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The International Transmission of Financial Shocks: The Case of Japan

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Abstract

One of the more dramatic financial events of the late 1980s and early 1990s was the surge in Japanese stock prices that was immediately followed by a very sharp decline of more than 50 percent. While the unprecedented fluctuations in Japanese stock prices were domestic financial shocks, the unique institutional characteristics of the Japanese economy produce a framework that is particularly suited to transmit such shocks to other countries through the behavior of the Japanese banking system.

The large size of Japanese bank lending operations in the United States enables us to use U.S. banking data to investigate the extent to which this domestic Japanese financial shock was transmitted to the United States, as well as to identify a supply shock to U.S. bank lending that is independent of U.S. loan demand. We find that binding risk-based capital requirements associated with the decline in the Japanese stock market resulted in a decline in commercial lending by Japanese banks in the United States that was both economically and statistically significant. This finding has added importance given the severe real estate loan problems currently faced by Japanese banks. How Japanese bank regulators decide to resolve these problems will have significant implications for credit availability in the United States as well as in other countries with a significant Japanese bank presence.

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The increasing globalization of banking and financial markets provides important advantages in terms of gains in efficiency and diversification, but it also offers potential pitfalls. One such pitfall is associated with the risks that would emanate from any group of globally active financial institutions collectively suffering financial difficulties. Given the size and global penetration of Japanese banking organizations, the significant problems at large Japanese banks following the dramatic decline in the Japanese stock market at the beginning of this decade may have created just such an event. Despite the dramatic decline in stock prices, slumping real estate prices, and unusually weak economic growth, domestic Japanese bank lending continued to increase, albeit at a much slower rate than in the late 1980s. In contrast, overseas lending by Japanese banks declined substantially in the early 1990s, and by an amount sufficient to make the total worldwide assets and loans of Japanese banks decline.

Several factors contribute to the potential for Japanese banks to be particularly effective transmitters of domestic financial shocks overseas. First, large cross-holdings of Japanese corporate stocks by Japanese banks make these banks susceptible to downturns in the stock market. Second, bank regulatory changes in Japan in the late 1980s both enhanced

enforcement of capital requirements and allowed changes in the value of bank stock holdings to directly affect bank capital, setting the stage for the banking sector to transmit an adverse stock price shock through reductions in credit availability. Third, bank-firm lending relationships are particularly strong and important in Japan, making banks reluctant to reduce credit to their long-term customers. Fourth, the large international presence of Japanese banking organizations allowed them to shift much of the asset and loan shrinkage overseas, insulating domestic firms from much of the shock.

We examine the hypothesis that Japanese banking problems caused by the decline in Japanese stock values were transmitted internationally by investigating the lending behavior of Japanese bank subsidiaries, agencies, and branches in the United States during this period. Since Japanese banks have made significant penetrations into markets in the United States, and because their U.S. activity is a significant proportion of their overseas operations, the United States is an ideal location for determining whether Japanese financial shocks were transmitted overseas. In particular, we find that Japanese branches in the United States reduced lending at the time of declines in their parents' capital positions.[1]

This event enables us to identify and isolate an external supply shock to U.S. lending. By focusing on the transmission of the effects of Japanese stock market losses via the actions of Japanese bank branches and subsidiaries in the United States, we

are able to overcome a major problem of previous studies investigating the linkage between bank capital ratios and bank loan growth in the United States: the inability to completely isolate bank loan supply shocks from demand effects. The recent unprecedented movements in the Japanese stock market, being independent of domestic economic conditions in the United States, provide a loan supply shock that is independent of U.S. demand conditions.

The next section of the paper provides an overview of the influence of capital regulations on Japanese bank activities, the importance of lending relationships in Japan, and the increasing importance of Japanese banks in world financial markets, especially their penetration of the banking sector in the United States. The second section describes the panel data for Japanese banks and methodological issues. The third section provides the empirical results, which show that Japanese lending in the United States was affected by the parent banks' capital positions. The final section offers some conclusions regarding the need for policymakers to consider global events more broadly. In particular, the international transmission issue is likely to be revisited soon, as the Japanese address their real estate loan problems. How this problem is resolved will have potentially significant implications for any country with a large Japanese banking presence.

I. Background

One of the more dramatic financial events of the second half of the 1980s was the asset inflation in Japan. The subsequent deflation was, perhaps, even more striking. Figure 1 shows the extent of the surge in the Nikkei stock index. Even using monthly average data that miss the precise peak in the Nikkei, the figure reflects a tripling of the index between January 1986 and December 1989, before experiencing an equally sharp decline. Urban land prices also rose and then fell dramatically, although they tended to peak after the Nikkei. Such rapid rises and declines in stock prices and other asset values were unprecedented in Japan.

A unique combination of institutional characteristics of the Japanese economy produce a framework that is particularly suited to transmit such a domestic financial shock to other countries through the behavior of the Japanese banking system. Bank regulatory changes in the late 1980s made Japanese banks take satisfying capital requirements more seriously, while at the same time codifying the direct impact of fluctuations of stock market values on the level of a bank's capital. Because Japanese banks are allowed to hold large equity stakes in firms, the dramatic decline in stock prices reduced bank capital substantially. As a consequence, banks downsized their activities in an attempt to raise capital-to-asset ratios. The particularly strong relationships that Japanese banks have with their loan customers provide them with a strong incentive to insulate their long-term

customers from a reduction in credit availability. Finally, the large overseas presence of Japanese banking organizations provided an escape valve for the pressure to shrink. By concentrating the shrinkage of operations on overseas rather than domestic lending, Japanese banks both mitigated the adverse effects on their domestic customers and transmitted internationally what was originally a domestic shock.

Transmission of the Shock

A substantial body of evidence indicates that banks in the United States respond to adverse capital shocks by growing more slowly and, in many instances, shrinking (Bernanke and Lown 1991, Hall 1993, Hancock and Wilcox 1995, Peek and Rosengren 1995a, 1995b, 1995c). While investigators have found a positive relationship between bank capital and either asset growth (Frankel and Morgan 1992) or bank lending (Kim and Moreno 1994) for Japanese banks after the mid 1980s, prior to that time the relationship was much weaker or nonexistent. This is consistent with a change in the regulatory environment in Japan in the mid and late 1980s, including the adoption of the Basle Accord, that placed greater emphasis on the role of bank capital. Essentially, Japanese banks were not subject to explicit capital ratio requirements until the mid 1980s. (See Kim and Moreno 1994 for a more detailed discussion.) Rather, the Bank of Japan often controlled bank lending through "window guidance" (Hoshi, Scharfstein, and Singleton 1993).

The introduction in 1988 of the Basle Accord, an international agreement that set common standards by which to evaluate capital adequacy, set the stage for the dramatic fluctuations in Japanese stock prices to have a substantial impact on Japanese bank capital.[2] The Basle Accord contains a provision that allows up to 45 percent of unrealized gains on equity security holdings (revaluation reserves, also referred to as hidden reserves) to be included in bank capital.[3] The rapid growth of Japanese banks was relatively unaffected initially by the adoption of the Basle Accord because of the boost in their tier 2 capital that came from the substantial accrued capital gains on their shareholdings associated with the dramatic rise in Japanese stock prices. Furthermore, higher stock prices enabled Japanese banks to increase tier 1 capital by issuing new equity shares and debt securities at favorable prices, as well as by selling some of their stock holdings in other companies that had substantial unrealized gains.[4]

The subsequent decline in Japanese stock prices, with the Nikkei index losing more than half its value in just the late 1989 to early 1992 period, caused a dramatic decline in tier 2 capital, given that Japanese banks hold approximately 20 percent of Japanese common stock (French and Poterba 1991; Prowse 1990). The tier 2 risk-based capital ratio of many major Japanese banks, including 7 of the 10 largest banks in the world, in the early 1990s temporarily fell below the 8 percent minimum required under the Basle Accord. As a result of the widespread decline in

Japanese bank capital, the total assets of Japanese banking organizations declined steadily after 1990, an outcome unprecedented in the postwar period.[5] The slowing in loan growth and the eventual shrinkage of overall banking operations of Japanese banks appears to be consistent with earlier evidence on the response of U.S. banks to adverse capital shocks. Thus, it appears that the sharp rise in Japanese stock prices in the 1980s and the subsequent decline in the 1990s, by impacting bank capital, strongly affected both the ability and desire of Japanese banks to expand lending.

The effect on bank lending of the decline in Japanese stock prices was exacerbated by the deteriorating quality of bank assets, especially real estate loans. While the problem is widely acknowledged to be serious, the well-known lack of transparency of the Japanese banking system make it difficult to quantify the bad loan problem. By one estimate (Huh and Kim 1994), bad loans represented about 7 percent of total loans in 1992, an amount very close to recent estimates by private analysts in the range of 6 percent. However, unlike the treatment of the sharp declines in unrealized gains on stock market holdings, which are observable and thus not easily manipulated to avoid substantial declines in reported bank capital ratios, the timing of both the write-down of the bad loans and the associated additions to loan loss reserves can be managed by banks and by regulators, as was done in many countries during the Third World debt crisis. To date, Japanese banks have

been slow to address the problem by writing down loans and adding to loan loss reserves, resulting in reported capital ratios that overstate their financial health.

Importance of Lending Relationships

Information asymmetries make open market credit instruments imperfect substitutes for bank loans as a source of credit for many firms, especially smaller firms where most information is private, and make long-term bank lending relationships valuable. Banks acquire much of this private information through financial relationships and, in particular, through repeated banking and lending transactions. In this way, over time, a bank can overcome many of the asymmetric information problems such as adverse selection and moral hazard emphasized by, for example, Stiglitz and Weiss (1981).

Thus, imperfect information can give rise to a special role for bank loans. Even though the United States has large, liquid capital markets, lending relationships have been found to be important. While such relationships are (not surprisingly) most important for small firms (for example, Petersen and Rajan 1994), banking relationships have been shown to be valuable even for larger firms that do have access to national credit markets (see, for example, Slovin, Sushka, and Polonchek 1993; James 1987).

One might expect lending relationships to be even more important in a bank-oriented country such as Japan compared to a more market-oriented country such as the United States. Much of

the industrial organization of Japan is built around the "main bank" system that serves as the core of keiretsus, groups of firms that are closely tied together through product-market relationships, as well as through cross-holdings of each other's equity. Bank lending relationships take on added importance because restrictions on the corporate bond market in Japan (which have recently been eased) caused most of the financing needs of Japanese firms to have been met historically by bank loans. For firms in a keiretsu, most of that bank credit comes from the bank(s) in its group.

An important characteristic of Japanese economic structure is that the main bank plays a much larger and more crucial role than simply serving as a source of credit. Often current or former bank employees are placed in key management positions or on the board of directors at other firms in the bank's keiretsu, enabling the bank to more easily monitor the firms to which it lends. Perhaps even more important is the role of the main bank when one of its group members becomes financially distressed. The main bank essentially has an implicit contract to aid the firm, as well as an incentive to do so to protect its reputation, perhaps by renegotiating the troubled firm's debt or by overseeing the restructuring of the firm (see, for example, Hoshi, Kashyap, and Scharfstein 1990). Furthermore, because Japanese banks tend to take large equity stakes in those firms to which they lend (Prowse 1990), main banks have an added financial interest in assisting troubled firms in which they have both a

debt and an equity exposure.

Research on lending relationships in Japan has provided evidence that supports the importance of such relationships. First, a firm's investment is affected by the health of its main bank (Gibson 1995). Second, keiretsu members and nongroup members with a strong main bank relationship are affected less by financial distress or tight credit conditions than other nongroup members (Hoshi, Kashyap, and Scharfstein 1990, 1991; Hoshi, Scharfstein, and Singleton 1993). In fact, city banks responded to the binding capital constraints caused by the sharp decline in Japanese stock prices by reducing both lending to and stock holdings of firms with which they did not anticipate having a continuing long-term relationship (Frankel and Morgan 1992).

The evidence in Table 1 supports the view that close lending relationships in Japan made it difficult for banks to reduce credit availability to their customers. Table 1 shows the overall loan growth, both for domestic operations and at overseas branches, for all Japanese banks, as well as separately for the city banks, trust banks, long-term credit banks, and regional banks.[6] In addition, beginning in 1989 (when such data became available), we have included the associated average risk-based capital ratios by bank type, based on our set of major Japanese banks with a presence in the United States (see below).

Even though Japan was suffering from its worst post World War II recession, domestic loan growth at these banks continued throughout the period (except for a brief decline at trust

banks), albeit at a much slower rate in the last three years. In contrast, overseas lending by branches of Japanese banks exhibited a much sharper reversal. Over the March 1987 to March 1991 period, overseas loans grew on average twice as fast as domestic lending. The growth in overseas loans then slowed sharply, reaching a peak in 1992 for all banks, city banks, and regional banks, and in 1991 for long-term credit banks and trust banks, roughly coinciding with a decline in their risk-based capital ratios. The subsequent decline in overseas loans occurred even though the economies in many of the foreign markets most important for Japanese banks were doing well, with the United States recovering from its recession and GDP growth quite strong in Asia.

The fact that the declines in lending were concentrated in their overseas rather than their domestic operations is consistent with Japanese banks valuing historical lending relationships at home more than those in more recently established foreign markets. While some of the decline in overseas loans in yen terms can be accounted for by the appreciation of the yen, the extent of the decline suggests that Japanese banks improved their capital ratios in part by shrinking their large overseas presence.

If Japanese banks had not had international operations, the loan shrinkage would have to have been accomplished domestically. Instead, the large overseas operations of Japanese banking organizations allowed Japanese banks to insulate domestic

customers from much of the shrinkage that was required to restore capital ratios. On the other hand, any country with a large Japanese banking presence could be adversely affected by the shrinkage of external lending by Japanese banks. The United States is just such an example, being one of the countries where Japanese banks have their largest overseas presence.

Implications for the United States

While the Japanese banking sector historically has had many large banks, it is only in the past decade that they have come to dominate the list of the largest banks on a global scale. As recently as 1980, only one Japanese bank, Dai-Ichi Kangyo Bank Ltd., was among the world's 10 largest banking organizations (Table 2). However, with a booming stock market, low domestic interest rates, and a strong yen, Japanese banks expanded aggressively during the late 1980s. By 1988, all of the world's 10 largest banking organizations were headquartered in Japan. And despite the sharp decline in the Nikkei and asset shrinkage at many Japanese banks in the early 1990s, the 10 largest banking organizations in the world, and 13 of the 15 largest, were still headquartered in Japan as of the end of 1994.

The aggressive expansion of Japanese banks in the late 1980s has included greater penetration of foreign markets, in part because of the opportunities provided by these markets and in part because of Japanese regulatory actions that encouraged the internationalization of Japanese finance (Frankel and Morgan

1992).[7] In particular, Japanese banking organizations made significant inroads into U.S. banking markets. By 1990, Japanese branches and subsidiaries accounted for approximately 8 percent of all U.S. banking assets and 18 percent of all commercial and industrial (C&I) loans to borrowers located in the United States (Figure 2). While Japanese banks initially may have expanded U.S. operations in order to serve their Japanese customers opening or expanding operations in the United States, by the late 1980s they were actively expanding their business with U.S.-based customers (Seth and Quijano 1991; Nolle and Seth 1995), with their business lending in the United States growing much more rapidly than Japanese external trade (Terrell 1993).[8] However, with the retrenchment that followed the fall in the Nikkei, Japanese banking organizations saw their U.S. market share of both assets and C&I loans decline.

This decline in the Japanese share of the U.S. market was not generally experienced by other foreign banking organizations. The Japanese share of foreign banking activity in the United States peaked in 1990, when Japanese banks accounted for over 60 percent of U.S. commercial and industrial loans and 45 percent of U.S. banking assets held by foreign banking organizations (Figure 3). The subsequent decline reflects a combination of the Japanese decline and an increase in the market share of U.S. banking assets by non-Japanese foreign banking organizations.[9]

Figure 4 shows that even in dollar terms, loans by Japanese banking organizations in the United States declined after 1990

and have only recently begun to increase. Stated in yen, the decline begins earlier and is proportionately much greater. Thus, the reduction in the yen value of assets and loans at overseas branches accomplished through the appreciation of the yen may have lessened the need for Japanese banking organizations to reduce overseas operations in order to strengthen the parent bank's capital ratio.

II. Data and Methodology

The panel data include semiannual observations from September 1988 until September 1994 of the branch and subsidiary activity of 11 city banks, 3 long-term credit banks, 5 trust banks, and the 10 largest regional banks.[10] The data begin in 1988, the first time that risk-based capital measures were reported for Japanese parent banks. We use semiannual observations because Japanese banks report capital and assets semiannually. While the Japanese branch and subsidiary data are available quarterly from U.S. call report data, we use only the March and September reports to match the reporting dates available for the Japanese parent banks.

For our panel of data, we have consolidated the branches of each parent company. Thus, we have one branch observation per period for each parent bank, which includes all branch activities in the United States by that parent bank. We have aggregated the data in this way for two reasons. First, all aggregated branches are capitalized by the same parent. Second, branch openings and

closings can result in large changes in individual branch data associated with the transfer of assets between branches of the parent bank, even if no significant change in overall branch activity has occurred. In addition, we include agencies in our branch totals. Agencies operate like branches in terms of their assets but, unlike branches, are prohibited from accepting deposits. Because the capital of a subsidiary, rather than the capital of the parent bank, is relevant for meeting capital requirements, subsidiaries of each bank remain as independent observations, and separate regressions are estimated for the set of subsidiaries.

The distinction between Japanese subsidiaries and branches (plus agencies) is potentially important. Japanese subsidiaries are likely to have a much larger retail operation, are separately capitalized, and are not included in the capital or assets of their Japanese parent. Thus, one might expect their behavior to be sensitive to local market conditions but to be less sensitive to capital problems of their parent. On the other hand, Japanese branches (and agencies) are not separately capitalized, relying on the capital of their parent. Branch activity should be more sensitive to capital problems of the parent, since their size and portfolio composition affect the risk-based capital ratio of the parent. Still, even though Japanese subsidiaries tended to maintain relatively high risk-based capital ratios, the overall percentage contraction by the well-capitalized subsidiaries was, on average, of the same magnitude as that for the branches, which

rely on relatively poorly capitalized parents.

The bulk of Japanese bank lending here occurs at branches, accounting for roughly three-fourths of all U.S. loans by Japanese banking organizations. City banks are by far the most important bank type, accounting for two-thirds of the assets and loans made by all Japanese branches and subsidiaries in the United States. Next in importance are the long-term credit banks, followed by trust banks. The regional banks have the smallest presence, accounting for little more than 3 percent of assets and only slightly more than 1 percent of the domestic commercial and industrial loans made by Japanese branches and subsidiaries in the United States.[11]

The estimated equation for Japanese bank branches is of the following form:

$$\frac{\Delta loans_i}{assets_{i,t-1}} = \alpha + \beta_1 PRBC_{i,t-1} + \beta_2 LAND_{i,t-1} + \gamma XTS_{t-1} + \theta XBS_{i,t-1} + \varepsilon_{i,t}$$

The dependent variable is the change in total loans of all U.S. branches of parent bank i from period t-1 to period t (a six-month period), divided by the beginning-of-period assets held by U.S. branches of parent bank i. Because the entire U.S. branch operations of each Japanese parent bank have been summed, we have observations for a total of 29 banks.

The primary focus is on the Japanese parent's risk-based capital ratio, PRBC, since, unlike subsidiaries, branches have no separate capital and are considered part of the parent company.

Capital is measured as of the beginning of the period. If the parent company has a low risk-based capital ratio and is unable or unwilling to raise additional capital, it may choose to satisfy its capital requirement by shrinking its assets and liabilities, including those in its overseas branches. If Japanese banks do respond by shrinking their overseas branches, then the coefficient on PRBC should be positive.

Because Japanese banks have been slow to reserve for their serious bad loan problems, their capital ratios do not accurately reflect their financial health, being overstated to the extent that the banks have underreserved for problem loans. To control for this misstatement of capital ratios, we have included an additional variable, LAND, in an attempt to capture the effect of the bad loan problem on bank behavior. Even though the problems are not fully reflected in the official capital ratios, the banks are aware of the extent of their problems and may be reacting to that knowledge and the probable need to eventually reserve for and charge off those loans. LAND is measured as the percentage reduction in the commercial land index for all urban districts (constructed by The Japan Real Estate Institute) relative to its peak in September 1991. The series has a value of zero until the September 1991 observation and then takes on a negative value, reflecting the cumulative decline since that time. The land price index is chosen as our proxy because much of the bank bad loan problem is related to loans collateralized by commercial real estate. We anticipate a positive estimated coefficient,

with loan growth slowing as collateral values decline and the (unreserved for) loan problems become more severe.

The other independent time series variables (XTS) include the percentage change in foreign direct investment by Japanese companies in the United States (FDI) and U.S. payroll employment growth (Emp Growth), each measured over the prior six-month period. Because Japanese companies frequently utilize Japanese banks, increases in foreign direct investment should be positively related to lending by Japanese branches. Because the FDI data are available only as annual observations, we calculate the March observation as the average of the current and previous years' values. We use the current-year value for the September observation. We then calculate the percentage change over the prior (six-month) period. We anticipate a positive coefficient. Payroll employment growth is included to control for loan demand. To the extent changes in branch loans reflect changes in loan demand, the coefficient should be positive.

The final set of explanatory variables (XBS) controls for bank-specific effects. This set includes the beginning-of-period logarithm of assets of the U.S. branches of the parent Japanese bank to control for the size of the U.S. presence of each bank. We also include nonperforming loans (loans 90 or more days past due plus nonaccruing loans) divided by total loans at the parent's U.S. branches (NPL) in the total loans equation, and use the same calculation, replacing total loans with C&I loans as an argument in the C&I loan equation. Branch holdings of commercial

and industrial loans (CI/A) and of real estate loans (RE/A), each divided by the parent's total U.S. branch assets, are also included. Each of these variables is measured as of the beginning of the period. These measures control for perceived lending risks, as well as for U.S. demand shocks that might disproportionately affect a segment of the portfolio. Finally, we include a set of dummy variables indicating whether the parent is a trust bank (Trust), a long-term credit bank (Long-term), or a regional bank (Regional).

In a further attempt to control for loan demand, we consider an alternative specification of the dependent variable, the change in loans at the branches of bank i divided by beginning-of-period assets, minus the change in total loans at all non-Japanese banks in the United States divided by beginning-of-period assets of all non-Japanese banks in the United States. This measures the growth in loans relative to the average for all non-Japanese banks in the United States.[12] If the Japanese bank capital supply shock was unimportant, Japanese branches would have a pattern of changes in loans similar to that of other banks in the United States, reflecting changes in loan demand associated with changes in general economic activity, and we would expect an insignificant coefficient on the parent risk-based capital ratio.

A similar set of regressions is estimated for Japanese subsidiaries. Because Japanese subsidiaries are independently capitalized, we must include the subsidiary's risk-based capital

ratio, as well as the parent's risk-based capital ratio. We would expect the subsidiary's capital to be important, while the parent's capital ratio might play only a secondary role, perhaps reflecting the extent to which the parent could inject additional capital into the subsidiary if needed. Thus, we would expect the parent's capital ratio to be less important for subsidiaries than for branches. Because no regional bank owns a U.S. subsidiary, the regional bank dummy variable is not included in the subsidiary equations. All the other independent variables are the same as in the branch equation.

Several adjustments were made to the data set. For the branch data, we required that commercial and industrial loans account for at least 5 percent of assets. Some Japanese branch operations are primarily bond trading units with no implications for the availability of domestic U.S. bank loans. We eliminated the first two years that a Japanese parent had branch operations in the United States, because de novo entry usually results in a very rapid initial expansion of loans unrelated to the capital position of the parent. In addition, we had to exclude a few branches that did not provide data on nonperforming loans.

Subsidiary observations were deleted for the same reasons--if they did not have at least 5 percent of their assets in commercial and industrial loans, if the data were for the first two years of a subsidiary's operations, or if nonperforming loan data were not reported. In addition, we deleted any quarter in which a subsidiary acquired another bank, since this would result

in a jump in the loan series reflecting the acquisition rather than ongoing operations. We also deleted two subsidiaries with risk-based capital ratios exceeding 100 percent, each with substantial capital and few loans and a portfolio dominated by government securities, which have a zero weight in risk-based capital calculations.

All equations were estimated using ordinary least squares, fixed effects, and random effects specifications. Hausman specification tests indicated that the variance components model, which allows for bank-specific effects, was the most appropriate specification for the branch data, while the fixed-effects specification was most appropriate for the subsidiary data.

Because the first observation was lost owing to the need to lag the parent's risk-based capital ratio, all regressions are estimated over the 1989:1 to 1994:2 period, providing a maximum of 12 semiannual observations per bank. However, the panels are unbalanced, since not all banks operated branches over the entire period and some subsidiaries had not operated for a full two years prior to the beginning of our sample or were closed before 1994:2. The branch panel has 29 banks and a total of 315 observations. The subsidiary panel has 19 banks and a total of 209 observations.

III. Empirical Results

Table 3 presents the results for the Japanese branch equations for the change in both total loans (columns 1-3) and

commercial and industrial loans (columns 4-6), each measured relative to beginning-of-period assets. Column 1 contains the variance components specification of the total loans equation. The estimated coefficients both on parent risk-based capital and on the decline in urban commercial land prices are positive (as predicted) and significant at the 1 percent level. The estimated coefficient on the parent risk-based capital ratio implies that a 1 percentage point reduction in the risk-based capital ratio of the parent would result in loan growth relative to assets at that bank's U.S. branches being reduced by 2.2 percent per six-month period. Because loans comprise roughly 60 percent of Japanese branch assets, this number substantially understates the percentage reduction in loans. Thus, our estimate would roughly correspond to a decline of 7.5 percent of loans at an annual rate (in current dollars). This finding of a coefficient that is both economically and statistically significant indicates a substantial loan supply effect transmitted from Japanese parent banks through their U.S. branches.

Both of the time series variables have statistically significant effects that are of the predicted sign. FDI has a positive coefficient that is significant at the 1 percent level. Employment growth has a positive estimated effect that is significant at the 5 percent level. Thus, both of these variables appear to be controlling for loan demand influences at Japanese branches as intended.

Among the bank-specific variables, none is statistically

significant. While the share of C&I loans has the predicted sign, the nonperforming loans variable and the share of real estate loans each have positive rather than the predicted negative signs. The dummy variables for bank type indicate no systematic differences among types of parent bank.

When the dependent variable is adjusted to reflect the change in loans at Japanese branches relative to the average change occurring at all other U.S. banks (column 2), we obtain very similar results. The primary differences are that the estimated coefficient on employment growth is now half as large and no longer statistically significant, and that the estimated coefficient on the trust bank dummy variable is of the opposite sign (but still insignificant). The difference in the employment growth coefficient is as expected. Thus, the results do not appear to be sensitive to which specification we use to control for loan demand effects. This is consistent with the parent-bank-capital-induced loan supply response of Japanese branches being independent of U.S. loan demand shocks.

The corresponding equations for the change in C&I loans relative to assets (columns 4 and 5) indicate smaller responses to both parent risk-based capital ratios and the decline in land prices, in part because C&I loans comprise a smaller share of Japanese branch assets (roughly 40 percent). Other differences are that employment growth is no longer significant and both the nonperforming loans variable and the share of C&I loans have estimated coefficients that are significant at the 5 percent

level and have the predicted negative signs. In addition, the dummy variable for long-term credit banks has significant positive coefficients.

To ensure that the results for the significant negative response to parent capital ratios were robust, we considered a number of alternative specifications. First, we reestimated the equations with three alternative land price series: the index for the average of commercial, residential, and industrial land prices in all urban districts; the index for the average of commercial, residential, and industrial land prices for the six largest cities; and the index for commercial land prices in the six largest cities. The results in each case were quite similar to those reported in Table 3. Second, we reestimated the equations with a smaller data set that excluded the largest and smallest values of the dependent variables, using only changes in loans that were between -10 and 15 percent of assets. However, even with the removal of the outliers, the results were robust.

Third, we reestimated columns 2 and 5 with dependent variables that measured loan growth relative to the average for the banks in the same state(s) as the branch(es) instead of relative to the U.S. average. At the same time, we also used state rather than national employment growth rates as an explanatory variable. If a parent bank had branches in more than one state, we used a weighted (by branch loans) average of the states in which branches were operating for both the state loan growth and employment growth variables. Again, we obtained

results quite similar to those reported in Table 3. Finally, we reestimated the equations with parent risk-based capital ratios as the only explanatory variable to see if the results were sensitive to the inclusion or exclusion of the other independent variables. The estimated coefficient on parent risk-based capital in the total loans equation was 2.427, with a t-statistic of 8.75, and in the C&I loans equation, the coefficient estimate was 1.089 with a t-statistic of 4.97.

Table 3 also contains estimates of the fixed-effects specifications in columns 3 and 6. The results are very similar to the variance components estimates. Even though Hausman tests indicate that the variance components specification is preferred, we present the fixed-effects results to show that our results are not specific to the use of the variance components specification and to permit comparisons with the estimates for Japanese bank subsidiaries, where Hausman tests indicate that fixed effects is the preferred specification.

Table 4 presents the results for Japanese subsidiaries. The fact that the fixed-effects specification is the preferred specification suggests that idiosyncratic factors are relatively more important at subsidiaries. While the estimated coefficients on the subsidiary risk-based capital ratio are positive, the effect is significant (at the 1 percent level) only for the change in C&I loans. The parent risk-based capital ratio also has positive estimated coefficients, but they are never significant even at the 5 percent level. This finding could be a

result of the diversity in subsidiary activity. However, when we estimated the same set of regressions either excluding small subsidiaries (those with total assets less than $500 million) or excluding extreme values of the dependent variables, we obtained qualitatively similar results to those presented in Table 4. This is consistent with our expectation that subsidiary capital ratios would be the more relevant, with parent capital serving primarily as a backup for the subsidiary if a capital infusion became necessary.

The decline in urban commercial land prices in Japan again has significant positive estimated coefficients, although one might expect this variable to be less relevant to subsidiary activity given the evidence on parent versus subsidiary capital ratios. For subsidiaries, neither FDI nor employment growth is significant. Among the bank-specific variables, only the logarithm of subsidiary assets has a significant estimated coefficient.

Because, on average, Japanese subsidiaries in the United States are quite well capitalized, one might expect the t-statistics of the subsidiary capital ratio coefficients to be relatively weak. Because they tend not to be near the margin of the risk-based capital requirements, an increase (or decrease) in their capital ratio may have little effect on their behavior. In fact, that is the case for the change in total loans equation, although the subsidiary capital effect is significant at the 1 percent level in the C&I loan equation. Alternatively, since

U.S. regulators enforce a leverage ratio requirement as well as the risk-based requirement, it may be that it is the (unweighted) leverage ratio rather than the risk-based capital ratio that is most relevant for U.S. subsidiaries. However, when the subsidiary risk-based capital ratio is replaced with the subsidiary leverage ratio, we obtain results with even weaker subsidiary capital ratio effects.

Tables 3 and 4 indicated that the shock to Japanese parent bank capital resulted in substantial loan shrinkage at their U.S. branches, with the estimated coefficient on the parent risk-based capital ratio significant at the 1 percent level. On the other hand, as expected, the evidence was much weaker for Japanese subsidiaries, with the parent risk-based capital ratio never having an estimated coefficient significant even at the 5 percent level. One concern might be that part of the reduction in branch loans reflected a shifting of assets by Japanese banks from their branches to their much better capitalized subsidiaries.

To be sure that the net effect of the parent bank capital shock was to reduce total Japanese lending in the United States, we reestimated our equations with a new dependent variable. Table 5 presents the results for total U.S. operations of Japanese banks, with the dependent variable calculated from the combined balance sheets of all U.S. branches and subsidiaries of each Japanese parent bank. Columns 1 and 2 show results for the full sample. The results indicate that the parent risk-based capital ratio again has a positive estimated coefficient that is

significant at the 1 percent level. Overall, the results are similar to those for branches and suggest that loan shifting was not a factor.

Consistent with this evidence, an analysis of the largest negative changes in total loans and in C&I loans finds little evidence of loan shifting from branches to subsidiaries. Of the 25 largest decreases in total loans relative to assets at branches, none have unusually large corresponding increases at subsidiaries. For C&I loans, only one observation has an unusually large increase at a corresponding subsidiary.

Because many Japanese banks have only a branch presence in the United States and thus do not have the opportunity to shift loans to their U.S. subsidiaries, we also examined a subsample of Japanese banks that have both subsidiary and branch operations in the United States. The results are quite similar to those of the full sample and to the branch results, with the parent risk-based capital ratio having an economically large coefficient that is statistically significant at the 1 percent level. Given the size of branch operations relative to those of subsidiaries, it is doubtful that the significant shrinkage found in the branches could be explained by shifting between branches and subsidiaries. Nonetheless, when we combine the branch and subsidiary data for those institutions where this possibility exists (columns 3 and 4), we still find a strong relation between parent bank capital ratios and lending in the United States.

IV. Conclusion

One unanticipated effect of the Basle Accord may be that lending outside of Japan has become sensitive to Japan-specific shocks, given the importance of Japanese banks worldwide. In particular, declines in the Nikkei that may be uncorrelated with movements in stock markets elsewhere, or declines in Japanese real estate values uncorrelated with real estate values elsewhere, may nonetheless be transmitted to other countries via the lending responses of Japanese banks. Because Japanese banks account for nearly one-fifth of commercial and industrial loans to U.S. addresses by banks in the United States, the international transmission of Japanese banking problems has potentially large effects on U.S. bank lending. In fact, we find that the Japanese parent's risk-based capital ratio has an economically and statistically significant impact on Japanese branch lending in the United States.

The Japanese banking experience enables us to identify a shock to bank capital not related to demand conditions in the United States, thus avoiding a major criticism of studies examining the relationship between U.S. bank capital ratios and bank lending, the difficulty in finding a good proxy for supply shocks that are uncorrelated with changes in U.S. loan demand. The substantial increase in Japanese stock values significantly increased Japanese bank capital ratios in the 1980s. And, the substantial decrease in Japanese stock values beginning in 1990 substantially decreased Japanese bank capital ratios. Thus, the

effects of the "bubble economy" in Japan could be transmitted to the credit markets in the United States through the U.S. branches and subsidiaries of Japanese banks in a way unrelated to the demand for loans in the United States.

This international transmission of shocks that were primarily Japanese in nature should cause some revaluation of public policy, as financial markets and financial intermediaries become more global. Shocks that in the past may have been localized and easily contained within a single country now have the potential to be spread internationally. Just how easily these shocks can be transmitted is likely to be a function of the national regulatory framework adopted, a factor that to date may have received inadequate attention. While this paper focuses on capital problems stemming from the decline in Japanese stocks, the decline in Japanese real estate values, yet to be fully addressed by Japanese banking regulators, represents an even larger potential problem. Unlike the sharp decline in unrealized gains on stock market holdings, which were observable and not easily manipulated to avoid substantial declines in bank capital ratios, the timing of both the write-downs of the real estate loans and the associated additions to loan loss reserves can be managed by banks and by regulators, as was done in many countries during the Third World debt crisis.

The way in which Japanese regulators finally resolve the large volume of problem real estate loans on Japanese banks' balance sheets could have potentially serious ramifications for

many of their banks and, as a consequence, important implications for credit availability in the United States and other countries with a significant Japanese banking presence. Such issues highlight the need for macroeconomic and regulatory policymakers to shift to a global focus, as has already occurred in many banking and financial markets.

This paper addresses only changes in bank loans, not the effects of disruptions of bank credit on borrowers. However, several previous studies have documented that even large customers at large banks in both the United States and Japan can be adversely affected if their banking relationship is disrupted (Gibson 1995; Slovin, Sushka, and Polonchek 1993). This evidence highlights the fact that the globalization of banking will require policymakers to monitor more carefully both banking conditions and policy responses to shocks abroad, which now may be more easily transmitted internationally.

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Footnotes

1. The term branches will be used to refer to both branches and agencies. The important distinction for us is whether the entity is included in the balance sheet of the parent bank (agencies and branches) or not (subsidiaries).

2. The Basle Accord tried to create a "level playing field" by providing standardized capital regulations so that all internationally active banks would satisfy the same two minimum risk-based capital ratios. The new regulations require tier 1 (core) capital to equal at least 4 percent of risk-weighted assets. The broader measure, tier 2 capital, which includes tier 1 capital as well as subordinated debt and revaluation reserves, must be equal to at least 8 percent of risk-weighted assets.

Despite the greater uniformity in regulation brought about by the Basle Accord, national differences remain that could have substantial effects on the extent to which the capital constraints are binding. In particular, differences across regulators from different nations remain in the designation of the set of assets allowable for tier 1 and tier 2 capital. Furthermore, regulators in different nations have allowed differences in the categorizations of assets placed in particular risk classifications. For a more detailed description of these differences, see Scott and Iwahara (1994). In addition, differences in reserving procedures for possible loan losses can have a significant impact on reported capital across countries. Failure to fully reserve for expected loan losses can reduce the comparability of capital ratios when nonperforming loans are increasing and collateral values are decreasing.

3. The unrealized capital gains can be included in tier 2 capital, as long as tier 1 capital accounts for at least 50 percent of total capital. Thus, unrealized gains on stock market holdings can only be utilized to the extent the bank has sufficient tier 1 capital to maintain the required tier 1 share of total capital. Note that current U.S. banking restrictions on holding shares in other U.S. firms make this provision of little relevance to U.S. banks.

4. If a bank has substantial unrealized gains that have not been included in its tier 2 capital because of the binding tier 1 share constraint, an increase in tier 1 capital will increase tier 2 capital in a ratio of two to one. Thus, Japanese banks had a strong incentive in the late 1980s to increase tier 1 capital by issuing new equity or realizing gains on appreciated assets.

5. Frankel and Morgan (1992) report that the first yearly asset decline (5 percent) in Japanese city banks since World War II occurred in 1991. Our sample of banks is not limited to city banks, but the data are limited by the availability of risk-based

capital ratios only back to September 1988. Because the data in Table 2 (below) are limited to only domestic operations and overseas branches, they do not indicate the extent to which overall operations (that also include foreign subsidiaries) declined.

6. Note that the overseas data do not reflect total overseas operations, only that of branches. While branch operations do account for the majority of overseas operations, subsidiaries are also important components.

7. One intent of those developing international regulations for banks was to limit any competition among regulators of different nations that could result in a lowering of capital standards, in an attempt to provide competitive advantages for their own internationally active banks. In fact, a key motivation for many involved in establishing the Basle Accord was to slow the aggressive expansion of Japanese banks that included substantial penetration of foreign markets (see, for example, Frankel and Morgan 1992; Sugahara 1994).

8. Seth and Quijano (1991) show that in the early 1980s as much as three-fourths of Japanese branch lending in the United States was to Japanese firms, but by 1989 Japanese firms accounted for no more than two-fifths of Japanese branch lending in the United States.

9. The extent of foreign bank asset growth during this period is overstated, reflecting as it does the shift from offshore to onshore banking activity after the December 1990 elimination of the reserve requirement for large time deposits and Eurocurrency borrowings for their banking offices located in the United States (Terrell 1993). However, the assets of Japanese banks operating in the Cayman Islands declined much more than those of other non-U.S. banks, with the market share of Japanese assets in the Cayman Islands declining substantially by the end of 1992. Thus, the data in Figure 2 also would understate the decline in U.S. operations of Japanese banks to the extent that Japanese banks shifted some offshore U.S. activity onshore.

McCauley and Seth (1992) and Terrell (1993) provide a more complete discussion of offshore banking activity. In general, Japanese banks booked relatively few C&I loans at offshore locations, with only 4 percent of C&I loans to U.S. addresses booked by Japanese branches located at offshore locations in 1993. In contrast, non-Japanese foreign banks booked significant C&I loans offshore. For example, 57 percent of French, 81 percent of German, and 42 percent of Canadian C&I loans to U.S. addresses were booked at offshore rather than onshore branches. Terrell (1993) reports that 90 percent of offshore branch assets and liabilities were booked in the Cayman Islands. Reports from the Cayman Islands indicate that from year-end 1991 to year-end 1992 the Japanese bank share of assets in the Cayman Islands

decreased from 20.6 percent to 13.1 percent.

10. This includes all Japanese banks with significant U.S. operations but excludes approximately 20 Japanese banks that have very small operations in the United States and for which we have no parent capital data. The total C&I loans of these omitted banks together represent less than 3 percent of Japanese C&I lending in the United States. The data on parent banks include all city banks and long-term credit banks. While seven trust banks operate in Japan, we have not included the two smallest, which have no significant presence in the United States. For example, Chuo, the larger of the two omitted trust banks, does not operate a branch or subsidiary in the United States, although it does have one small agency. We also have included the 10 largest regional banks, each of which has at least one branch (but none a subsidiary) in the United States.

11. Japanese city banks are prohibited from engaging in trust-related business or holding long-term bank debt or deposits. Long-term credit banks are restricted in Japan to accepting deposits from their borrowers and from governments; they also are allowed to issue long-term debt. Trust banks are intended to engage primarily in trust business in Japan.

12. We also constructed alternative loan growth series measured relative to the average loan growth in the state (or states) in which the branches or subsidiaries operated. However, the results with these alternative dependent variables and with state employment growth substituted for U.S. employment growth were very similar to those for the United States, and thus are not reported in the tables.

Table 1
Japanese Bank Loans
(Loans stated in 100 million yen)

	All Japanese Banks		City Banks			Regional Banks		
	Japan	Overseas	Japan	Overseas	RBC Ratio	Japan	Overseas	RBC Ratio
Mar-87	2,506,880	294,054	1,312,914			689,778		
Mar-88	2,846,359	356,443	1,506,465			778,889		
Mar-89	3,175,672	458,483	1,676,962	341,682	9.95	886,155	8,241	10.41
Mar-90	3,558,735*	676,530	1,874,652	487,741	8.64	1,016,637	14,307	8.86
Mar-91	3,743,534*	733,953	2,000,205	524,696	8.93	1,069,996	17,123	9.52
Mar-92	3,888,295*	742,890	2,068,732	541,805	8.21	1,131,656	19,849	8.75
Mar-93	4,025,505*	673,414	2,131,472	501,303	9.26	1,181,875	16,626	9.55
Mar-94	4,066,682*	617,810	2,132,318	475,486	9.65	1,212,363	14,860	10.13

	Trust Banks			Long-Term Credit Banks		
	Japan	Overseas	RBC Ratio	Japan	Overseas	RBC Ratio
Mar-87	186,622			317,565		
Mar-88	205,461			355,542		
Mar-89	222,797	57,990	13.45	389,756	50,568	10.39
Mar-90	236,503	96,620	11.46	430,941	77,860	9.44
Mar-91	216,712	112,963	10.29	456,620	78,535	8.95
Mar-92	216,995	109,831	8.56	470,909	70,732	8.31
Mar-93	239,064	96,360	10.02	473,092	58,220	8.99
Mar-94	249,972	79,660	10.42	472,027	46,894	9.26

Note: RBC Ratio is the simple average of the risk-based capital ratios of the banks in our sample, while the Japan and Overseas loans totals include all institutions in the category.

* To get a more consistent series, the Japan all-banks data are adjusted to exclude Regional II banks beginning in March 1990.

Source: Economic Statistics Annual, Bank of Japan.

Table 2
15 Largest World Banking Organizations, Based on Total Assets

Rank	1980		1988		1994	
	Name	Country	Name	Country	Name	Country
1	Citicorp, New York	United States	Dai-Ichi Kangyo Bank Ltd., Tokyo	Japan	Sanwa Bank Ltd,. Osaka	Japan
2	Banque Nationale de Paris	France	Sumitomo Bank Ltd., Osaka	Japan	Dai-Ichi Kangyo Bank Ltd., Tokyo	Japan
3	BankAmerica Corp, San Franciso	United States	Fuji Bank, Ltd., Tokyo	Japan	Fuji Bank, Ltd., Tokyo	Japan
4	Credit Agricole Mutuel, Paris	France	Mitsubishi Bank Ltd., Tokyo	Japan	Sumitomo Bank Ltd., Osaka	Japan
5	Credit Lyonnais, Paris	France	Sanwa Bank Ltd., Osaka	Japan	Sakura Bank, Ltd., Tokyo	Japan
6	Societe Generale, Paris	France	Industrial Bank of Japan, Ltd., Tokyo	Japan	Mitsubishi Bank Ltd., Tokyo	Japan
7	Barclays Bank Ltd., London	United Kingdom	Norinchukin Bank, Tokyo	Japan	Norinchukin Bank, Tokyo	Japan
8	Deutsche Bank, Frankfurt	Germany	Tokai Bank Ltd., Nagoya	Japan	Industrial Bank of Japan, Ltd., Tokyo	Japan
9	National Westminster Bank Ltd., London	United Kingdom	Mitsui Bank, Ltd., Tokyo	Japan	Mitsubishi Trust & Banking Corp., Tokyo	Japan
10	Dai-Ichi Kangyo Bank Ltd., Tokyo	Japan	Mitsubishi Trust & Banking Corp., Tokyo	Japan	Long Term Credit Bank of Japan Ltd., Tokyo	Japan
11	Chase Manhattan Corp., New York	United States	Credit Agricole Mutuel, Paris	France	Deutsche Bank, AG, Frankfurt	Germany
12	Fuji Bank, Ltd., Tokyo	Japan	Citicorp, New York	United States	Sumitomo Trust & Banking Co., Ltd., Tokyo	Japan
13	Mitsubishi Bank Ltd., Tokyo	Japan	Sumitomo Trust & Banking Co., Ltd., Tokyo	Japan	Tokai Bank Ltd., Nagoya	Japan
14	Sumitomo Bank, Ltd., Osaka	Japan	Banque Nationale de Paris	France	Mitsui Trust & Banking Co., Ltd., Tokyo	Japan
15	Sanwa Bank Ltd., Osaka	Japan	Barclays PLC, London	United Kingdom	Credit Agricole Mutuel, Paris	France

Source: American Banker various issues.

Table 3
Determinants of Japanese Lending in the United States, U.S. Branches, 1989:1 to 1994:2

Estimation Method	Variance Components	Variance Components	Fixed Effects	Variance Components	Variance Components	Fixed Effects
Dependent Variable	$\frac{\triangle Loan}{Asset}$	$\frac{\triangle Loan}{Asset} - \frac{\triangle USLoan}{USAsset}$	$\frac{\triangle Loan}{Asset}$	$\frac{\triangle CI}{Asset}$	$\frac{\triangle CI}{Asset} - \frac{\triangle USCI}{USAsset}$	$\frac{\triangle CI}{Asset}$
Constant	-39.125* (2.26)	-37.896* (2.21)	-	-3.585 (0.26)	-4.015 (0.29)	-
Parent RBC	2.211** (7.09)	2.076** (6.71)	2.390** (5.56)	0.676** (2.82)	0.667** (2.79)	0.684* (2.07)
Land Price	0.532** (6.26)	0.591** (7.00)	0.509** (5.23)	0.303** (4.77)	0.325** (5.13)	0.335** (4.60)
FDI	0.075** (3.57)	0.068** (3.27)	0.077** (3.11)	0.058** (3.42)	0.056** (3.31)	0.055** (2.79)
Emp Growth	0.843* (2.27)	0.419 (1.14)	0.802 (1.94)	0.427 (1.50)	0.306 (1.08)	0.309 (0.98)
Log(Asset)	1.328 (1.35)	1.308 (1.35)	1.632 (0.55)	0.131 (0.17)	0.175 (0.23)	-2.121 (0.94)
NPL	0.041 (0.36)	0.053 (0.47)	0.085 (0.62)	-0.318* (2.04)	-0.315* (2.03)	-0.286 (1.63)
CI/A	0.031 (0.88)	0.028 (0.80)	0.072 (1.11)	-0.062* (2.26)	-0.062* (2.28)	-0.178** (3.68)
RE/A	-0.049 (0.93)	-0.045 (0.86)	-0.057 (0.57)	-0.004 (0.09)	-0.001 (0.02)	0.004 (0.06)
Trust	-0.008 (0.01)	0.242 (0.17)	-	-0.363 (0.32)	-0.332 (0.29)	-
Long-Term	1.689 (1.07)	1.792 (1.14)	-	2.846* (2.28)	2.868* (2.31)	-
Regional	2.741 (0.96)	2.750 (0.97)	-	-1.276 (0.56)	-1.149 (-0.51)	-
Hausman test P-value	0.998	0.999	-	0.626	0.640	-
Observations	315	315	315	315	315	315
R^2	0.432	0.414	0.423	0.298	0.288	0.304
SSR	11526	11373	11083	6813	6789	6466
SER	6.474	6.431	6.314	4.978	4.969	4.823

Note: The data are semi-annual observations for March and September. Independent variables are measured as of beginning of period; FDI and employment growth are measured over the prior six-month period. NPL is measured as nonperforming loans as a share of loans in the first three columns and as nonperforming C&I loans as a share of C&I loans in the last three columns. Absolute values of t-statistics are in parentheses.

* Significant at the 5 percent level.
**Significant at the 1 percent level.

Table 4
Determinants of Japanese Lending in the United States, U.S. Subsidiaries
Estimation Method: Fixed Effects, 1989:1 to 1994:2

	$\frac{\triangle Loan}{Asset}$	$\frac{\triangle Loan}{Asset} - \frac{\triangle USLoan}{USAsset}$	$\frac{\triangle CI}{Asset}$	$\frac{\triangle CI}{Asset} - \frac{\triangle USCI}{USAsset}$
Subsidiary RBC	0.165 (1.13)	0.174 (1.20)	0.467** (3.61)	0.471** (3.64)
Parent RBC	0.134 (0.25)	0.004 (0.01)	0.633 (1.37)	0.617 (1.33)
Land Price	0.421** (3.00)	0.482** (3.46)	0.375** (3.03)	0.398** (3.22)
FDI	0.008 (0.23)	0.002 (0.05)	0.028 (0.92)	0.026 (0.87)
Emp Growth	0.511 (0.84)	0.086 (0.14)	0.013 (0.02)	-0.103 (0.19)
Log(Asset)	-18.277** (5.12)	-18.154** (5.12)	-9.012** (2.86)	-8.938 (2.84)
NPL	-0.340 (1.23)	-0.309 (1.12)	0.023 (0.08)	0.028 (0.10)
CI/A	0.013 (0.15)	0.012 (0.14)	-0.024 (0.31)	-0.021 (0.27)
RE/A	0.135 (1.30)	0.136 (1.31)	0.110 (1.07)	0.114 (1.10)
Hausman test P-value	0.000	0.000	0.001	0.001
Observations	209	209	209	209
R^2	0.341	0.340	0.296	0.296
SSR	10917	10764	8417	8410
SER	7.766	7.712	6.819	6.816

Note: The data are semi-annual observations for March and September. Independent variables are measured as of beginning of period; FDI and employment growth are measured over the prior six-month period. NPL is measured as nonperforming loans as a share of loans in Columns 1 and 2, and as nonperforming C&I loans as a share of C&I loans in the last two columns. Absolute values of t-statistics are in parentheses.
* Significant at the 5 percent level.
**Significant at the 1 percent level.

Table 5
Determinants of Japanese Lending in the United States, Total U.S. Operations
Estimation Method: Variance Components, 1989:1 to 1994:2

	Full Sample		Japanese Banks with Both U.S. Subsidiaries and Branches	
	$\frac{\triangle \text{Loan}}{\text{Asset}}$	$\frac{\triangle \text{CI}}{\text{Asset}}$	$\frac{\triangle \text{Loan}}{\text{Asset}}$	$\frac{\triangle \text{CI}}{\text{Asset}}$
Constant	-38.994** (2.60)	-7.630 (0.65)	-79.326** (3.93)	0.443 (0.02)
Parent RBC	2.165** (7.29)	0.713** (3.14)	2.464** (7.33)	0.869** (3.24)
Land Price	0.536** (6.50)	0.321** (5.15)	0.554** (5.71)	0.241** (3.15)
FDI	0.073** (3.57)	0.055** (3.33)	0.093** (3.80)	0.066** (3.13)
Emp Growth	0.840* (2.33)	0.449 (1.64)	0.675 (1.57)	0.271 (0.78)
Log(Asset)	1.289 (1.57)	0.324 (0.50)	2.968** (2.78)	-0.335 (0.34)
NPL	0.039 (0.32)	-0.305* (2.04)	0.163 (1.02)	-0.257 (0.76)
CI/A	0.037 (1.02)	-0.062* (2.17)	0.191** (3.35)	-0.047 (0.97)
RE/A	-0.030 (0.57)	0.006 (0.14)	0.159* (2.20)	0.051 (0.80)
Trust	0.188 (0.13)	0.066 (0.06)	0.841 (0.58)	-1.004 (0.73)
Long-Term	1.444 (0.87)	2.977* (2.30)	1.800 (1.41)	2.797* (2.34)
Regional	3.012 (1.08)	-0.328 (0.15)	-	-
Hausman test P-value	0.986	0.799	0.327	0.041
Observations	304	304	204	204
R^2	0.439	0.304	0.541	0.321
SSR	10249	5999	5696	3677
SER	6.231	4.767	5.689	4.571

Note: The data are semi-annual observations for March and September. Independent variables are measured as of beginning of period; FDI and employment growth are measured over the prior six-month period. NPL is measured as nonperforming loans as a share of loans in columns 1 and 3, and measured as nonperforming C&I loans as a share of C&I loans in columns 2 and 4. Absolute values of t-statistics are in parentheses.
* Significant at the 5 percent level.
**Significant at the 1 percent level.

Figure 1

The Nikkei Stock Index

Figure 2

Japanese Bank Penetration into the U.S. Banking Market:

Percentage of Assets and of C & I loans to U.S. Addresses

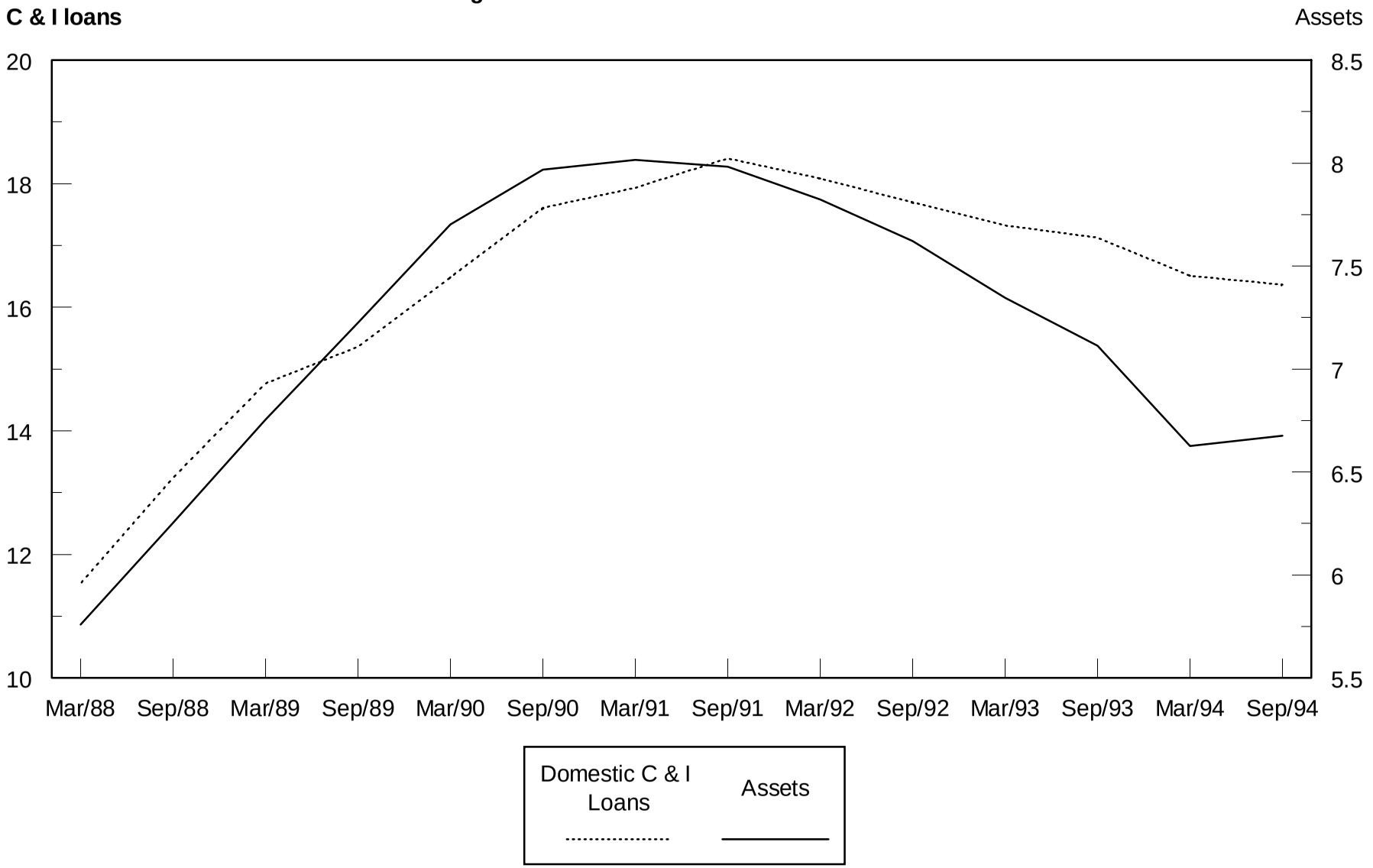


Figure 3
Japanese Percentage of Foreign Bank Activity in the United States

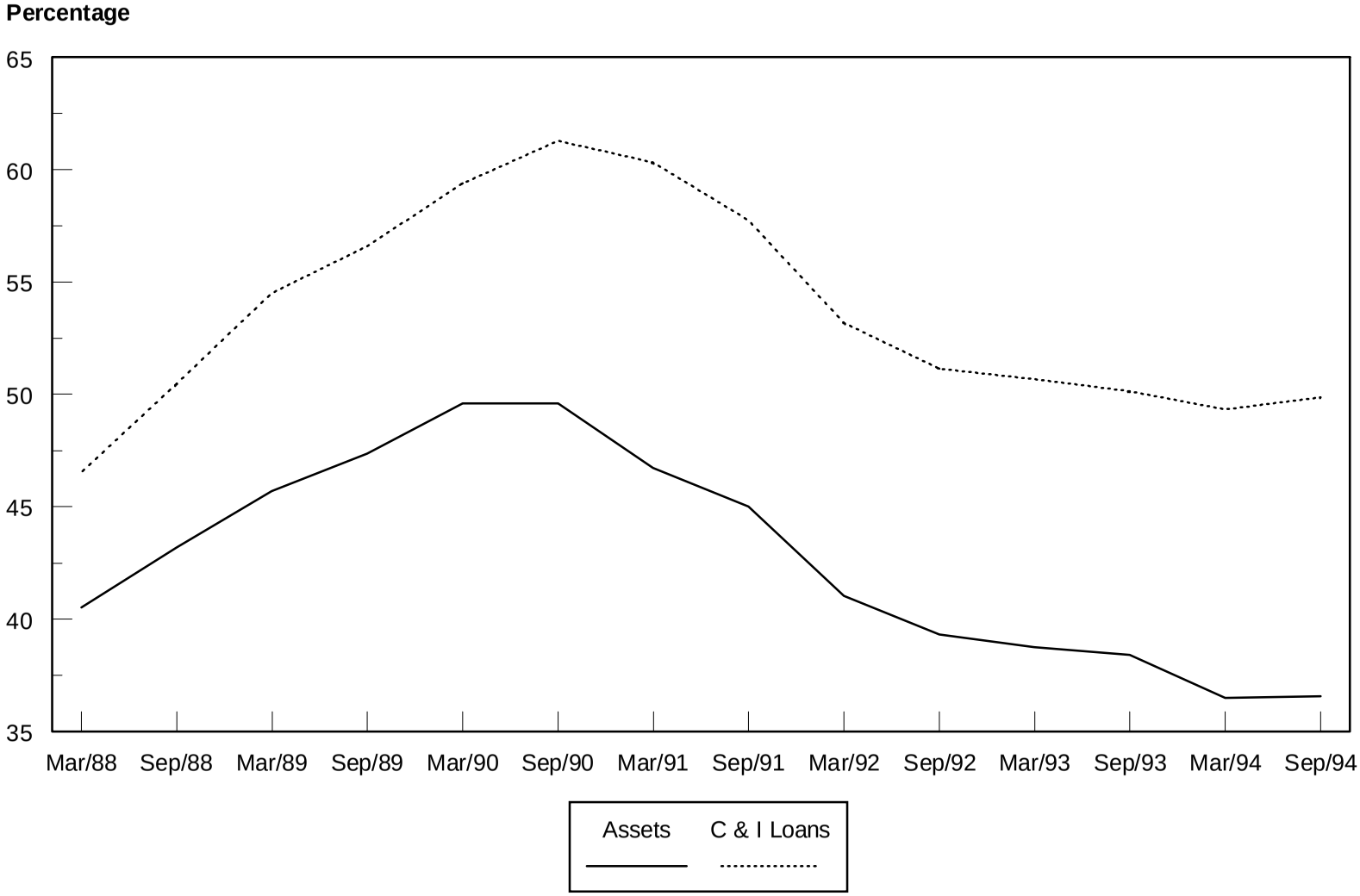
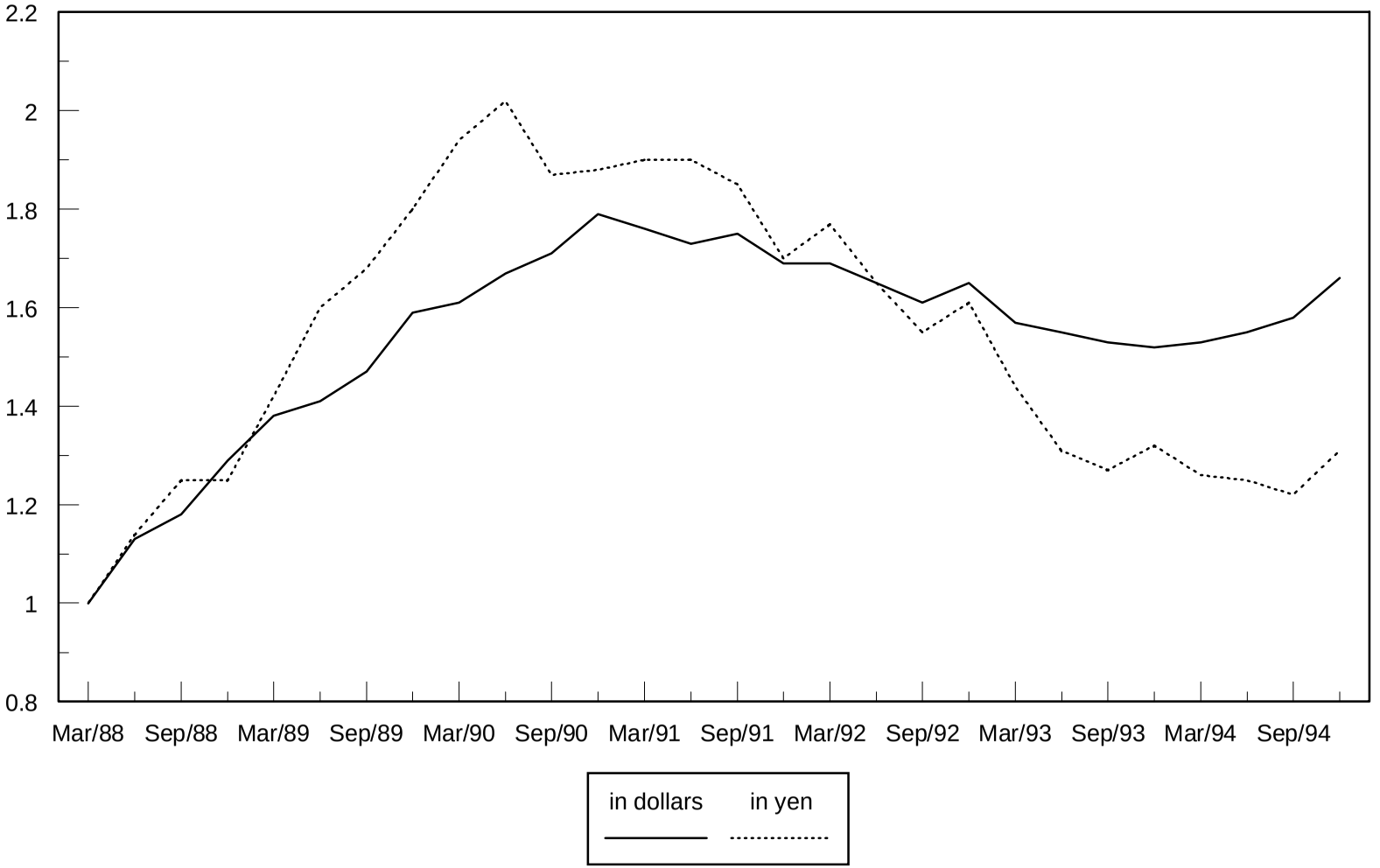


Figure 4
C & I Loans by U.S. Subsidiaries, Branches and Agencies of Japanese Banks



Series are indexed, with 1988:Q1 = 1.