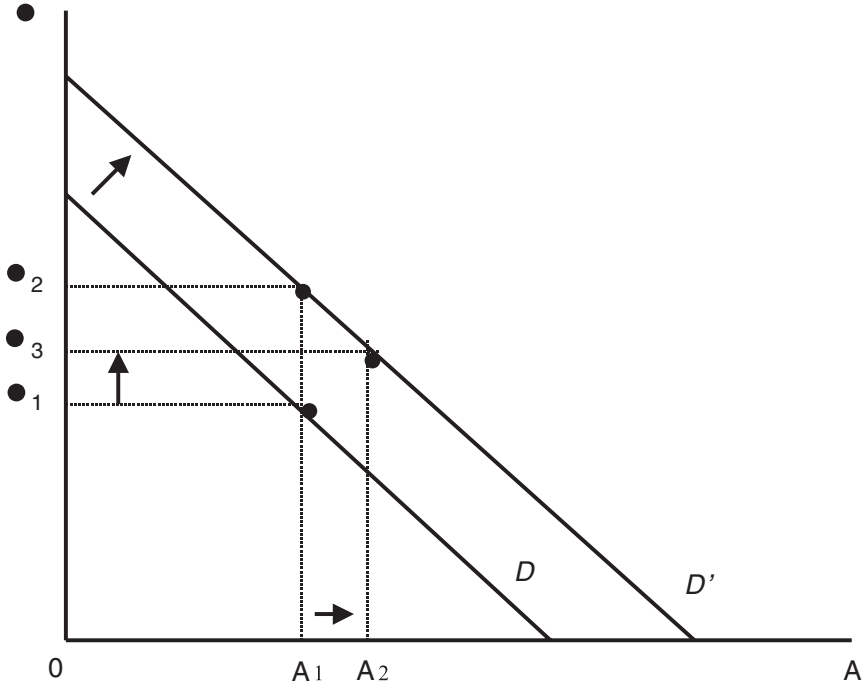
As shown in figure 4.22, this shift in the demand curve from D to D' implies a rise in η measured at the same loan amount A_1. For small and medium-sized firms with $p > r - i$, a rise in η reduces τ and thus increases the amount of the loan to A_2 at τ_3. This fall in τ remains somewhere between τ_1 and τ_2, because η is the same on D and D' measured at the original τ_1, and a rise in η does not occur.[14] Hence, a rise in land prices increases loans to small and medium-sized firms and raises the collateral rate from the original level to some extent.

Increased loans to riskier borrowers do not mean that banks were ignorant of the higher risks. On the contrary, because of their knowledge of the higher risks, banks increased τ from the original level and depended heavily on the value of collateral to secure the loan. As shown in equation (12), τ is higher for a borrower with a higher p.

On the other hand, the aggregate loan demand of large firms shifted downward from the middle 1970s and especially in the late 1980s. This downward shift was due to the decrease in the growth rate of the economy

14. If D and D' start from the same point on the vertical axis, η is identical at τ_1. Thus, the new collateral rate τ_3 cannot be less than the original τ_1. If D' shifts simply upward, as shown in figure 4.22, η is smaller on D' than on D at the same τ_1, and τ_3 must be higher than τ_1.

Figure 4.23   Large firms: Decreased demand
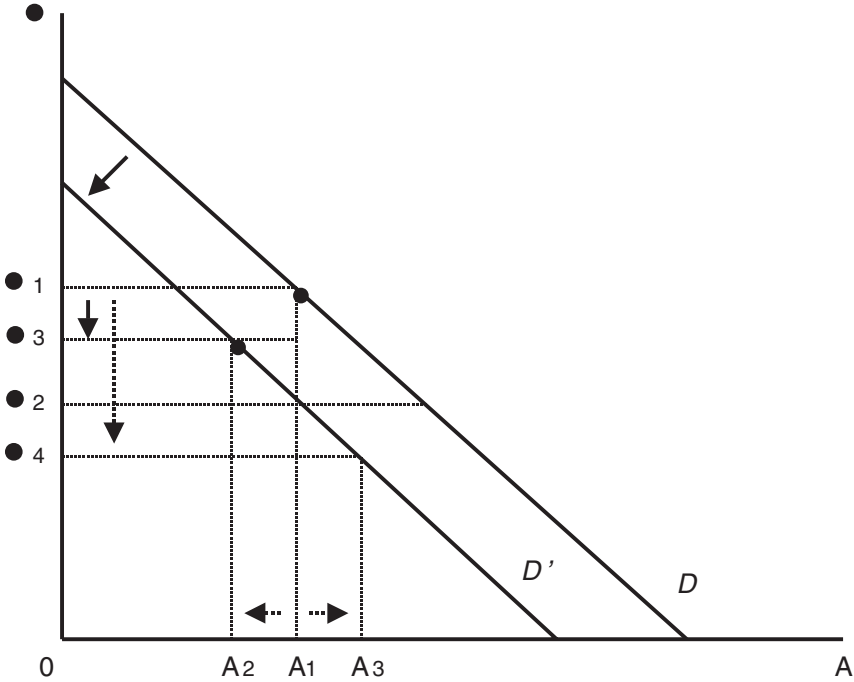
and therefore of investment demand by firms. Another factor was increased opportunities for large firms to raise funds directly from capital markets. The downward shift of D to D' in figure 4.23 implies a fall in η measured at A_1. For large firms with $p < r - i$, a fall in η unambiguously reduces the new τ to less than the original level τ_1. It is not clear whether τ_3 is higher or lower than τ_2, and thus whether the new loan amount is larger or smaller than A_1 depends on how the demand curve shifts.

   For small and medium-sized firms, however, the same downward shift of the demand curve with respect to τ from D to D' affects them differently. A fall in η increases τ. So, as shown in figure 4.24, a fall in η at A_1 resulting from the shift from D to D' increases τ from τ_1 to τ_3.[15] So, for small and medium-sized firms, a downward shift of the demand curve, which happened after the asset price crashes, unambiguously increases τ and reduces the loan amount to A_2. This sharp downward shift for small firms' loan demand was caused by the collapse in their creditworthiness with the fall in land prices.

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15. The level of τ_3 could be less than τ_1 in this particular case of the parallel shift of the demand curve. But τ_3 is never less than τ_2, and A_2 is always less than A_1. If the demand curve starts from the same point on the vertical axis, τ_3 is always higher than the original level τ_1.

Figure 4.24 Small and medium-sized firms: Decreased demand
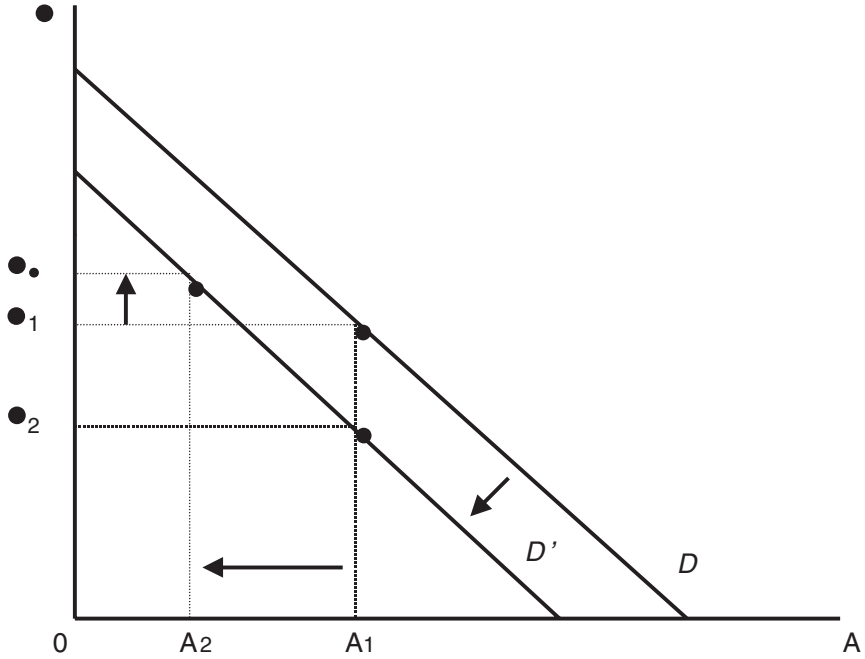
This implication of the model is confirmed by the evidence in figure 4.8 above, which shows the ratio of loans secured by real estate for each group of banks. Regional banks and second-tier regional banks lend mostly to small and medium-sized firms, and long-term-credit banks and trust banks lend mostly to large firms. In the late 1980s, this ratio slightly increased for regional banks and sharply decreased for long-term-credit banks and trust banks. The increasing ratio for city banks during the late 1980s is due to the increased loans to small and medium-sized firms, as well as mortgage loans to individuals.

This empirical observation implies that the banks' lending policy in the late 1980s was not inconsistent with profit-maximizing behavior. The problem was the failure to foresee the drastic fall in the land prices that occurred in the 1990s, which happened after prices had risen for four decades. The land price plunge in the 1990s was triggered by a sudden tightening of monetary policy and mandatory governmental restrictions on loans to the real estate industry, which were intended to reduce soaring land prices.

Bank Loans and Real Estate Prices

Real estate is the most important form of collateral for secured loans in Japan, being used in 73 percent of all loans (as shown in figure 4.8 above).

Although stocks and bonds increased their role as collateral for bank lenders in the late 1980s, these assets were owned mostly by large firms, and their share among total secured loans was only about 4 to 7 percent (as shown in figure 4.20 above). Generally, small and medium-sized firms do not have eligible collateral other than real estate. Since buildings depreciate quickly in Japan, land has been the most important asset used to secure bank loans.

Despite the importance in theory and in practice, the empirical relationship between collateral and bank loans has not been easy to identify econometrically, because of the difficulty in obtaining accurate loan data. The Japanese bank loan market in the late 1980s is a unique case for empirical study, since loan collateral was primarily represented by land prices and both collateral value and loan originations changed sharply over a short period of time.

It is already well established that there has been a strong causal link from land prices to total bank loans over the past four decades.[16] In the following analysis, we reexamine this relationship, disaggregating the data by borrower size category and by time period.

Data and Analysis Method

We examine monthly data over an observation period of March 1955 to March 1999.[17] Four different bank loan datasets are used in the study: (1) total loans by all domestically licensed banks, (2) loans to large firms, (3) loans to small and medium-sized firms, and (4) total credit guarantees by credit guarantee associations. Credit guarantees are made only for loans to small and medium-sized firms. We examine the relationship between land prices and credit guarantees, because a credit guarantee is theoretically equivalent to having sufficient collateral. Data on funding by companies listed on the Tokyo Stock Exchange are used as a proxy for the amount of funds raised in the capital market.

Two variables are used to measure land prices: (1) the land price index for Japan and (2) the land price index for the six largest cities. Monthly land price indices were obtained by interpolating semiannual data.

The period of analysis was (1) the entire observation period (March 1955 to March 1999), (2) the high-growth period (March 1955 to December 1974), (3) the low-growth and the bubble period (January 1975 to December 1990), and (4) the period of falling land prices (January 1991 to March 1999).

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16. Shimizu (1997b, chapter 4, section 2). See appendix 4A of this chapter.

17. Data sources: *Economic Statistics Annual; Economic Statitics Monthly; Economic and Financial Data on CD-ROM;* Bank of Japan, *Price Indexes of Urban Areas;* Nippon Institute of Real Estate Research; and *Monthly Statistics of Tokyo Stock Exchange*. Software used for the analysis is RATS, Version 4.

We examined the relationship using the impulse response function of the VAR(2) model with 12 lags. The model can be expressed as:

$$Y_t = \sum_{i=1}^{12} a_i Y_{t-i} + \sum_{i=1}^{12} b_i X_{t-1} + u_{1t} \tag{I}$$

$$X_t = \sum_{i=1}^{12} c_i X_{t-i} + \sum_{i=1}^{12} d_i Y_{t-1} + u_{2t} \tag{II}$$

where X_t and Y_t are land price variables and bank loan variables, respectively, a_i, b_i, c_i, and d_i are parameter estimates, and u_{it} is an error term.

For the period after January 1975, the funds raised in the capital market by large firms are added as an additional explanatory variable, Z_t, and its relationship with X_t and Y_t is examined.

The Results

The *p*-values of the F-test of the impulse response functions are summarized in tables 4.1 and 4.2. Only the responses significant at the 5 percent level are shown in figures 4.25 and 4.26. In the following, we summarize the important findings with primary attention focused on the period after 1975.

Full period (March 1956 to March 1999). For all types of loans, there are highly significant univariate causal relationships from either land price index to bank loans. The impact of land prices is more significant for loans to small and medium-sized firms than for loans to large firms. No causality was found for any types of bank loans to land prices. In general, changes in land prices preceded changes in bank loans by about a year. The effect of changes in land prices on bank lending is transmitted more quickly for small and medium-sized firms than for large firms. The effect of land prices on bank lending is estimated to persist for more than 10 years. Our evidence suggests that monetary policy did not directly and specifically affect land prices. The BOJ did support the increase in credit creation in the 1980s, which was fueled by land prices increasing collateral.

High-growth period (March 1956 to December 1974). According to table 4.1, total loans were independently influenced by movements in both measures of land prices. Loans to large firms were not affected by land prices in this period. Only the all-Japan land price measure affected loans to small and medium-sized firms. This means that bank loans to small and medium-sized firms were especially sensitive to the enhanced creditworthiness induced by higher land prices during the high-growth period. On the other hand, large firms did not need to depend on the value of land for their creditworthiness and were much less affected by it.

Table 4.1 P values of the F-test of the impulse response functions, land prices, and bank loans

Direction of the effect	Whole period March 1956-March 1999		High-growth period March 1956-December 1974		Low-growth and bubble period January 1975-December 1990		Period of falling land prices January 1991-March 1999	
	All Japan	6 cities	All Japan	6 cities	All Japan	6 cities	All Japan	6 cities
Land P ➜ loans								
Total loans	**0.00002**	**0.000007**	**0.009**	**0.007**	**0.0000003**	**0.00002**	0.351	0.253
Large firm loans	**0.015**	**0.028**	0.19	0.094	0.37	0.47	0.9	0.95
Small firm loans	**0.00004**	**0.0012**	**0.006**	0.075	**0.012**	**0.002**	0.6	0.15
Credit guarantee	**0.0000003**	**0.00000001**	**0.0005**	**0.0000004**	0.11	0.176	0.095	0.333
Loans ➜ Land P								
Total loans	0.474	0.872	0.068	0.526	0.298	0.795	0.244	0.59
Large firm loans	0.46	0.77	0.62	0.74	**0.0004**	**0.0008**	0.27	0.32
Small firm loans	0.2	0.58	0.78	0.97	0.27	0.18	**0.046**	0.12
Credit guarantee	**0.002**	**0.0000007**	**0.02**	**0.000003**	0.124	0.149	0.042	0.21

Note: Bold numbers are those significant at less than 5 percent level.

Table 4.2 P values of the F-test of the impulse response function funds raised in the capital market (FRCM)

	Low-growth and bubble period	Period of falling land prices
	January 1975-December 1990	January 1991-March 1999
FRCM → loans		
Total loans	0.485	0.17
Large-firm loans	0.585	**0.002**
Small-firm loans	0.135	0.262
Loans → FRCM		
Total loans	0.256	0.285
Large-firm loans	0.62	**0.018**
Small-firm loans	0.331	0.485
Land prices of all Japan		
Land prices → FRCM	**0.014**	0.145
FRCM → land prices	**0.0001**	0.237
Land prices of 6 large cities		
Land prices → FRCM	**0.0029**	0.843
FRCM → land prices	**0.0006**	0.069

Note: Bold numbers are those significant at less than 5 percent level.

Low-growth and bubble period (January 1975 to December 1990). During this period, like the previous one, loans to large firms were not affected by land prices. Loans to small and medium-sized firms, and thus total loans, were significantly affected by both kinds of land prices (see table 4.1). Land prices in the six largest cities had larger effects on both total loans and loans to small and medium-sized firms (see figures 4.25j to 4.25m) As shown in figures 4.18 and 4.19 above, the contrast in the movements of land prices in the six largest cities and those in other cities is impressive. Land prices soared rapidly in the six largest cities, but not so much in other locations, remaining rather stable there. Therefore, the increased bank loans made to small and medium-sized firms were mainly a phenomenon for firms holding land in large cities.

Interestingly, in this period, bank loans to large firms significantly and negatively affected both measures of land prices, as shown in figures 4.25n and 4.25o. That is, the reduced growth in large-firm loans contributed to increased land prices both in all Japan and in the six largest cities. This is hard to interpret as a causal relationship. During this period, nonbank fund-raising directly from capital markets by large firms increased, and bank loans to large firms fell due to the reduced demand. At the same time, the increased funds raised in the capital market were invested in real estate and had significant effects on both kinds of land prices, as is explained below. The negative relationship between large-firm loans and land prices must be deemed a spurious relationship.
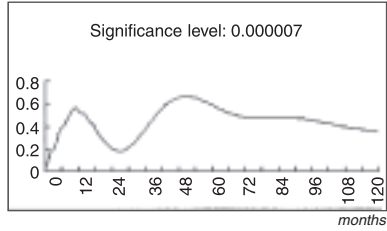
Figure 4.25   The impulse response functions: Land prices, bank loans, and credit guarantee
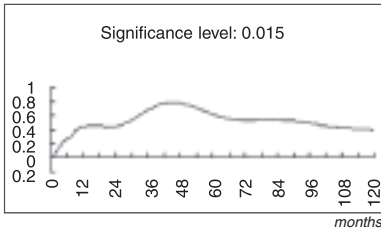
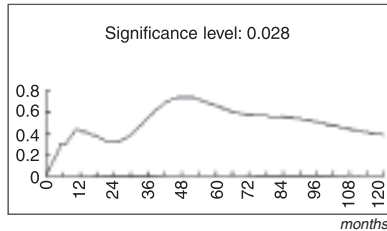**Figure 4.25a–Response of total loans to land prices (all Japan)** (March 1956 to March 1999)

Significance level: 0.00002

months
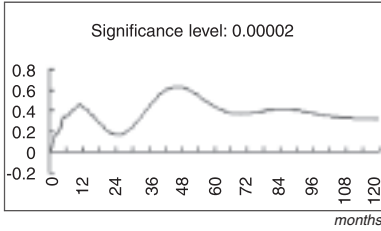
Figure 4.25b–Response of total loans to land prices in 6 large cities (March 1956 to March 1999)

Significance level: 0.000007

months

Figure 4.25c–Response of large-firm loans to land prices (all Japan) (March 1956 to March 1999)

Significance level: 0.015

months

Figure 4.25d–Response of large-firm loans to land prices in 6 large cities (March 1956 to March 1999)

Significance level: 0.028

months

Figure 4.25e–Response of small and medium-sized firm loans to land prices (all Japan) (March 1956 to March 1999)

Significance level: 0.00004

months
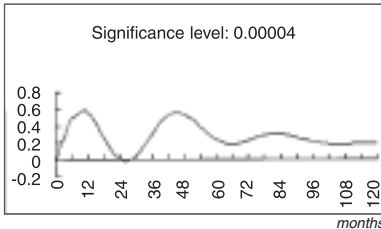
Figure 4.25f–Response of small and medium-sized firm loans to land prices in 6 large cities (March 1956 to March 1999)

Significance level: 0.0012
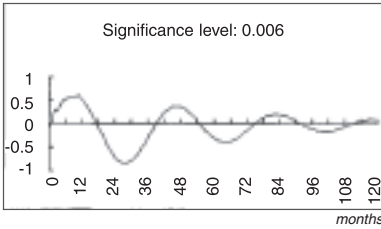
months
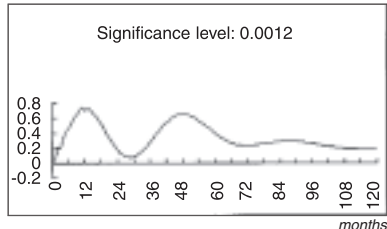
Figure 4.25g—Response of total loans to land prices (all Japan) (March 1956 to December 1974)

Significance level: 0.009

months
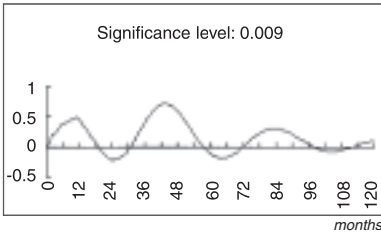
Figure 4.25h—Response of total loans to land prices in 6 large cities (March 1956 to December 1974)

Significance level: 0.007

months
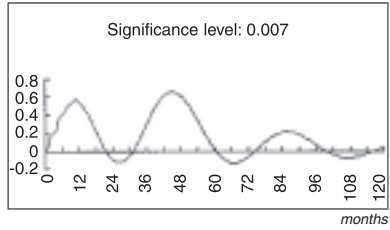
Figure 4.25i—Response of small and medium-sized firm loans to land prices (all Japan) (March 1956 to December 1974)

Significance level: 0.006

months

Figure 4.25j—Response of total loans to land prices (all Japan) (January 1975 to December 1990)

Significance level: 0.0000003

months
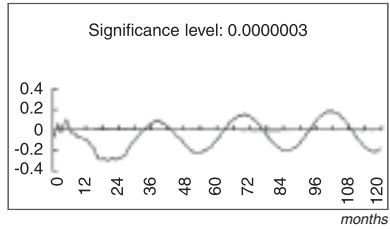
Figure 4.25k—Response of total loans to land prices in 6 large cities (January 1975 to December 1990)

Significance level: 0.00002

months
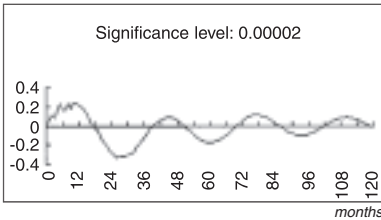
Figure 4.25l—Response of small and medium-sized firm loans to land prices (all Japan) (January 1975 to December 1990)

Significance level: 0.012

months
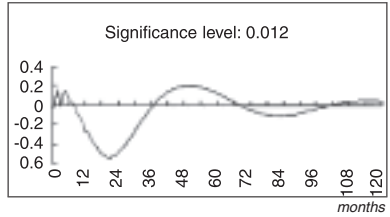
Figure 4.25m—Response of small and medium-sized firm loans to land prices in 6 large cities (January 1975 to December 1990)

Significance level: 0.002


months
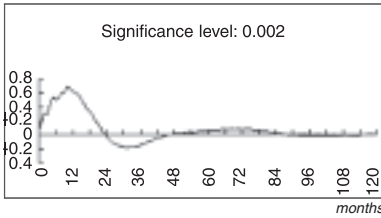
Figure 4.25n—Response of land prices in all Japan to large-firm loans (January 1975 to December 1990)

Significance level: 0.0004

months
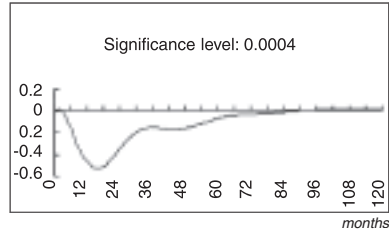
Figure 4.25o—Response of land prices in 6 large cities to large-firm loans (January 1975 to December 1990)

Significance level: 0.0008

months
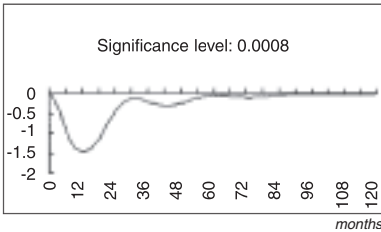
Figure 4.25p—Response of small and medium-sized firm loans to land prices in all Japan (January 1991 to March 1999)

Significance level: 0.046

months
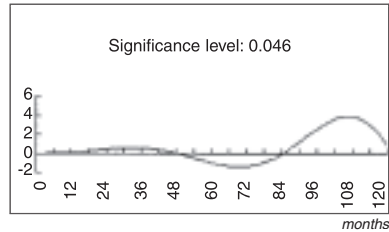
Figure 4.25q—Response of credit guarantee to land prices in all Japan (June 1960 to March 1999)

Significance level: 0.0000003

months
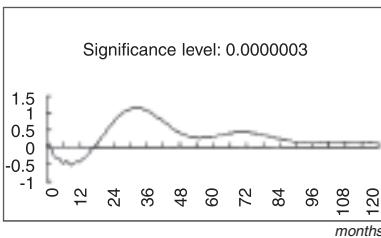
Figure 4.25r—Response of credit guarantee to land prices in 6 large cities (June 1960 to March 1999)

Significance level: 0.00000001

months
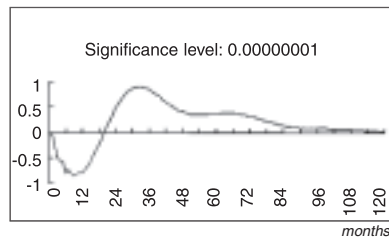
Figure 4.25s—Response of land prices of all Japan to credit guarantees (June 1960 to March 1999)

Significance level: 0.002

months
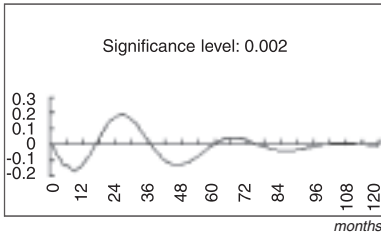
Figure 4.25t—Response of land prices of 6 large cities to credit guarantees (June 1960 to March 1999)

Significance level: 0.0000007

months
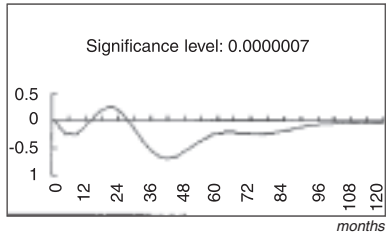
Figure 4.25u—Response of credit guarantees to land prices (all Japan) (June 1960 to December 1974)

Significance level: 0.0005

months
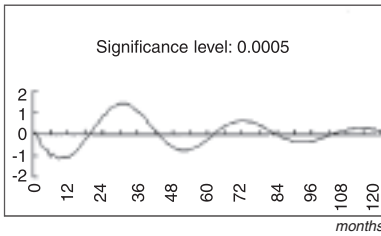
Figure 4.25v—Response of credit guarantees to land prices of 6 large cities (June 1960 to December 1974)

Significance level: 0.0000004

months
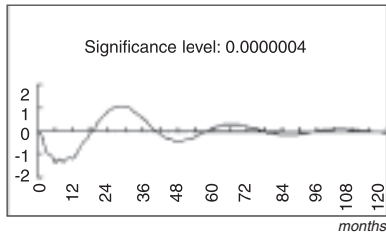
Figure 4.25w—Response of land prices of all Japan to credit guarantees (June 1960 to December 1974)

Significance level: 0.020

months
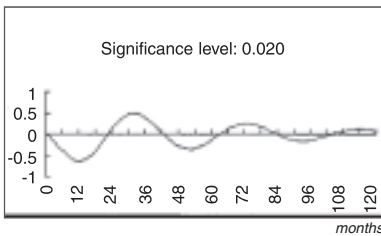
Figure 4.25x—Response of land prices of 6 large cities to credit guarantees (June 1960 to December 1974)

Significance level: 0.000003

months

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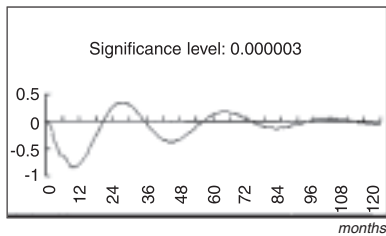
Figure 4.26 The impulse response functions: Funds raised in the capital market

Figure 4.26a—Response of funds raised in the capital market to land prices (all Japan) (January 1975 to December 1990)

Significance level: 0.014

months
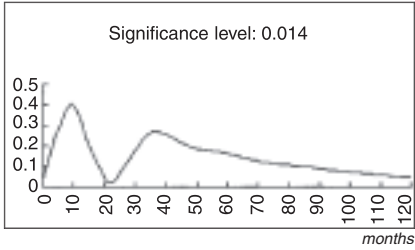
Figure 4.26b—Response of land prices in all Japan to funds raised in the capital market (January 1975 to December 1990)
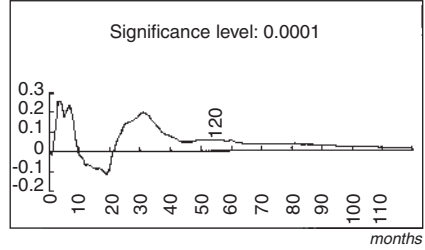
Significance level: 0.0001

months

Figure 4.26c—Response of funds raised in the capital market to land prices in 6 large cities (January 1975 to December 1990)

Significance level: 0.0029

months
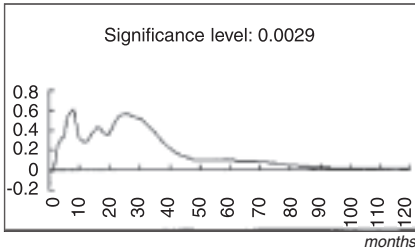
Figure 4.26d—Response of land prices in 6 large cities to funds raised in the capital market (January 1975 to December 1990)

Significance level: 0.0006

months
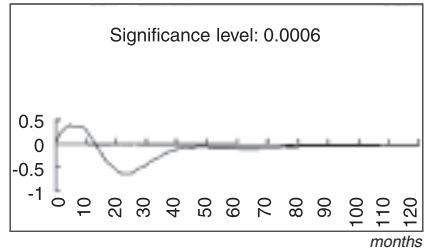
Figure 4.26e—Response of large-firm loans to funds raised in the capital market (January 1991 to March 1999)

Significance level: 0.002

months
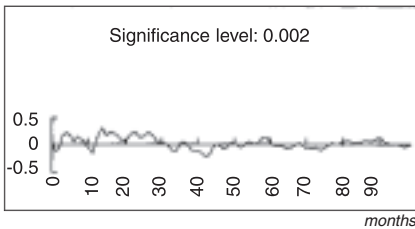
Figure 4.26f—Response of funds raised in the capital market to large-firm loans (January 1991 to March 1999)

Significance level: 0.018

months
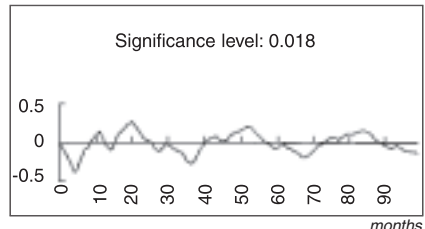
In table 4.2, the relationship between funds raised in the capital market and bank loans is not significant in either direction. On the other hand, the relationship between funds raised in the capital market and land prices is highly significant in both directions. As shown in figure 4.26c, the funds raised in the capital market are highly and positively affected by land prices in the six largest cities, and the effect remains positive for several years. The effect of land prices in all Japan on funds raised in the capital market shown in figure 4.26a is significant, but not as large as in figure 4.26c. This suggests that the increased land prices in the six largest cities mainly contributed to the increased fund-raising in the capital market.

The effects from funds raised in the capital market to land prices are also significant (figures 4.26b and 4.26d). The coefficients on land prices remain positive for more than a decade only for land prices in all Japan. These findings are consistent with the following observation. Land prices, especially in the six largest cities, encouraged large firms to raise funds from the capital market. Then these funds were themselves invested in land and equity holdings, and contributed to the further rise in asset prices. Thus, the collateral principle as it applies to corporate bond issuance could have been an important channel through which increased land prices encouraged increased fund-raising in the capital market.

Summarizing the above findings, we could characterize what happened in the Japanese financial market in the 1980s as follows: Deregulation of the capital market and low interest rates made it easy and profitable for large firms to raise money in the capital market. At the same time, a rise in land prices in the six largest cities increased the collateral value of land, and the soaring stock prices further encouraged fund-raising in the capital market. The funds raised by large firms were invested in land- and stock-holdings, further raising their prices, while reducing the demand for bank loans.

Then banks started to make loans secured by land to small and medium-sized firms, which was made possible due to the increased land prices in large cities. As a result, the small and medium-sized firms receiving larger loans were primarily located in large cities. The funds raised in the capital market by large firms played a major role in further raising land prices. Compared with the role of large firms, the role of increased bank loans to small and medium-sized firms in raising the land prices is less important.

Falling-land-price period (January 1991 to March 1999). All the causal relationships between land prices and bank loans disappear in this period, except that the effect of loans to small and medium-sized firms on land prices in all Japan is significant at the 4.6 percent level, as is seen in table 4.1. The direction of the causality and the patterns of the coefficients are very different from those in the earlier periods (figure 4.25p). This

suggests that one cause of the land price decline could have been the credit crunch experienced by small and medium-sized firms in the 1990s.

The lack of significant causality indicates that the fall in bank loans in the 1990s was not proportional to the extremely large fall in land prices. This could imply that bank loans to small and medium-sized firms have not yet fallen enough to be consistent with the land's market value, based on the relationship that existed in the earlier periods. If bank loans had to be secured with collateral at the same rate through the 1980s, then the amount of bank loans outstanding is still too great. This strongly suggests the possibility of discovering further bad loans in the Japanese banking system.

The relationship between funds raised in the capital market and land prices is still significant for both directions, as shown in table 4.2 and in figures 4.26e and 4.26f. These results suggest that the reduced amount of fund-raising in the capital market might have contributed to the fall in land prices, and vice versa. But the coefficients representing this relationship are smaller than those in the earlier period. Therefore, in the 1990s, the role of land prices was far less significant than in earlier periods.

Credit guarantees. The guarantees of the Credit Guarantee Association cover only bank loans to small and medium-sized firms against default for a guarantee fee of 1 percent. The effects of the land prices both in the six largest cities and in all Japan on the credit guarantee are significant for the whole period and high-growth period (table 4.1). The effect is not significant for the period after 1991. Compared with the effect on bank loans, the pattern of the coefficients on credit guarantees suggests a positive effect that persists for about 2 years. The cyclical pattern of the coefficients on the credit guarantee is opposite to that for bank loans. That is, when land prices increase, bank loans to small and medium-sized firms increase, and credit guarantees fall. When the growth rate in land prices decreased, the credit guarantees increase. This suggests that small and medium-sized firms used increased land values to secure their borrowings when land prices were rising, and they depended on credit guarantees when the rate of the rise in land prices decreased.

Conclusion

Real estate plays an important role as a key form of collateral for obtaining credit not only in Japan but in nearly all Asian countries.[18] In the 1980s, financial deregulation encouraged large firms to raise long-term funds from the capital market. Regulated low interest rates facilitated a rise in stock prices and further encouraged the expansion of the capital market, reducing the demand for long-term bank loans by large firms. At the

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18. The analysis for South Korea is shown in the appendix.

same time, deregulation helped banks increase the amount of funds they had available for lending. Banks tended to increase loans to small and medium-sized firms to substitute for the reduced demand for loans by large firms. The increased land prices helped to enhance the creditworthiness of these small and medium-sized firms, and the loans made to them increased markedly.

Under a regime of regulated deposit interest rates, bank profits were proportional to the size of their loan portfolios. Banks continued to follow their traditional lending behavior for maximizing profits in a newly liberalized market—with painful results. The common belief in Japan before 1992 that land prices never fall, the so-called myth of land, affected bank lending policy in the face of increased competition for originating loans. Our model of bank lending and collateral can explain the lending pattern as typical profit-maximizing behavior if we assume banks ignored the changing economic environment (which seems more than plausible). Banks increased the amount of real estate collateral needed to secure their loans because they clearly perceived higher credit risks involved in making the loans to these new borrowers. The problem was their persistent belief that land prices would never fall.

The empirical analysis based on the estimated impulse-response functions of the previous section indicates that causality between land prices and financial market activities existed in Japan. Loans to small and medium-sized firms and funds raised in the capital markets are significantly affected by land prices. The analysis implies that the asset inflation in 1980s planted seeds for a later financial crisis and the later government policy change to stop it abruptly triggered the financial crisis in Japan. In this sense, the monetary policy that brought about asset inflation in the 1980s was largely responsible for the current financial crisis.[19] Japan's experience shows how large the economic dislocation caused by the combination of regulating interest rates and allowing asset price fluctuations can be.

The dominant position of banks in Japan's financial market and the lack of an effective system of credit risk sharing through the capital market were the fundamental structures that brought about the ensuing financial crisis.[20]

In order to end the financial crisis, stabilization of land prices at an unregulated market equilibrium is needed. Deregulation of the real estate market is a promising policy measure for economic recovery; such measures as real estate tax reform and deregulation of real estate construction could increase both real estate demand and liquidity in this market.[21]

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19. See Shimizu (1997c; 1998) for a discussion of Japanese monetary policy in the 1980s.

20. See Shimizu (1997b, chap. 8).

21. Thurow (1998) correctly makes this point.

The above analysis may offer a useful perspective on the causes of other Asian financial crises that have occurred in the years since Japan began to experience its financial difficulties. Certainly these economies share many common characteristics in their financial organization.

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Appendix 4.A
Land Prices and Total Bank Loans

The effect of land prices on bank loans can be demonstrated empirically. We analyzed the relationship using a generalized least squares regression with an autocorrelation adjustment at 3 degrees using monthly data from January 1956 to July 1994. The two regression equations are as follows:

$$\Delta ABL_t = \alpha + \beta \Delta LP_t + \gamma CR_t + u_t \tag{i}$$

$$\Delta ABL_t - \Delta IPI_t = \alpha + \beta \Delta LP_{t-12} + \gamma CR_t + u_t, \tag{ii}$$

where

- ABL = Amount of bank loans by all banks
- LP = Land price index of all territories
- CR = Interest rate in the call money market
- IPI = Industrial production index

The term Δ designates the rate of growth relative to the same month of the previous year; α, β, and γ are parameters; t shows the current period; $t-12$ shows the 12-month lag; and u is an error term.

The regression (2) intends to eliminate an effect from the economic activity by subtracting the growth rate of the industrial production index from the growth rate of bank loans. In this case, the best result is obtained by the 12-month lagged rate of change in land prices rather than the current one.

Table 4A.1 and figure 4A.1 show that the regression fits extremely well, and the coefficient of the land prices is highly significant at the 1 percent level.

We made the same empirical examination for Korea for the period from September 1974 to December 1996 with similar results, as shown in table 4A.2. The results clearly show that in Korea land prices also have a significant effect on the amount of bank loans.

Table 4A.1 Regression of bank loans on land prices: Japan

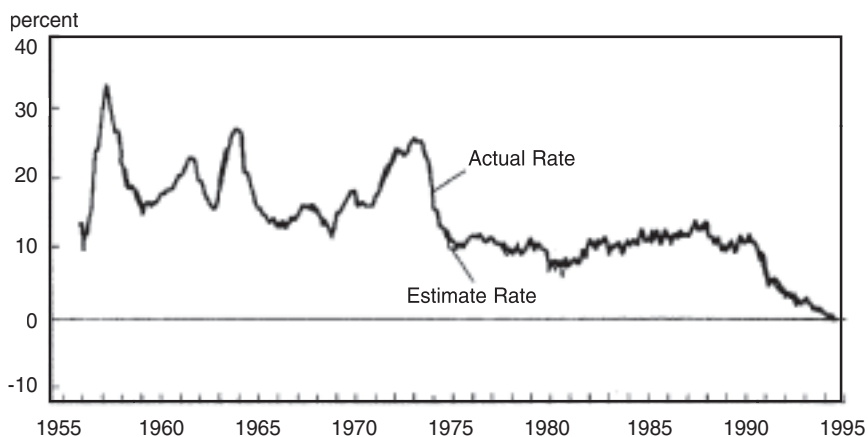|	ƒ	ƒ LP (t − 12)	ƒ LP (t)	CR	D.W.	RSQ
ƒ ABL	10.32**		0.30**	− 0.11*	1.96	0.99
	(7.88)		(5.68)	(− 2.12)		
ƒ ABL − ƒ IPI	3.39	0.35**		− 0.19	2.06	0.91
	(1.29)	(3.05)		(− 1.06)		

D.W. = Durbin-Watson statistic
RSQ = r-squared
** = Significant at 1 percent level.
* = Significant at 5 percent level.

Figure 4A.1 Actual rate and estimated rate of bank lending [regression (1)]

percent

Table 4A.2 Regression of bank loans of land prices: South Korea

		ƒ	ƒ LP (t − 12)	D.W.	RSQ
	(1)	6.553**	0.328**	0.195	0.4027
ƒ ABL − ƒ IPI		(9.952)	(13.617)		
	(2)	3.799	0.680**	1.039	0.926
		(1.656)	(20.913)		

** = Significant at 1 percent level.
(1) Ordinary least squares.
(2) Generalized least squares method with autocorrelation adjustment in error terms.