Bank Cost of Capital and International Competition

by Steven A. Zimmer and Robert N. McCauley

The rising share of U.S. corporate loans booked by foreign-owned banks and the withdrawal of U.S. banks from foreign lending (Chart 1) raise concerns about the competitiveness of U.S. banks. The increasing fraction of U.S. banking assets controlled by foreign banks is paralleled by the rising share of U.S. manufacturing assets or employment under the control of foreign firms.[1] Unlike U.S. banks, however, U.S. manufacturing and commercial firms are not retrenching their foreign operations.[2] U.S. banks, then, are lagging U.S. industrial firms in international competition as measured by asset growth.

This contrasting performance may reflect some unique features of U.S. banking law and the very different profitability of banks' and corporations' foreign operations. A fundamental economic force may also be at work. If a relatively high cost of capital burdens both U.S. banks and industrial firms but figures more critically in financial than in industrial competition, then it is understandable that U.S. banks might lag their industrial counterparts.

This article investigates how capital costs may have contributed to the declining competitiveness of U.S. banks. We compare capital costs facing commercial banks in different industrial countries to determine whether U.S. banks are in fact operating at a disadvantage. In addition, we seek to identify the factors that account for differences in the cost of capital and explore some of the implications of these disparities.

Our analysis reveals that Japanese banks enjoy a low cost of capital, German and Swiss banks face a moderate cost of capital, and U.S., U.K., and Canadian banks confront a high cost of capital. These differences can be traced to shareholders' valuations of bank earnings in different equity markets. In effect, shareholders allow banks from different countries to price their services at different levels. What appears, then, to a banker with demanding shareholders as razor-thin margins designed to win market share may appear to another banker with less exacting shareholders as a fully priced transaction. We illustrate this point by calculating the capital costs for three different financial products: a straight corporate loan, a commitment to lend, and an interest rate swap.

Differences in bank cost of capital may arise from differences in national saving behavior, macroeconomic stabilization policies, industrial organization, financial policies, and taxes. Taxes can exert a more important effect on bank cost of capital than on industrial cost of capital, but they do not account for the differences observed. Stronger official safety nets for foreign banks may serve to cheapen subordinated debt and equity costs.

The cost of capital differences assert themselves forcefully in wholesale lending. In addition to the broad shift of market share in lending to U.S. corporations from U.S. banks to foreign banks shown in Chart 1,

[1]Only in the rare industry such as chemicals, however, have foreign firms reached the one-third share achieved by foreign banks in U.S. corporate lending. See Ned G. Hownestein, "U.S. Affiliates of Foreign Companies: Operations in 1988," *Survey of Current Business*, vol. 70 (July 1990), pp. 127-43.

[2]Raymond J. Mataloni, "U.S. Multinational Companies: Operations in 1988," *Survey of Current Business*, vol. 70 (June 1990), pp. 31-53.

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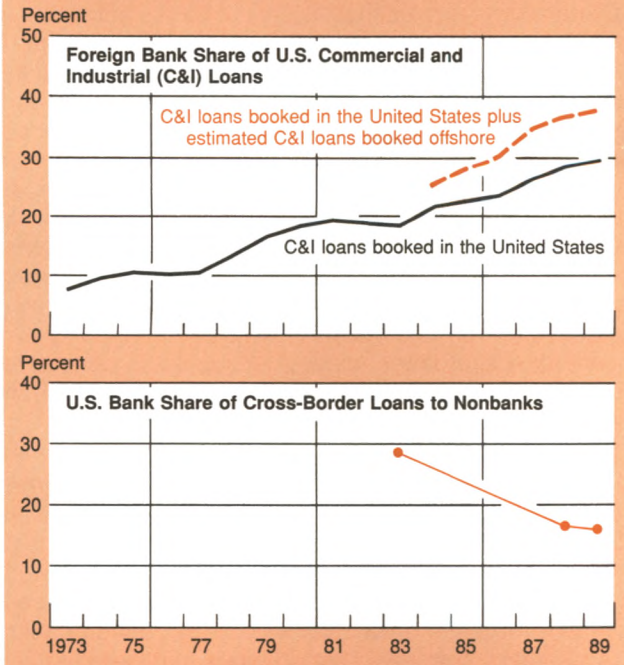
country-by-country gains by foreign banks argue for the importance of capital costs. The foreign banks with the greatest capital cost advantage have increased their market share most, while the foreign banks with little or no capital advantage have showed scant if any gains. Moreover, in the market for credit enhancement for commercial paper and municipal bonds, where equity capital costs are even more critical than in corporate lending, foreign banks have left even less of the market for U.S. banks. Banks with a cost of capital disadvantage experience particular difficulty competing in low-risk and low-value-added products since they have less potential to offset their disadvantage through lower labor and overhead costs, better production economies, and better risk management and assessment.

We begin by defining the cost of capital for banks as the fee or net spread between bank borrowing and lending rates that a financial product must generate in order to increase the market value of the bank. While usage of the term "cost of capital" in reference to banks varies, our focus on a required spread (or fee) has much to recommend it in a world of multicurrency lending and off-balance sheet banking. Since an international standard on bank capital limits a bank's ability to leverage up its equity, a bank's cost of capital is largely determined by the value that the stock market assigns to a bank's earnings and, to a lesser extent, by the risk premium paid on its subordinated debt.

Chart 1

Market Shares in Bank Lending



Sources: Bank for International Settlements; Federal Financial Institutions Council, Reports of Condition; Federal Reserve; Federal Reserve Bank of New York staff estimates.

Note: 1989 datum is estimated.

Defining the cost of capital

The cost of capital for banks differs from the cost of capital for industrial firms in two key respects. First, the cost of equity facing a bank assumes paramount importance, despite the fact that banks are more highly leveraged than commercial firms. Second, if the international accord on required capital ratios for banks binds at the margin, the equity required for a given project is readily quantified.

The primacy of equity

A bank's cost of capital for a financial product is the spread or fee that allows the required regulatory capital to earn the rate of return demanded by the market. If a bank prices a product below its cost of capital, the bank inflicts a loss on its shareholders.

Over two years ago, bank regulators from the major industrial countries established international regulatory constraints on bank pricing.[3] The so-called Basle Agreement requires banks from 1992 to hold 4 percent tier 1 capital, or shareholder equity, and 4 percent tier 2 capital, including subordinated debt, against risk-weighted assets. In the discussion below, we concentrate first on the more important tier 1 capital—henceforth referred to as equity.

While regulation sets a minimum on equity required for a bank product, the market determines the cost of that equity. A simple example illustrates how bank managers assess the cost of equity from the market. Suppose that bank managers are weighing a proposed corporate loan. For simplicity, assume that the credit committee judges the contemplated loan to pose much the same risks as the bank's other assets.[4] Bank management should issue new equity to support the loan if doing so promises at least to maintain the market value

[3]Committee on Banking Regulations and Supervisory Practices, Bank for International Settlements, "International Convergence of Capital Measurement and Capital Standards," July 1988, in Raj Bhala, *Perspectives on Risk-Based Capital* (Rolling Meadows, Ill.: Bank Administration Institute, 1989), Appendix, pp. 193-235.

[4]See Appendix C for the effects of relaxing this assumption.

[5]The bank may raise new equity through retained earnings or free up equity by asset sales. The cost of such equity is tantamount to the cost of new issuance if we interpret the bank's action as forgoing repurchase of its shares.

of its outstanding shares.[5] For the share issuance not to lower the bank's share price, the return on the new equity devoted to the contemplated loan must be at least as great as the profit rate on the bank's existing equity. The profit rate is defined as after-tax earnings divided by market value of equity.

Of course, making the loan runs up operating and other expenses. Thus the spread on the loan must be wide enough so that once labor costs, physical capital costs, expected loan default losses, and other expenses are accounted for, the after-tax earnings on the loan stand in the same relation to the allotted equity as overall bank earnings bear to the market value of the bank's outstanding shares. The net (after expenses) spread required to generate this required equity return is the bank's cost of capital for the loan.

Suppose the stock market consistently assigns a bank a share price twenty times earnings, and therefore bank management takes its required profit rate to be 5 percent. In considering a loan of average risk, the bank's managers would require that the loan return an annual profit of 5 percent on the 4 percent portion of equity allotted to it. This is equal to an after-tax return of 20 basis points on the value of the loan. If national and local taxes claim 50 percent of earnings, the bank needs a pretax net spread of 40 basis points just to cover its equity costs. Thus, the bank's cost of capital for a corporate loan is 40 basis points.

The role of debt

If banks may leverage every dollar of equity with $25 of assets, it may seem strange that the cost of capital as defined does not include the cost of debt financing—except the cost of subordinated debt in tier 2 capital. It should be recognized at the outset that off-balance sheet products such as letters of credit, commitments to lend, and interest rate swaps require equity to support them, in proportions set by the Basle Agreement, but no funding with debt. Interest rates have no direct bearing on the financial cost of these products to a selling bank.

We neglect deposit funding costs even for loans or other funded products because internationally active banks from different countries competing in the same market tend to fund themselves at similar interest rates at the margin. Under normal circumstances, one internationally active bank will pay much the same as another for deposits in London and other wholesale markets. Acquiring and holding even low-cost consumer deposits entail promotional and operating costs that tend to raise marginal costs to wholesale funding levels. Banks compete on the basis of the markup they charge over their cost of borrowed funds.

We readily concede that banks tend to enjoy a slight home-court advantage in selling deposits in their home currencies and in their home markets. Since the home-court advantage is often misunderstood, however, the following sections compare debt costs in the United States and Japan and consider whether low real interest rates at home actually help banks.

Debt costs and competition in U.S. commercial lending. Foreign banks ordinarily pay a 10-basis-point premium on their Yankee (foreign bank) certificates of deposit or purchased federal funds. Indeed, in late 1990 some foreign banks paid considerably more for end-year funding. If a foreign bank pays an extra 10 basis points—about 6 basis points after tax—on 24/25ths of its liabilities, it needs a 146-basis-point advantage in cost of equity on the last 1/25th (4 percent) just to pull even with its U.S. competitors.[6]

In the U.S. corporate loan market in particular, however, it is by no means clear that large U.S. banks have consistently enjoyed such a home-court advantage in wholesale funding. Although foreign banks have had to pay a premium to raise dollars in the United States, they may well have enjoyed a funding advantage in lending to U.S. firms in the late 1980s. Until December 1990, a U.S. bank had to hold a 3 percent Eurodollar reserve against funds raised in the Eurodollar market if the bank's home [illegible] had net obligations to the bank's foreign branches. A 3 percent reserve was also required on large certificates of deposit issued by U.S. offices. Consequently, once the bank had brought money into the United States from its foreign branches on a net basis, it faced no reserve incentive for raising funds offshore as opposed to onshore. A U.S.-chartered bank could not get around the reserve requirement by booking a loan to a U.S. corporation offshore because such loans were included in the computation of the required Eurodollar reserve. But since the consolidated reporting required to enforce this provision was not available for foreign banks' branches and agencies operating in the United States, they could avoid the Eurodollar reserve requirement by booking a loan to a U.S. firm offshore.

As long as the large U.S. certificate of deposit rate remained well below the London Interbank Offered Rate (LIBOR), the Eurodollar reserve requirement did not work to the disadvantage of U.S. banks. But as the United States drew in funds from the international banking system to finance its current account, domestic rates rose relative to offshore dollar rates. By mid-1987 a foreign bank able to borrow at LIBOR with no reserve to fund a loan to a U.S. corporation could regularly

[6] $.96\{10 * (1-.39)\} = .04 * X$, where .39 represents combined federal, state, and local taxes. Solving for X, we have $X = 146.4$.

[7] See "Revision of Regulation D," *Federal Reserve Bulletin*, September 1980, pp. 758-73.

access cheaper funding than a U.S. bank choosing between issuing a reservable domestic certificate of deposit or bidding for a reservable Eurodollar deposit (Chart 2, shaded area). Data reported to the Bank for International Settlements by industrialized countries show that offshore claims on U.S. nonbanks reported by foreign banks grew from $48 billion at end-1984 to $189 billion at end-1990 and to $194 billion by mid-1990.[8] The Eurodollar reserve requirement may have been necessary for monetary control, but its uneven application surrendered some portion of the home-court advantage possessed by U.S. banks in borrowing dollars.

Debt costs and competition in Japanese commercial lending. The U.S. Treasury has argued that deposit regulation has put foreign banks operating in Tokyo at a disadvantage. Japanese banks have funded themselves with (a falling proportion of) consumer deposits carrying low, regulated interest rates, while foreign banks do not have access to such funds. The practice of average cost pricing on corporate loans has tended to pass through the benefit of regulated rates to corporate borrowers and to make foreign banks particularly uncompetitive.[9]

[8]Bank for International Settlements, *International Banking and Financial Market Developments*; and *Federal Reserve Bulletin*, various issues, Table 3.14.

[9]As the Treasury notes, "Loan charges are based in part on the blended cost of funds to domestic institutions, which continue to be below those of foreign banks." Such pricing casts doubt on the

Do low real interest rates at home help? In competing to offer borrowers narrow spreads over the cost of borrowed funds, a bank from a country with lower interest rates, whether or not adjusted for inflation, has no direct advantage over banks from a country with higher real interest rates. In this respect, competition among banks differs from competition among industrial exporters, which gives the edge to those with access to cheap money at home. A bank that borrowed in a low-interest currency to lend in a high-interest currency could expose itself to enormous risks. Only indirectly can low real interest rates at home help by showing up as cost of equity differences, but such differences are captured in our cost of capital measures.

The cost of equity

The return on a financial product has to be high enough to cover the required profit rate on the equity allotted to it. This required profit rate is best conceived of as the profit rate the bank can expect to sustain in the long term.

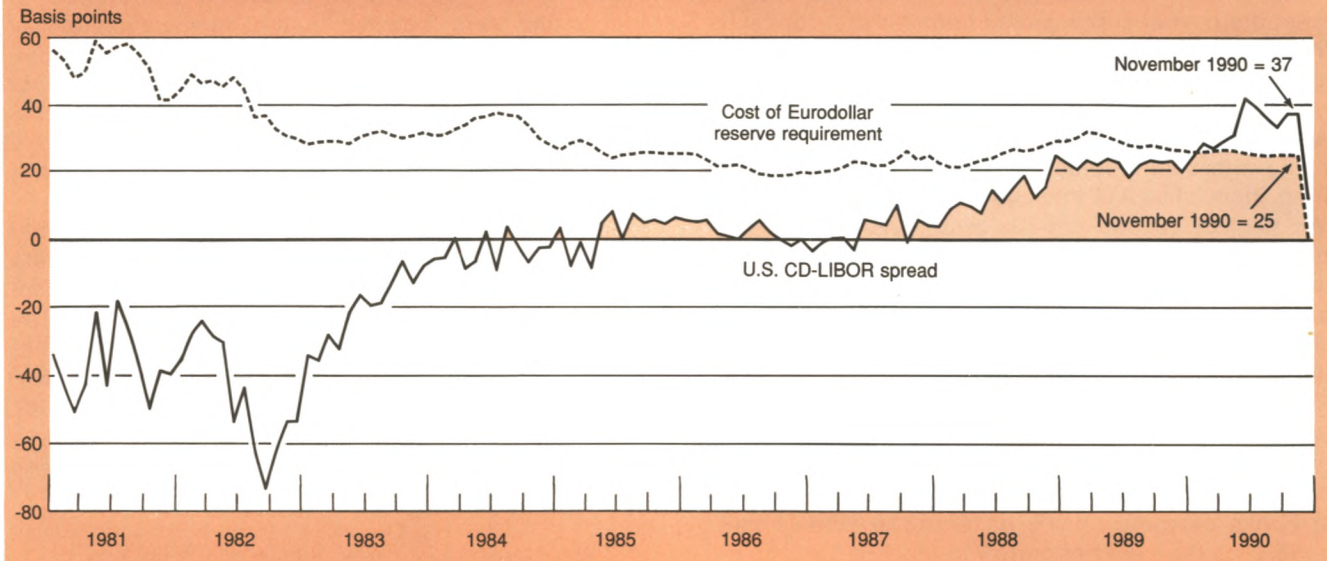
Conceptual problems

Although long-term sustainable profit rates cannot be

Footnote 9 continued
notion that Japanese banks reap extraordinary profits from cheap deposits at home that can be used to finance expansion abroad. U.S. Department of the Treasury, *National Treatment Study* (Washington: Government Printing Office, 1990), p. 218.

Chart 2

Cost of the Eurodollar Reserve Requirement and the Spread between Adjusted CD Cost and LIBOR



Note: CD cost is adjusted for FDIC insurance cost and reserve requirement of 3 percent.

observed, we can observe prevailing profit rates and adjust them to render them comparable across countries. Before explaining these adjustments, however, we consider three potential problems in using current profit rates as proxies for long-term profit rates—growth, cyclicality of profits, and undercapitalization.

Profitability. If investors expect a bank's profitability to rise, its current profit rate understates its true cost of equity because investors are paying up for earnings not yet in evidence. Thus, new firms perceived to have extraordinary growth potential and therefore priced at high multiples of current earnings are generally not thought to enjoy particularly low cost of equity. One must distinguish between growth in profits and growth in profitability, however. A bank's profits may grow simply because the bank reinvests a high proportion of its earnings or it issues new shares in volume. Growth in profitability requires more earnings from a given amount of capital and would have to result from a change in market structure, a change in cost structure, or other fundamental changes not easily achieved.

Japanese and U.K. banks' earnings prospects may raise the issue of profitability growth. In the United Kingdom, the entry of building societies into mainstream banking and the maturation of the consumer credit business point to lower bank earnings in the future; in Japan, deposit deregulation signals a reduction in profits for banks. In these instances, current profits overstate future profits and cost of equity is overstated. But if Japanese banks have, as some claim, pursued a market share strategy abroad with a view toward eventually raising spreads, then current profit rates may understate the cost of equity. Since these growth considerations are clearly difficult to quantify and, in the case of Japan, work in offsetting directions, no adjustment is made for growth in computing the cost of equity, although the possibility of the need for such an adjustment is recognized.

Cyclicality of profits. The second problem with using current profit rates as a measure of the cost of equity arises from the cyclicality of profits. If a firm is having a bad year, its profits do not proxy future profits well. The stock market may recognize a temporary downturn and price the shares of the firm in anticipation of higher future profits. In this case the current profit rate would understate the cost of equity.

The cyclicality of profits represents a significant theoretical shortcoming of the use of profit rates to measure the cost of equity. In practice, however, the cyclicality of profits is not problematic because of two factors: the behavior of bank managers and the behavior of the equity market.

Bank managers, like most corporate managers, generally seek to smooth reported profits because equity markets tend to reward steady profitability. Bank managers command a considerable array of devices to smooth reported profits, including setting reserves and recognizing capital gains on, for instance, real estate. If managers approximate current profits to sustainable profits by realizing gains in bad years and not doing so in good years, then stated profits may represent long-term earnings better than one might otherwise think.

A second factor mitigating the measurement problems associated with the cyclicality of profits is the apparent short-term horizon of most equity markets. If a firm has an unusually poor year, then equity markets might be expected to recognize that profits will recover in the future and to price the equity accordingly. In reality, equity markets appear to price shares largely on current performance. Evidence for this observation can be found in the fact that price-earnings ratios tend to be either noncyclical or even procyclical.[10]

Undercapitalization. Cost of equity can easily be overstated for an undercapitalized bank. If asset losses reduce a bank's equity to levels below international capital standards, the bank must reduce assets or issue new equity. A bank with $100 billion in assets but only $2 billion in equity, for instance, faces the choice of raising $2 billion in equity to meet the Basle standard or selling off $50 billion in assets. If new equity is issued, the current shareholders will share current earnings with the new owners; if assets are reduced, the current shareholders will lose the income earned by the assets. In either case, earnings per share are set to decline. Investors for their part should recognize the impending dilution of their claim or asset shrinkage and value the share in anticipation of reduced earnings per share. As a result, the current earnings in relation to market capitalization of an undercapitalized bank will tend to overstate its cost of equity.

The market value of a poorly capitalized bank is reduced for two reasons other than anticipated asset shrinkage. First, a poorly capitalized bank is riskier because it is highly leveraged. Second, the loss of value on a portion of a bank's assets raises questions about management. The effect of anticipated asset reduction on the market value of the bank is almost certainly greater than these other two effects since it represents a first-order effect—reduction in future profits—as opposed to just an increase in volatility of profit, a second-order effect. Thus, while it is often said that an undercapitalized bank has a high cost of equity because of its riskiness, it is probably more correct to say that the appearance of a higher cost of equity will

[10]Robert N. McCauley and Steven A. Zimmer, "Explaining International Differences in the Cost of Capital: the United States and United Kingdom versus Japan and Germany," Federal Reserve Bank of New York, Research Paper no. 8913, August 1989.

change as such a bank adjusts assets to equity.

Measuring the cost of equity

Reported profits of banks cannot be directly compared across countries because of different accounting practices, different economic conditions, and the interaction of the two. We make four separate adjustments to stated profits: an adjustment for the differential treatment of developing country debt by banks across the different countries, an adjustment to impose equity accounting on shares held by Japanese and German banks, an adjustment for the interaction of growth and inflation with banks' net nominal asset position, and an adjustment for discrepancies between stated depreciation charges and economic depreciation.

The income data adjusted are taken largely from the annual reports of banks in the sample. The banks in the sample are listed in Table 1. Summary measures of the adjustments appear in Table 2.

Loan loss reserves for developing country exposures. Losses on assets introduce greater difficulty in measuring a sustainable profit rate for a bank than for an industrial firm. When an industrial firm writes down assets, appraisers can refer to next best use or even scrap values. Valuing a substandard loan, by contrast, requires a judgment of the borrower's capacity to pay as well as any collateral asset value. Bank stock analysts as a result make larger errors in forecasting earnings than industrial stock analysts.

One can adjust for asset quality problems by lowering earnings over time after a problem becomes evident, as banks generally do and as we do below. As an alternative, one may restate earnings between the booking of an ultimately problematic loan and the emergence of the problem, so that an ex post appropriate reserve is built up beforehand.

The banks in this study all have significant claims on developing countries that have restructured their debts, and all have reported lower profits as a result of making

Table 1
Banks in Sample (by Country)

United States
Bank America Corporation
Bankers Trust New York Corporation
Chase Manhattan Corporation
Chemical Banking Corporation
Citicorp
First Chicago Corporation
J.P. Morgan and Company
Manufacturers Hanover Corporation
Security Pacific Corporation

Canada
Bank of Montreal
Bank of Nova Scotia
Canadian Imperial Bank of Commerce
Royal Bank of Canada

Switzerland
Credit Suisse
Swiss Bank Corporation
Union Bank of Switzerland

Japan
Bank of Tokyo
Dai-Ichi Kangyo Bank
Fuji Bank
Industrial Bank of Japan
Long-Term Credit Bank of Japan
Mitsubishi Bank
Sanwa Bank
Sumitomo Bank

Mitsubishi Trust and Banking
Mitsui Trust and Banking
Sumitomo Trust and Banking

United Kingdom
Barclays
Lloyds Bank
Midland Bank
National Westminster Bank

Germany
Commerzbank
Deutsche Bank
Dresdner Bank

Table 2
Summary of Adjustments to Cost of Equity
(Percentage Point Adjustments)

Period Averages 1984-90	United States	Japan	United Kingdom	Canada	Germany	Switzerland
Developing country	4.95	−0.18	0.60	0.86	0	0
Cross-holding	0	1.50	0	0	1.53	0
Depreciation	−1.51	−0.05	−2.88	−1.39	−0.64	−0.39
Net nominal assets	−1.16	−0.15	−0.23	−1.10	−0.67	−0.41
Total	2.28	1.13	−2.51	−1.63	0.22	−0.80
Developing Country Year by Year						
1984	−12.93	−0.71	−6.46	−11.91		
1985	−7.63	−0.72	−3.24	−6.85		
1986	−5.59	−0.24	−1.47	−3.81		
1987	54.19	0.15	7.44	18.61		
1988	−12.79	0.17	−1.00	0.07		
1989	20.06	0.32	8.32	8.47		
1990	−0.73	−0.25				

provisions for possible losses. The extent of reserving or charging-off of such developing country loans varies by country and by bank—with the extremes ranging from less than 50 percent reserved to 100 percent reserved. Part of the difference in reserving against losses reflects differences in portfolio composition, and thus performance, and differences in bank commitment to the relevant markets. Quite apart from such differences in composition and bank strategies, however, bank managements have reserved in accordance with their own outlook for servicing and with national norms, regulation, and taxation.

Increases in loan loss reserves reduce profits: banks that have reserved heavily against restructured developing country loans report, all other things being equal, lower profits than banks that have not reserved as heavily. To render bank profits more comparable, we attempt to impose a uniform profile of reserving against such loans. Reported profits are lowered in years that banks have reserved less than is indicated by the uniform profile; conversely, reported profits are raised in years that banks have reserved more than is warranted.

Although only uniform treatment of restructuring country exposures permits a comparison of bank earnings and thus of cost of equity for banks in the late 1980s, no definitive benchmark for reserving is available. We set the uniform reserve ratio by end-1989 toward the high end of international usage to reflect our understanding of German and Swiss practice. This approach is the most practical, because standards of disclosure for German and Swiss banks make it very difficult to restate their accounts to any other standard.

In our adjustment we restate profit flows as if the reserves were taken on an after-tax basis; that is, we assume that the bank gets a full tax break on all reserves. In reality the tax authorities in some countries, notably the United States and Japan, have not generally allowed their banks to reserve on an after-tax basis (see equations, Appendix A). The effect of national differences in tax treatment of developing country reserves is often overstated: if losses are in the event realized on such portfolios, U.S. and Japanese banks share their losses with their respective governments; if the loans provided against ultimately perform, additional income will be recognized and taxes will be paid. Thus, differences in tax treatment will ultimately prove to be differences of timing. The time value of early deductibility of potential loan losses is not trivial, but it should be noted that transactions such as debt-equity swaps serve to bring forward tax benefits.

The decline in the dollar since 1985 has tended to shrink the developing country debt problem for foreign banks. Because most of the claims on restructuring countries were denominated in dollars, successive rounds of reserving have cost foreign banks less. For instance, reserving against 5 percent of their troubled country claims cost eight Japanese banks an average of 27 percent of their net income in the year to March 1985. After the yen appreciated from 250 to the dollar in March 1985 to 124 in March of 1988, however, reserving against 10 percent of the same banks' restructuring country exposure cost them only 31 percent of their net income. The importance of the dollar-yen exchange rate to Japanese banks was underscored by market reports of Japanese banks' bidding for $1.3 billion to cover the loss of dollar assets entailed in the exchange of Venezuelan debt in December 1990.[11]

Cross-held shares. Banks in Japan, Germany, and Switzerland hold substantial equity stakes in commercial and industrial firms. The dividends from these shareholdings contribute to a bank's income, but the retained earnings associated with the shares do not. Retained earnings show up in earnings only when capital gains are harvested through the sale of shares.

Haphazard realization of capital gains can misstate income quite seriously. A bank may go for extended periods without realizing capital gains on its shares in order to delay payment of taxes. In this case the profits of the bank would be understated. We hold that, for the correct statement of income, retained earnings associated with bank shareholdings should be consolidated with the bank's income. In other words, retained earnings associated with shareholdings, as well as dividends actually received, contribute income in the long term.

We correct for this problem in two steps. The first step is to subtract from after-tax income the after-tax capital gains from equity realizations. The second step is to add the retained earnings associated with the shares (less effective income tax on the earnings) to after-tax income. For Japanese banks, the retained earnings rates used are taken from our earlier estimates for nonfinancial firms and reflect all other adjustments to stated profits (see equation in Appendix A).[12]

Although such an adjustment serves consistently to narrow the differences between price-earnings ratios of Japanese and U.S. industrial firms, it bears on the comparison of Japanese and U.S. banks in a markedly different way. Japanese banks traditionally resembled other Japanese firms in leaving long-held shareholdings on their books at cost. As a result, their profit on sale of equity holdings fell well short of the retained earnings

[11]Konosuke Kuwabara, "Dealers See Dollar Staying Close to the Level of ¥132," *Japan Economic Journal*, December 22, 1990, p. 22.

[12]Robert N. McCauley and Steven A. Zimmer, "Explaining International Differences in the Cost of Capital," Federal Reserve Bank of New York *Quarterly Review*, vol. 14 (Summer 1989), pp. 7-28.

associated with their shareholdings. As the shape of the international agreement on capital adequacy became clearer, however, Japanese banks stepped up their realization of gains on long-held shares, reportedly by selling and repurchasing shares so as not to disturb the pattern of cross-shareholdings.[13] City banks in particular stepped up their realizations since they had farther to go to meet the Basle standard. By 1988 and 1989, capital gains on shareholdings exceeded the retained earnings associated with cross-held shares by a wide margin and also accounted for a large portion of pretax income (Chart 3).

Thus, the dormancy of Japanese city banks' shareholdings into 1987 understated their earnings, but heavy turnover in the three years to March 1990 overstated earnings. Churning of the equity portfolio in these years masked weak earnings and built up shareholders' equity.[14] We hypothesize that bank managers accepted the tax costs of realizing the gains in order to show enough earnings growth to market their equity in quantity.

German banks appear to have realized gains on their holdings of equities in the late 1980s much less often than Japanese banks. So, even though the fraction of German equities held by German banks represents only about half the fraction of Japanese equities held by Japanese banks,[15] adjusting for cross-held shares

[13]Robert Zielinski and Nigel Holloway, *Unequal Equities: Power and Risk in Japan's Stock Market* (Tokyo: Kodansha International, 1991), p. 187.

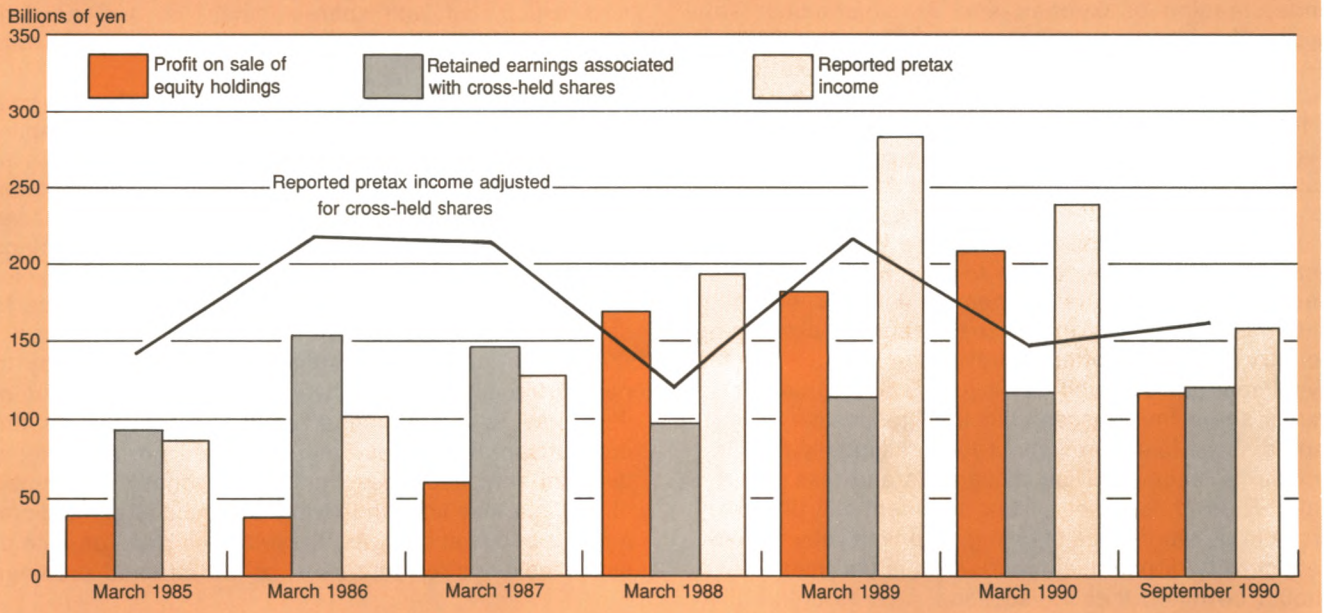
[14]Recognition of the real weakness of Japanese banks' earnings for five years is key to any assessment of the cost of equity through

Footnote 14 continued
the anticipated dividend yield. Any growth in dividends for the last five years does not proxy earnings growth but instead represents a rise in the effective payout ratio. For an application of the anticipated dividend method that concludes that the required return for Japanese banks is higher than that for U.S. banks, see Jack Glen and Richard Herring, "P/E Multiples: Comparative Evidence for Japan and the United States," University of Pennsylvania, August 1990 (processed).

[15]According to Claudio E.V. Borio, *Leverage and Financing of Non-Financial Companies: An International Perspective*, Bank for International Settlements, Economic Paper no. 27, May 1990, p. 30, German banks hold 8 percent German shares, although data on participations in unlisted firms are not available; Japanese banks hold 17 percent of Japanese shares. The shareholdings of the German banks may be more concentrated in the three sample banks.

Chart 3

Japanese Bank Earnings from Cross-held Shares



Sources: Profit on sale of equity holdings is from Nikkei Newsletter on Bond and Money for 1988, 1989, and 1990 and from Federal Reserve Bank of New York staff estimates for previous years; pretax income is from annual reports; retained earnings associated with cross-held shares are Federal Reserve Bank of New York staff estimates.

Notes: Chart plots averages of six city banks and two long-term credit banks. Results for the six months to September 1990 are doubled.

boosts the cost of equity as much for German banks as for Japanese banks in our sample period.

Swiss banks hold shares as well, but their standards of disclosure render it very difficult to know how much their reported incomes should be adjusted. Unlike Japanese banks, Swiss banks serve as market makers in their domestic stock markets, so they turn over at least some of their shares enough to realize capital gains and thereby to show retained earnings on shareholdings in their income statements. Moreover, because Swiss firms pay out more of their earnings than Japanese firms, the omission of retained earnings on crossheld shares produces less downward bias in earnings.

A first glimpse of the hidden wealth of a Swiss bank permits estimates to be made of the understatement of earnings and thus the cost of equity for Swiss banks. Union Bank of Switzerland disclosed hidden reserves of 2 billion Swiss francs at the end of 1989, as compared with reported shareholders' equity of 10.6 billion Swiss francs without the newly disclosed amount. The sources of income on the hidden reserves reported by the bank for 1989 connect the reserves to the bank's shareholdings: "premium income received from the exercise of conversion rights and warrants as well as the dividends on shares reserved for warrants."[16]

Three different ways of assessing the understatement of earnings associated with these heretofore unacknowledged post-tax retained earnings yield strikingly similar results.[17] Whether our estimates of the cost of equity are biased downward by undisclosed income of Swiss banks depends on the degree to which investors incorporate the hidden income in the price that they are willing to pay for the shares. If they have paid for hidden income, then our estimates understate the cost of equity by about 1 percentage point for Swiss banks.

Inflation-related adjustments. Adjusting stated profits to eliminate inflation effects will reveal a sustainable *real* rate of return. The first adjustment aligns the different time profiles of returns on real and nominal assets. A second adjustment removes the portion of a bank's earnings that simply maintains the real value of the shareholders' stake. Without the latter adjustment, Brazilian banks finish first in the bank profit league. In reality, income runs just to keep equity in place.

To see why the first adjustment is necessary, compare the income flows from a nominal and a real asset in inflation. A portion of the income flow from a nominal asset such as a bond merely compensates for the inflationary erosion of the real value of the principal. The income flow from a real asset such as real estate or equity represents a real return since inflation does not on average erode the value of the principal over time.

If a nominal liability funds a real asset of equal value held for two years in an environment of steady inflation and no asset price risk, then accounting flows at first understate income and then overstate income. In year one, the servicing cost of the nominal liability exceeds the receipt from the real asset by the inflation rate, and the position produces a loss. At the end of year two, however, the sale price of the real asset has increased with two years' worth of inflation and so exceeds the cost of retiring the nominal liability. This gain from inflation overwhelms the net servicing cost in the second year, and net income is reported. The investment shows no net profit over the two years, and indeed the theoretical net income each year is zero.

No problem arises with steady inflation and no asset growth. Inflationary gains on real assets find their way into the income statement either at sale or as the returns on the assets grow with inflation. As a bank grows, however, or as inflation varies, profits are misstated.

The effects of varying inflation and asset growth depend on the balance sheet of the bank. U.S., U.K., and Canadian banks tend to have more nominal assets than nominal liabilities; that is, they hold net nominal assets. German, Japanese, and Swiss banks, holding larger shares of real assets such as equities or leasable assets, have more nominal liabilities than nominal assets. This contrast reflects the different banking traditions: strictly commercial banking in the English-speaking countries as against a combination of commercial and industrial banking in the continental and Japanese economies, which industrialized later. Because of these differences, U.S., U.K., and Canadian banks tend to overstate profits if inflation rises or assets grow, while the other banks tend to understate profits under these circumstances.

The adjustment for the different time profiles of nominal and real assets takes two steps. To adjust for the misstatement of profit owing to shifting inflation, we subtract from stated earnings the product of the net nominal assets and the difference between the prevailing inflation rate and an average of the inflation rates over the life of the bank's real assets. To adjust for growth, we subtract from stated earnings the product of the inflation rate and the change in the net nominal position (see Appendix A for equation).

The second adjustment is both simpler and more important. With inflation, a bank's equity must grow with

[16]Union Bank of Switzerland, *Annual Report, 1989*, p. 22.

[17]UBS reported that the hidden reserves generated income in 1989 that amounted to 1.0 percent of the bank's market capitalization at end-1989 and 0.7 percent after taxes. If the heretofore undisclosed reserves grew at the 10 percent average annual growth rate shown by assets from 1979 to 1989, then undisclosed income would have ranged from 0.6 percent to 1.2 percent of market capitalization in 1984-89 and averaged 0.9 percent for the period. If the hidden reserves instead grew in line with reported shareholders' equity, then undisclosed income would have ranged from 0.4 percent to 1.3 percent in 1984-89 and averaged 0.9 percent of market capitalization.

the price level just to maintain its real value. The portion of a bank's retained earnings that suffices to hold constant the real value of shareholder equity does not contribute to real sustainable profits. Failing to reduce profits accordingly biases upward the apparent required profit rates of banks in high-inflation countries.

This adjustment is required only for that portion of shareholders' equity in excess of the bank's depreciable assets.[18] As described below, the adjustment for the difference between economic and stated depreciation accounts for the cost of maintaining the real value of assets subject to depreciation. So shareholders' equity less depreciable assets is multiplied by the inflation rate, and the product is subtracted from stated profits (see Appendix A for equation).

Depreciation adjustment. Stated depreciation charges differ from true depreciation for two reasons. Because depreciation is taken on the historical cost of the physical asset instead of its replacement cost, accounting depreciation charges understate true depreciation costs in an inflationary environment. In addition, the depreciation rates allowed for tax purposes may differ from physical depreciation rates.

To correct for the inflation bias, we first infer the age distribution of the bank's physical assets from past depreciation rates and then mark them to current prices by using cumulative gross national product price deflators. Depreciation on the repriced physical assets is substituted for the depreciation taken on the historically priced assets.

For U.K. banks, corrections were made to reflect the low depreciation rates on buildings in the 1980s that resulted from earlier tax provisions practically allowing the cost of buildings to be treated as an expense. For Japanese banks, corrections were also made to offset accelerated depreciation on some bank buildings.

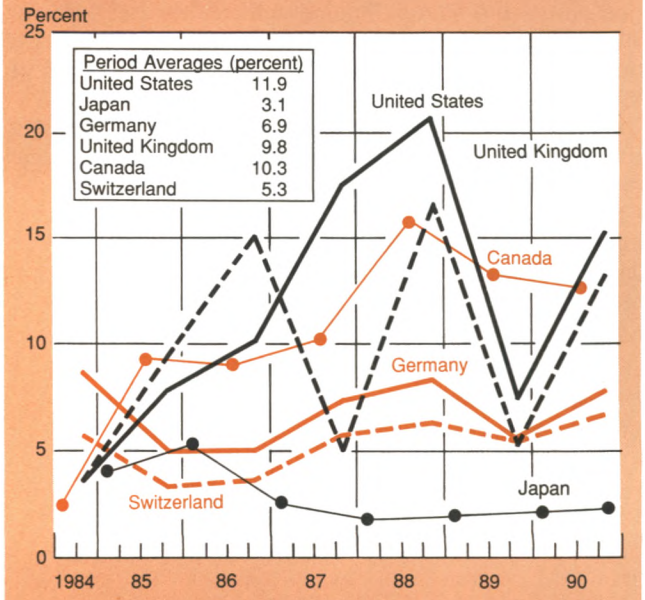
Results

The cost of equity for banks over the sample period 1984-90 varies markedly across countries (Chart 4).[19] In interpreting the figures, one should focus on period averages more than single years because the estimate can be biased for any given year in isolation. This is especially true for 1984 and 1985, when our adjustment for developing country reserves sharply reduces adjusted profits for U.S., U.K., and Canadian banks. For 1984-90 as a whole, equity markets in the United States, United Kingdom, and Canada burden banks with required returns of around 10 percent. German and Swiss banks face moderate equity costs in the 6 percent range, while Japanese banks enjoy very low equity costs of 3 percent.

Japanese bank share prices fell sharply in 1990, but Japanese banks' cost of equity remained low by international standards. The decline of Japanese bank share prices in the first quarter of 1990 only served to restore the cost of equity to its level of a year before. The further decline of Japanese share prices through September 1990, in conjunction with a half-year of flat reported earnings, raised the cost of equity by 1 percentage point in September to 3.1 percent. Even at this level, Japanese bank equity costs remained low in absolute or relative terms. The recovery of Japanese bank share prices in the fourth quarter brought down the cost of equity estimated for end-year. In retrospect, the decline in the cost of equity for Japanese banks in 1987-89 is somewhat surprising since bank stocks peaked in 1987 and have regularly underperformed the

Chart 4

Cost of Equity for Banks



Source: Federal Reserve Bank of New York staff estimates.

[18]For an approach that does not account for depreciable assets, see William M. Peterson, "The Effects of Inflation on Bank Profitability," in Richard G. Davis, ed., *Recent Trends in Commercial Bank Profitability* (New York: Federal Reserve Bank of New York, 1986), pp. 89-114.

[19]Data for U.S., U.K., Swiss, and German banks are from end-December, 1984-90; data for Japanese banks are end-March, 1985-90; data for Canadian banks are from end-October, 1984-90. Income data are partially estimated for 1990. Results for the United States and Britain do not include measures for Bank of America and Midland, respectively; both banks' real *and nominal* assets were shrinking over much of the sample period.

market since. The apparent inconsistency of falling share prices and falling cost of equity is resolved by noting both the weakness of earnings apart from capital gains and the substantial issuance of new shares.

The cost of lower tier 1 and tier 2 capital

The Basle Agreement permits internationally active banks to mix a variety of forms of capital with shareholders' equity in meeting the overall capital requirement of 8 percent against risk-weighted assets. Tier 1 capital can include not only common equity but also certain preferred shares. Qualifying as tier 2 capital are instruments and balance sheet items at the border of equity and debt: long-term preferred shares, revaluation reserves, general loan loss reserves, debt securities to be retired with equity, perpetual debt, and subordinated debt.

The following sections examine the cost of tier 1 preferred shares, tier 2 preferred shares, loan loss reserves, and subordinated debt. Tier 1 preferred shares appear quite cheap by comparison with common equity, although there may only be a market for these in New York. Over time, subordinated debt is likely to supplant loan loss reserves as tier 2 capital; national differences in subordinated debt costs suggest the importance of official support of banks to investors in bank capital instruments.

The cost of tier 1 preferred shares

Preferred shares are somewhat less costly than equity. This cost advantage reflects the lower risk and, in the United States, the exclusion of most preferred share dividend income from corporate taxation.

To qualify as tier 1, preferred shares must satisfy a stringent standard that has made them relatively rare in banking: they must be noncumulative. In other words, if a bank reaches the point where it eliminates its common share dividend and then eliminates its preferred share dividend as well, it does not promise to make good on the skipped preferred share dividend when and if it resumes paying dividends.

Barclays successfully marketed tier 1 preferred to U.S. investors in the summer of 1989 at a yield quite low by comparison with bank common equity costs. The yield to investors on the $180 million issue was 9.2 percent, and the cost to Barclays, payable out of post-tax income, was 8.2 percent.[20] This latter cost is comparable to subordinated debt costing 3.6 percent above LIBOR and implies a required spread on a corporate loan of roughly a quarter of that implied by British banks' cost of common equity.[21] It is little wonder that British banks are said to be looking to maximize the tax efficiency of such issues.[22]

An important advantage to a British bank of such equity is that it protects the bank's capital adequacy from exchange rate fluctuations.[23] When the pound sterling approached parity with the dollar at the end of 1984, British banks with very substantial dollar books watched their assets rise in relation to their sterling equity. With equity in dollars, dollar appreciation works to raise the sterling value of both assets and equity, so that the ratio of the two is more stable.

If noncumulative preferred shares are marketable in the United States but not abroad, foreign banks may enjoy an advantage over U.S. banks in hedging their capital adequacy. In the absence of a market for noncumulative preferred shares in nondollar currencies, U.S. banks could protect their capital adequacy from dollar depreciation only by taking a long position in the foreign currency. Such a position has the drawback, however, of introducing variability in earnings and capital even as it stabilizes the capital-asset ratio (see Box, p. 50).

The cost of tier 2 preferred shares

The development of the market for variable-rate preferred shares in New York provided banks with relatively inexpensive tier 2 preferred, at least under normal circumstances. For instance, on December 21, 1989, Morgan auctioned $250 million of cumulative preferred for periods of forty-nine to seventy-seven days with an interest rate of 6.75 percent.[24] This yield, payable out of after-tax net income, was equivalent to a deductible rate of about 2.4 percent above three-month LIBOR. The problem with auction-rate preferred, as some banks learned in 1990, is that under adverse circumstances, the bank can face the choice between watching the

[20]The wedge is introduced by the combination of the refundability under the U.S.-U.K. tax treaty of the Advance Corporation Tax, which integrates British corporate and investor income taxes, and the same treaty's withholding tax of 15 percent (*Barclays Bank PLC: Prospectus Supplement*, May 4, 1989, p. S3).

[21]The pretax, floating-rate equivalent cost to Barclays was 3.6 percent over LIBOR by the following calculation: $R/(1-t) - L$, where R (=8.156 percent) is the post-tax cost of preferred shares, t (=.35) is the British corporate tax rate, and L (=8.91) percent is the fixed-rate yield that can be swapped against LIBOR. Leveraged up twenty-five times, the required spread to cover this tier 1 equity would be about 17 basis points.

[22]Simon London, "Basle to Decide on Preference Capital," *Financial Times*, January 23, 1991, p. 15.

[23]Brian Pearse, Barclays' finance director, commented that "this issue as dollar-denominated capital will help insulate us—as a sterling-based bank—if the dollar suddenly appreciates further" (see John Evans, "Barclays to Issue Preferred Shares in US To Boost Capital, Reduce Currency Risk," *American Banker*, May 9, 1989, p. 3).

[24]J. P. Morgan, *Annual Report, 1989*, p. 47.

auction fail, paying a high rate, or retiring the preferred shares.

The cost of general loan loss reserves

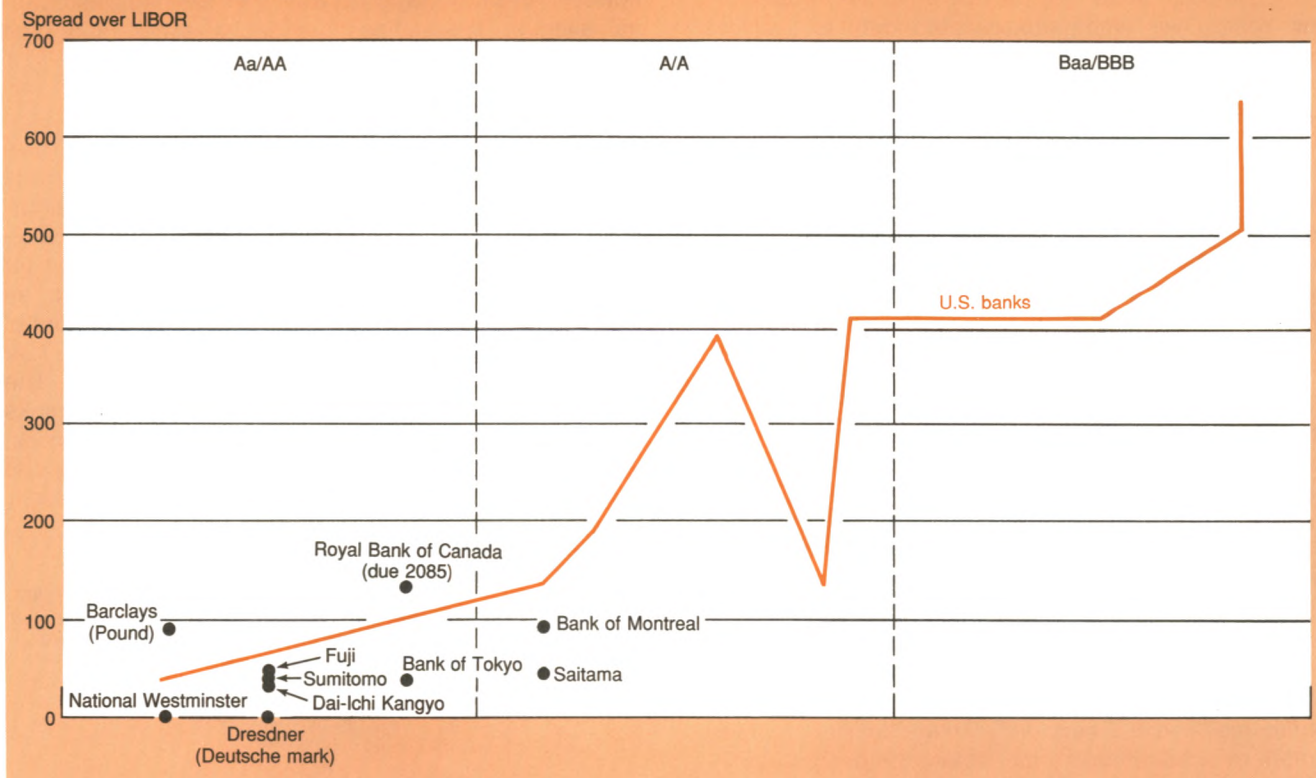
From some banks, general loan loss reserves will be very expensive; for others, they will be essentially costless. An addition to loan loss reserves usually comes at the expense of retained earnings, a component of shareholders' equity. As a result, the cost of general loan loss reserves may be taken to be as high as the cost of equity. (If a general loan loss reserve can be established out of pretax funds, then its cost is reduced by the time value of the early receipt of a tax reduction.) To the extent that a bank reserves for reasons other than meeting capital requirements (for instance, if regulators compel the bank to raise nonspecific reserves or if bank managers are simply underscoring their overcapitalization), then the reserves do not represent a marginal capital cost to the bank.

The cost of subordinated debt

The cost of subordinated debt varies systematically with the bond market's perception of the strength of a bank. Indicators of such strength include the ratings assigned by rating agencies. Plotting the yields (in relation to LIBOR) of fixed- and floating-rate notes in the Eurobond market and fixed-rate notes of U.S. banks trading in the U.S. corporate bond market highlights the premium that investors demand for accepting subordinated status (Chart 5). Nevertheless, four cautions are in order in interpreting these observations: ratings are not universally accepted as indications of bank strength, as evi-

Chart 5

Subordinated Debt Costs, November 1990



Sources: Association of International Bond Dealers; International Financing Review; Morgan Securities; Morgan Stanley.

Notes: For fixed rate bonds and notes, spreads over LIBOR equivalent to spreads over Treasury yields were calculated using appropriate midpoints of interest rate swap rates. Horizontal placement of observations within rating class reflects subdivisions of rating classes and any split in rating by agencies.

denced even by disagreements between rating agencies; yield information reflects indications by market-makers, rather than transaction prices; secondary market yields do not necessarily reflect rates obtaining on new issues; and these yields reflect a particular market environment, rather than an average of market environments.[25]

These qualifications aside, do banks from some countries enjoy an advantage in raising subordinated debt over banks from other countries? It appears that foreign banks' subordinated debt costs do not rise as quickly in response to lower ratings as the costs of U.S. banks. In Chart 5, foreign bank costs suggest a flatter curve than that described by U.S. banks' costs.

If foreign governments offer banks stronger support, then investors in bank bonds do not bear as much risk. (This interpretation is only strengthened by the rating agencies' practice of factoring into their ratings their perception of relations between banks and governments.) Since Continental Illinois, U.S. policy has regularly permitted bondholders of failed banks to take losses; foreign governments, by contrast, maintain ambiguous policies in this matter. In addition, banks with strong links to their industrial customers, including shareholdings, may enjoy a built-in market for subordinated debt that holds down debt costs at higher risk.

If these subordinated debt costs are taken to be representative of tier 2 capital costs, then tier 2 costs add anywhere from 1 basis point to 10 basis points to the equity cost of making a corporate loan. (Subordinated debt is capped at 50 percent of tier 1 capital but may account for 100 percent of tier 2 capital at the margin for some banks.) If a bank has to pay a pretax premium of 25 basis points for subordinated debt, then with a tier 2 requirement of 4 percent (1/25th) for a corporate loan, the bank needs to build another basis point into the loan spread before taxes. If a bank has to pay 200 basis points over LIBOR on its subordinated paper, it needs to charge an additional 8 basis points more before taxes to cover its tier 2 debt costs.

Cost of capital for financial products

Once bank managers have calculated their cost of equity, they can work out the spread or fee they must charge on individual products to cover their equity costs. If bank managers can identify the marginal source or relevant mix of tier 2 capital, then they can add its cost to the spread or fee needed to cover the cost of equity. Tier 2 capital costs are not included in capital costs as reported below.

[25]November 1990 was by no means a typical market environment for subordinated bank debt, but the sale by Japanese banks of subordinated debt in late summer 1990 permitted a wider set of observations.

The Basle Agreement has set the risk weight for each product as follows:

Product	Weight
Corporate loan	100 percent
Commitment to lend	50 percent
Interest rate swap	5 percent of notional amount plus 100 percent of positive mark to market value

These weights mean that a corporate loan absorbs shareholders' equity at the rate of 4 cents on the dollar, a commitment to lend absorbs at a rate of 2 cents per dollar, and an interest rate swaps absorbs 0.2 cents per dollar of contract initially. Given anticipated interest rate movements, the effective weight on the interest rate swap is more than double the initial weighting, so a bank should price a swap as if it absorbs 0.4 cents of equity.[26]

Cost of capital formulas for funded and unfunded products

Armed with an estimate of the cost of equity, the overall requirement of 4 percent equity, Basle risk weights, and corporate income tax rates, the bank manager can roughly calculate the required spread. The spread actually charged must be high enough so that, after the bite of income tax, the required return on the allotted equity is covered:

(1) spread * (1−tax rate) = cost of equity * risk weighting * 4 percent,

or $S * (1 - tc_t) = \text{COE} * \text{RW} * 0.04$.

Consider a corporate loan. If the tax rate is 40 percent and the cost of equity is 10 percent, then the required spread for the full weight loan would be 0.67 percent, or 67 basis points: spread * (1 − 0.4) = 10 * 1.0 * 0.04.

In reality, the determination of the cost of capital is slightly more complex because the bank is funding 4 percent of the loan with shareholder equity. The payment to equity is therefore the spread on the loan plus the real (net of inflation) after-tax return earned by investing the shareholder equity in a riskless asset. If the bank earns a positive (negative) real after-tax return from the investment of shareholder equity, then the required spread on its loans is narrowed (widened).

[26]The bank should anticipate an average amount of capital it will have to hold against the swaps. This average value reflects several different factors, including the volatility of interest rates, the length of the swap, and the term structure of interest rates. We estimate the average risk weighting of the ten-year interest rate swap to be 11 percent.

Although the more complete equation looks quite different,[27] the results are similar. If we assume the same parameters as earlier, and in addition assume an inflation rate of 5 percent and a riskless rate of 8 percent, then the required spread on the loan would be 71 basis points. A variation of this calculation for an unfunded product with a 100 percent risk weight, such as a standby letter of credit, shows the required fee to be 68 basis points.[28] Appendix B shows how tier 2 capital costs enter into the cost of capital for financial products, and Appendix C discusses the role of risk.

The role of taxes in bank cost of capital

Corporate income taxes play a rather different role in bank cost of capital than they do in cost of capital for nonfinancial firms. While corporate income taxes have an ambiguous effect on the cost of capital for nonfinancial firms, they clearly work to raise the cost of capital for financial firms. This difference results from the fact that financial assets are not physically depreciated and, to a lesser extent, from the way we define bank cost of capital.

Cost of capital for physical projects is defined as the real rate of return an asset must generate to cover the after-tax cost of the funds used to finance it. Corporate income taxes increase the pretax return that must be generated in order to meet a given after-tax return. At the same time, a high corporate income tax rate raises the value of the depreciation deduction and any investment tax credit that the firm can claim, and thereby reduces the required real rate of return. Moreover, the more leveraged a firm is, the less corporate income taxes work to raise required returns because of the tax deductibility of debt.

Generally, if the tax depreciation of an asset is slower than the physical depreciation of the asset, then the corporate income tax works to raise the cost of capital for the asset. If the tax depreciation of the asset is faster than the physical depreciation of the asset, then corporate income taxes may have no effect or may even reduce cost of capital, particularly if the firm is quite leveraged. In practice, the tendency of tax codes to permit physical assets to be depreciated faster than assets are losing economic value makes the cost of capital for physical projects less sensitive to corporate income tax rates.

Since financial assets do not depreciate, the corporate income tax raises the cost of capital by increasing the pretax rate a project must generate to meet a given required after-tax return. If the corporate income tax rises from 25 percent, a rate near the low, Swiss end of the spectrum, to 50 percent, a rate below the high, Japanese end of the spectrum, the cost of tier 1 capital rises by about 50 percent for a given cost of equity. By contrast, corporate income taxes do not directly affect the banks' cost of subordinated debt.

Since banks are highly leveraged, it would appear that their cost of capital should not be sensitive to corporate tax rates. Recall, however, that bank cost of capital is defined as a required spread or fee, and not as an overall interest rate. For example, consider a rise in the corporate tax rate that widens the required loan spread from 30 to 50 basis points. All other expenses aside, the bank needs to lend at a minimum of 8.5 percent instead of 8.3 percent at an interbank rate of 8 percent. Although this increase appears quite small, bankers compete in terms of spreads. Moreover, taxes show up directly in the required fee for products such as letters of credit and swaps.

Empirical results

Combining cost of equity estimates with equations 2 and 3 (see footnotes 27 and 28) produces the required spreads and fees on various financial products over the period 1984-90. The source of the various parameters is as follows: inflation is from the GNP deflator; the tax rate combines federal, regional, and local top-bracket corporate income tax rates; and the nominal interest rate is a riskless rate, approximated by an annual average of LIBOR less 1 percent.

We consider three different financial products: a standard corporate loan, a commitment to lend with a life greater than one year, and a ten-year dollar interest rate swap. The standard corporate loan—a funded

[27] (2) $0.96 * S * (1-tc_t) + 0.04 * \{ \frac{1+[r_t * (1-tc_t)]}{1+\pi_t} - 1 \}$
$= COE * RW * 0.04,$

where
S = required spread on loan (net of noninterest expenses)
tc_t = marginal corporate income tax rate at time t
r_t = riskless nominal interest rate at time t
π_t = inflation rate at time t
COE = cost of equity
RW = risk weighting.

[28] A variation of equation 2 applies to unfunded products such as letters of credit, commitments to lend, or swaps. The bank does not have to float debt to finance an unfunded product by definition, but equity is still required to underwrite the risk of the product. The proceeds from the required equity issue may be thought of as placed at the riskless interest rate. Unlike the spread on the loan, which is counted over the 96 percent portion of the loan financed by debt, the fee counts over the entire value of the project:

(3) $F * (1-tc_t) + 0.04 * \{ \frac{1+[r * (1-tc_t)]}{1+\pi_t} - 1 \} = COE * RW * 0.04$

where F = required fee on an unfunded project.

If we solve for equation 3 using the same parameters as in equation 2, we get 68 basis points as the required fee on a standby letter of credit, an unfunded project with a 100 percent risk weight.

financial product—is evaluated using equation 2, while the commitment to lend and the swap—both unfunded products—are evaluated using equation 3.

The required net spread on a corporate loan shows substantial variation across countries (Chart 6). A U.S., Canadian, or U.K. bank needs net spreads of 60 to 80 basis points while a Japanese bank needs only 10 basis points. It must be kept in mind that these spreads are net of all other expenses. If a U.S. bank has to allow 25 basis points for expected loan losses and another 25 basis points for providing and servicing the loan, then the bank will need a gross spread of about 130 basis points on the loan.

While the pattern of required fees on a commitment to lend in the different countries follows the pattern of spreads on the corporate loan, the results for the interest rate swap merit particular attention. The required annual net fee on this item is between 5 and 10 basis points for banks in the United States, United Kingdom, and Canada. Interest rate swap spreads can dip below 5 basis points. Thus, U.S., U.K., and Canadian banks cannot even earn enough on swaps to cover the cost of tier 1 equity. The problem is particularly acute when one recalls that cost of capital represents the net fee—after all expenses—required on the swap. Recent work by Zimmer indicates that a bank needs about 3 basis points to cover expected default losses on a ten-year interest rate swap.[29] Thus, even if we ignore compensation of the swap team and any overhead, a U.S. bank would need bid/ask spreads in excess of 15 basis points on interest rate swaps to cover the costs of capital and of expected defaults.

International taxation and bank cost of capital

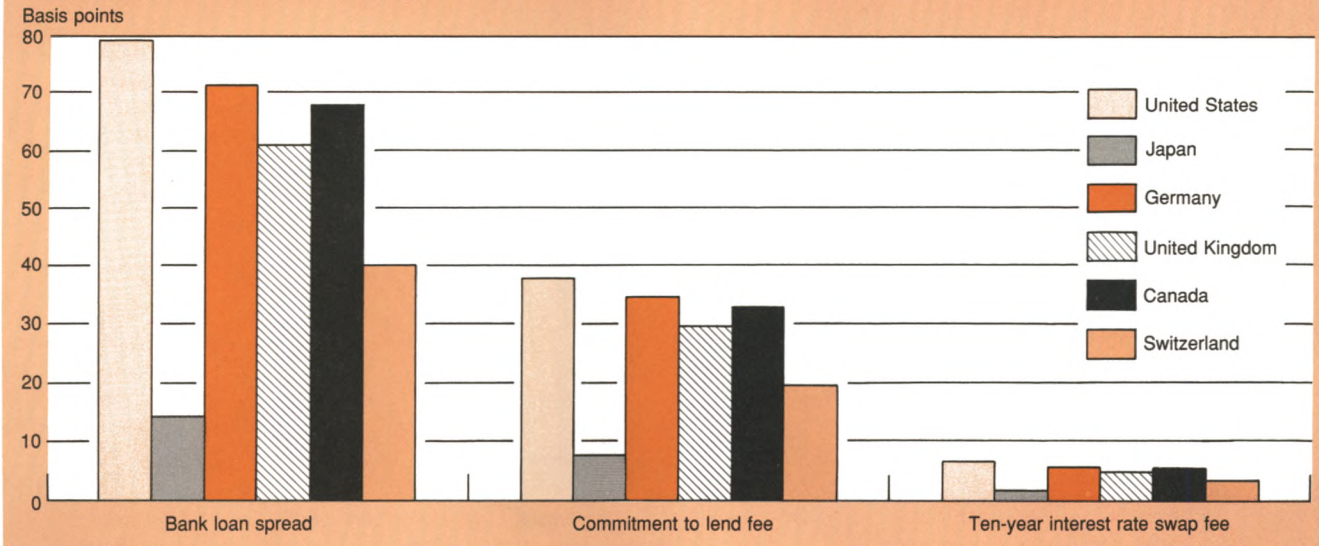
Internationally active banks generally go head to head in various markets, and such competition brings more than home country taxation into play. The cost of capital measures given in Chart 6 reflect U.S. taxes for U.S. banks, Japanese taxes for Japanese banks, and so on, and thus only apply to banks lending from their home country, whether engaged in home-court competition or in foreign lending from the head office. A multinational bank borrowing and lending in a number of markets must pay attention to a variety of tax codes. The interaction of tax codes, it turns out, tends to mitigate somewhat the benefits of hailing from a home country with low corporate taxes.

A multinational bank generally faces different effective corporate income tax rates in the different countries in which it does business. Since the cost of equity must be met after taxes, a single bank therefore faces differ-

[29]The calculation assumes that the swap is not netted. See Steven A. Zimmer, "Credit Risk in Interest Rate and Currency Swaps," Harvard University, 1988 (processed).

Chart 6

Spread or Fee Required to Cover Cost of Equity



Source: Federal Reserve Bank of New York staff estimates.

Note: Interest rate swap fee should be compared with one-half of swap spread as quoted in the market.

ent capital costs in different countries. As a result, the relation of capital costs for two banks from different countries varies across markets.

To assess the competitiveness of U.S. and German banks, for example, one cannot merely compare the cost of capital for a U.S. bank operating in the United States with the costs of a German bank operating in Germany. Consideration must also be given to the banks' capital costs in the same market, whether that market is the United States, Germany, Britain, or another country.

In calculating the effective tax rate for a bank in a foreign market we start with the corporate income tax payable at all levels of government in the foreign country. Next, for subsidiaries, we compute withholding taxes on dividends remitted, which tax treaties between pairs of countries lower from general rates of, for instance, 20 percent to 5 percent. Finally we factor in the home-country treatment of foreign taxes paid: some countries, such as the United States, give tax credits for a portion of the foreign tax paid (usually capped at comparable domestic taxes payable); other countries, such as Germany, exclude foreign source income from home-country taxation.[30] A bank may establish itself in a foreign market in the form of a branch or a subsidiary, and in general the tax rate differs by corporate form. Moreover, the taxation of a subsidiary's earnings depends on whether the subsidiary repatriates earnings or retains them.[31]

Cost of capital, or required spread, for a corporate loan thus depends not only on the cost of equity and taxes at home but also on taxes in the market served, the structure of tax treaties, and the corporate form of foreign operation (Chart 7 and Table 3). Each horizontal line in Table 3 represents a different market. For example, in the Japanese market (second line) a U.S. bank branch faces capital costs of 95 basis points as compared with 10 basis points for a Japanese bank, 55 basis points for a German branch, and 72 basis points for a Canadian branch.

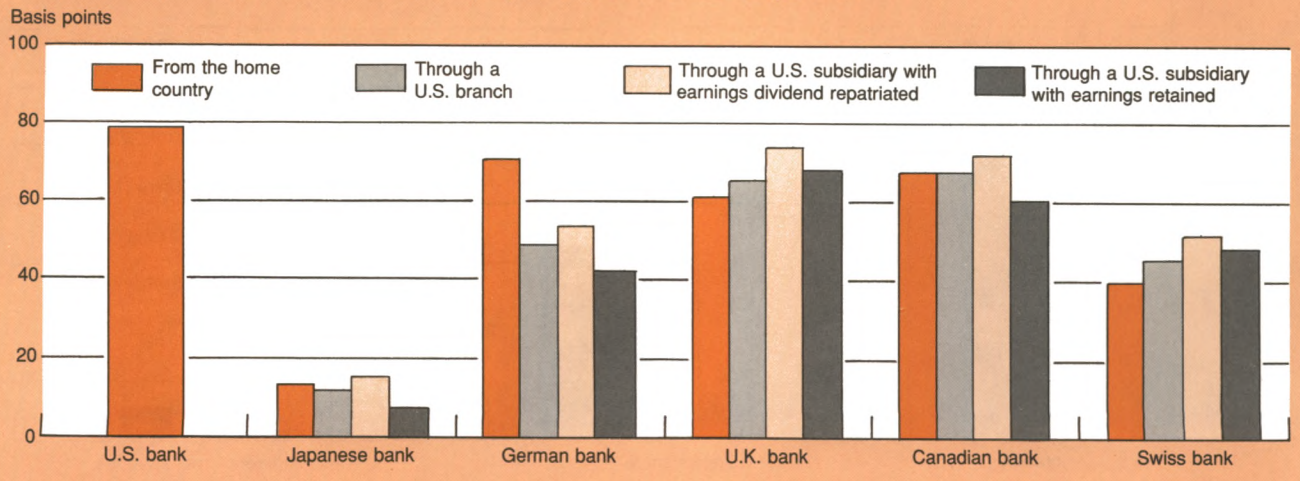
Same-market capital costs can tell quite a different story from home-market capital costs. Note that the table repeats our earlier finding that U.S. and German banks face capital costs of 76 and 65 basis points in their respective home countries. A German bank operating in the United States, however, faces capital costs of only 40 to 51 basis points; these figures bear compar-

[30]For general treatments of transnational taxation, see Julian S. Alworth, *The Finance, Investment and Taxation Decisions of Multinationals* (Oxford: Basil Blackworth, 1988); and Edmund Crooks, Michael Devereux, Mark Pearson, and Charles Wookey, "Transnational Tax Rates and Incentives to Invest," Institute for Fiscal Studies, Working Paper no. 89/9, October 1989.

[31]For instance, Bankers Trust reported in 1989 that it is saving U.S. taxes by not repatriating foreign earnings (about 25 percent of its shareholders' equity takes the form of undistributed earnings of certain foreign subsidiaries) and that federal taxes amounting to about 4 percent of shareholders' equity would have to be provided for, even after foreign tax credits, were the earnings not "permanently reinvested outside the United States" (*Annual Report, 1989*, p. 40).

Chart 7

Spread Required to Cover the Cost of Equity on a Loan to a U.S. Corporation



Source: Federal Reserve Bank of New York staff estimates.

ison with the 76-basis-point cost for a U.S bank operating at home (Chart 7). Conversely, a U.S. bank faces capital costs of 100 to 119 basis points in Germany, as compared with the 65-basis-point hurdle for a German bank operating at home.

The general result is that national differences in corporate tax rates tend to be flattened somewhat in cross-border operations by virtue of the interaction of national income tax codes and withholding taxes. In particular, banks from low-tax countries invariably face higher tax rates on their foreign operations. As a consequence, the usefulness of tax policy as a tool for reducing the U.S. disadvantage in cost of capital for banks competing abroad is limited. (See Box for related point.)

Note that the computed capital costs neither compel choice of corporate form nor exhaust relevant tax considerations. For example, British banks use both branches and subsidiaries in their U.S. operations despite the apparent advantage of branches. Further, it should be pointed out that effective tax rates do not reflect important aspects of certain tax systems. For example, the U.S. and Japanese tax systems both give tax credits for foreign income taxes paid up to the amount of domestic taxes payable on foreign income. For Japanese banks, however, the maximum credit for foreign taxes is based on worldwide income, while for U.S. banks foreign tax credits can only be applied to income earned in separate income "baskets"—a condition that restricts use of high withholding taxes levied by developing countries such as Brazil and Mexico.[32] In addition, Japanese banks can carry foreign tax credits forward and back three years, while no such provision exists for U.S. banks.

[32]A transition rule was provided for interest on loans to thirty-three troubled debtor countries. See Peat Marwick and Bank Administration Institute, *The Banker's Guide to the Tax Reform Act of 1986* (Rolling Meadows, Ill.: Bank Administration Institute, 1986), pp. 88-92.

Explaining international differences in bank cost of capital

These measures of the cost of equity are broadly in line with those of our earlier study of the cost of capital for industry in four countries.[33] The similarity suggests that the reasons adduced for differences in the cost of equity for nonfinancial firms may well carry over for banks. This section explores the relevance of the factors investigated empirically in the earlier study. In addition, it considers whether the particular risk features of banks introduce new sources of cross-country differences.

Macroeconomic and macrofinancial differences

Income tax differences do not explain international differences in bank cost of capital. Differences in household savings, macroeconomic stability, and relations among corporations, banks, and governments are consistent with observed differences in bank cost of equity.

Bank income taxes. Bank income taxes can exert a powerful influence on the cost of capital for banks, but international differences in bank income taxation offer very little help in making sense of international differences in bank cost of capital. The power of taxes is illustrated by Table 3, while the inadequacy of taxes as an explanation emerges from the broad similarity between country differences in the cost of capital (Table 3) and country differences in the cost of equity (Chart 4). In fact, if we consider average tax rates,

[33]See McCauley and Zimmer, "Explaining International Differences," *Quarterly Review*, for measures and empirical evidence supporting our explanations.

Table 3

Required Spreads on a Corporate Loan in Various International Markets

Branch / Subsidiary: Earnings Repatriated / Subsidiary: Earnings Retained

(In Basis Points)

	Home Country of Parent Bank					
Location of Market	United States	Japan	Germany	United Kingdom	Canada	Switzerland
United States	76	9 / 11 / 5	46 / 51 / 40	63 / 73 / 67	65 / 69 / 59	44 / 50 / 47
Japan	95 / 90 / 109	10	55 / 59 / 51	75 / 101 / 87	72 / 89 / 76	52 / 67 / 59
Germany	119 / 107 / 100	12 / 17 / 16	65	90 / 99 / 112	86 / 87 / 98	62 / 66 / 74
United Kingdom	68 / 76 / 76	9 / 10 / 3	43 / 36 / 36	59	65 / 65 / 51	41 / 38 / 42
Canada	82 / 95 / 102	10 / 13 / 7	58 / 56 / 44	75 / 87 / 74	65	55 / 63 / 51
Switzerland	62 / 76 / 76	9 / 10 / 2	40 / 41 / 32	59 / 59 / 52	65 / 65 / 46	38

Source: Federal Reserve Bank of New York staff estimates.
Note: Required spreads are computed on the basis of 1984-90 average cost of equity, interest rates, inflation, and 1990 tax rates.

Box: Implications of Currency Positioning of Shareholder Equity

In this Box we consider how the cost of capital for a bank's foreign affiliate depends on the net foreign exchange exposure of the affiliate. The calculations for Table 3 embody the assumption that the foreign affiliate has no foreign exchange exposure. In other words, the affiliate matches its foreign currency assets with funding in foreign currency liabilities, and the excess of assets over liabilities (shareholder equity) that supports the assets is held in the home currency. The bank invests shareholder equity in home-currency assets and therefore obtains a return on it that reflects home-country interest and inflation rates.

An argument can be made that the foreign affiliate should hold a long position in the foreign currency equal to 4 percent (required tier 1 capital ratio) of foreign assets in order to maintain the ratio of shareholder equity to assets in the face of foreign exchange movements. The drawback of such a position, of course, is that it ultimately represents a currency exposure to the parent, an additional source of volatility to earnings and shareholder wealth.

The question whether a foreign affiliate should take a long foreign exchange position in proportion to foreign assets is of more than theoretical interest. International capital standards requiring banks to hold capital against open foreign exchange positions are under negotiation. If international bank regulators decide that a long foreign exchange position in proportion to foreign currency assets represents an open foreign exchange position, then foreign affiliates will have an incentive to square foreign exchange positions and to hold shareholder equity in home-currency assets.

Since the question is still unresolved, we recalculate Table 3 on the assumption that the foreign affiliate holds a proportional long foreign position. The table below shows that the required spreads faced by many banks change because a bank that invests in a low-inflation currency tends to earn a higher *real after-tax* rate of interest† on riskless debt. Since the bank is assumed to invest shareholder equity (excess of assets over liabilities) in riskless debt, the higher real after-tax rate of return earned on the debt works to reduce the loan spread needed to cover the required return on equity. Thus, banks from high-inflation countries such as Canada can lower the cost of capital to affiliates in low-inflation countries by holding proportional shareholder equity in the low-inflation currency. Similarly, foreign affiliates of banks from low-inflation countries such as Japan and Switzerland encounter higher capital costs from holding proportional shareholder equity in high-inflation currencies.

In calculating the required spreads for the table, we implicitly assume that the parent bank defers realizations of foreign exchange gains and losses on the open position of the affiliate (typical for nonrepatriated earnings). Immediate realization would tend to shift the required spreads toward those in Table 3 in the long run. This shift arises from the tendency of a low-inflation currency to appreciate over time and thereby to increase the tax liability of the parent bank.

†The real after-tax rate of interest is roughly defined as {nominal interest rate · (1-tax rate)} – inflation rate. Since real interest rates across the countries are similar over the period considered, and since a bank's foreign affiliate faces the same tax rates in either currency, inflation is the prime determinant of the real after-tax rate of interest facing the bank.

Required Spreads on a Corporate Loan in Various International Markets: Proportional Long Position in Foreign Currency

Branch / Subsidiary: Earnings Repatriated / Subsidiary: Earnings Retained

(In Basis Points)

	Home Country of Parent Bank					
Location of Market	United States	Japan	Germany	United Kingdom	Canada	Switzerland
United States	76	21 / 25 / 15	50 / 54 / 41	59 / 66 / 62	71 / 76 / 65	26 / 33 / 30
Japan	82 / 79 / 94	10	45 / 48 / 42	60 / 75 / 66	68 / 80 / 70	21 / 34 / 28
Germany	114 / 106 / 97	24 / 30 / 28	65	83 / 85 / 94	93 / 90 / 100	37 / 44 / 50
United Kingdom	72 / 81 / 81	28 / 31 / 15	54 / 40 / 40	59	78 / 78 / 62	27 / 25 / 29
Canada	76 / 86 / 96	16 / 22 / 11	57 / 52 / 39	61 / 72 / 61	65	22 / 39 / 27
Switzerland	78 / 93 / 93	37 / 40 / 25	55 / 59 / 48	71 / 71 / 65	88 / 88 / 69	38

Source: Federal Reserve Bank of New York staff estimates.
Note: Required spreads are computed on the basis of 1990 tax rates and 1984-90 average cost of equity, interest rates, and inflation.

Japan and Germany tax banks quite heavily, while U.S. banks bear a tax burden more like that imposed by low-tax Switzerland.[34]

Household savings. Higher household savings rates in Japan, Germany, and Switzerland, perhaps reinforced by lower household access to bank credit, serve to lower equity costs for banks in these countries. However much the mobility of capital across borders has integrated debt markets, equity markets remain sufficiently distinct to allow differences in national savings behavior to assert themselves in the valuation of internationally comparable income streams.

Stability of growth. The particularly low equity costs for Japanese banks can be ascribed in part to the success of policy in smoothing growth. Japan's economy has grown markedly more steadily in the 1980s than the U.S., German, or British economies. Banks with heavy exposure to equity prices and high-leverage firms may particularly benefit from stabilization policy, which in the case of Japan works against a backdrop of adaptive corporate responses to economic challenges.

Relations between banks and corporations. Industrial organization in Germany and Japan tends to lower risk premia on the debt of industrial firms and to permit higher leverage at lower distress costs than would be entailed in the United States, Canada, or the United Kingdom. Close links between bankers and borrowers in Germany and Japan may also serve to lower capital costs for banks. The mixture of debt and equity claims on bank customers may spread risk, improve information flows, and facilitate bank influence over troubled debtor firms in ways that make German and Japanese bank shares more attractive to investors. These considerations are complementary to, but distinct from, the tax advantages of bank shareholding, especially in the presence of inflation. In addition, banks with close links to corporations may benefit from insensitivity of subordinated debt costs to bank risk.

Close links with corporations and other financial institutions served Japanese banks well in 1987-89, when the banks raised more equity than any other industry in Japan. By one count, the city banks raised the equivalent of $43 billion, including convertible issues, and each city bank in our sample raised between $3 billion and $6 billion equivalent.[35] Listings of the ten largest shareholders of, for instance, Sumitomo and Mitsubishi in March 1989 and March 1990 reveal the usefulness of reciprocal shareholdings. Over the fiscal year Sumitomo increased its outstanding shares by over 10 percent and Mitsubishi by over 7 percent. Yet the top ten shareholders remained in the same order for each bank, and indeed the stake of the top ten declined only 0.48 percent from 27.96 percent for Sumitomo and 0.72 percent from 29.00 percent for Mitsubishi.[36]

Capital constraints and financial deregulation may be straining the cross-holding pattern. Industrial firms among Sumitomo's and Mitsubishi's top ten shareholders did a bit better than the life and casualty insurers in taking up their share of new issues. Moreover, according to a news report in early April 1990, representatives of life insurers were letting it be known that they had had their fill of bank shares and could not be counted on to absorb any more.[37]

Relations among banks, corporations, and governments. Government policies to spread the costs of corporate distress beyond the immediately affected parties reduce the potential for losses by banks and their shareholders. If antitrust, trade, and industrial subsidy policies bolster distressed industries and firms in Germany and Japan more predictably than in Britain, Canada, and the United States, then investors in bank shares may face less risk and be willing to pay more for a given earnings stream.

Bank-specific factors

A puzzle arises from the comparison of the cost of equity for industry and banks in the United States, Japan, and Germany (Table 4). U.S. banks confront equity costs above those of U.S. industry, while Japanese and German banks enjoy a lower cost than those of Japanese and German industry, respectively. Why do Japanese and German banks seem to enjoy cheaper equity than their industrial customers?[38]

Risk, deposit insurance, and the cost of equity. The higher leverage characteristic of banks relative to industrial firms would seem at first glance to make banks more risky than their corporate customers. Higher leverage makes for more risky equity, and investors may be expected to demand a higher rather than a lower rate of return for bearing the extra risk. But deposit insurance

[34]Economic Advisory Committee of the American Bankers Association, *International Banking Competitiveness and Why It Matters* (Washington, D.C.: American Bankers Association, 1990), pp. 16 and 84.

[35]Zielinski and Holloway, *Unequal Equities*, pp. 184-6.

[36]Annual reports.

[37]"Major Life and Casualty Insurance Companies Selling Large Quantities of Stocks Formerly Considered 'Stable Long-Term Holdings,' Centering on Bank Stocks, in Response to Falling Markets," *Nikon Keizai Shimbun*. April 2, 1990, p. 1.

[38]Market misapprehension of the effect of inflation does not seem to resolve the puzzle. Inflation delivers unaccounted income to industry but gives a spurious boost to bank earnings. Investors' misunderstanding of the effects of inflation, therefore, would tend to raise industrial equity costs relative to bank equity costs. Yet industrial equity costs are higher relative to bank costs in the lower inflation economies of Germany and Japan.

in law and in practice allows a bank to operate at considerable risk without paying the price in the debt market that an industrial firm would pay.

Government support for bank debt funding reduces the downside risk of holding bank equity. A commercial or industrial firm that suffers losses large in relation to equity finds itself on a downward spiral as the heavier risk premia on debt put a greater burden on the firm's cash flows. A bank's debt costs rise much less quickly in response to loss of firm net worth. The value of government support for banks, in other words, rises precisely in bad times, and thereby reduces earnings volatility.

Differences in official safety nets. Differences in the strength and coverage of official safety nets may lower bank equity costs abroad in relation to industrial equity costs. As argued above, the cost of U.S. bank subordinated debt rises sharply as ratings are lowered, while foreign banks' subordinated debt costs seem much less responsive to ratings. The greater sensitivity of U.S. debt costs is understandable in light of losses that holders of U.S. bank holding company bonds have suffered in bank failures since the failure of Continental Illinois.

That the authorities in foreign countries rely less on market discipline on banks[39] finds expression not only in subordinated debt costs but also in equity costs. Lower sensitivity of subordinated debt costs to bad news itself limits earnings volatility and thereby lowers risk to equity holders. Moreover, less reliance on market discipline means that bank customers take their business elsewhere more slowly in response to bad news, so that once again bank earnings show less volatility. The recent experience of shareholders in large foreign banks has no parallel to the total loss of share value incurred by shareholders of Continental Illinois. Whether a government comes to the aid of an ailing bank itself or organizes a private sector rescue, shareholders in the rescued bank face less downside risk.

Are U.S. banks just riskier? Some observers would reject the explanations offered and contend that U.S. banks pay more for their equity because U.S. banks are simply more risky. At the extreme, this argument could posit a single international schedule relating bank cost of equity to risk, with the higher cost of equity faced by U.S. banks simply reflecting their greater risk. One could try to measure bank risk by measuring asset riskiness and leverage, but the difficulty of doing so is quite daunting. First, the relation of asset risk and leverage to bank risk is mediated by the official safety net. Second, as noted earlier, it is difficult in practice to separate the effects of asset risk and leverage from the conceptual problem of measuring cost of equity for an undercapitalized bank.

To understand the measurement problem, consider the claim that U.S. money center bank assets are more risky than their German and Japanese counterparts. This claim must be reconciled with the fact that German, Japanese, and even Swiss banks hold much larger equity positions—equities and participations—than do U.S. banks (Table 5). The decline in the Tokyo stock market in 1990 provided a reminder of how a sharp market downturn can reduce the value of bank assets and capital.

Direct measures of the market risk of bank equities do not suggest much link between the relative cost of equity and risk. Returns from U.S., Japanese, German, and British banks, at least, tend to match those of the Standard and Poor's 500, Nikkei, Commerzbank, and *Financial Times* indexes, respectively (Table 6).[40] U.S. banks' shares do seem quite a bit more risky than the

[39]Statement of E. Gerald Corrigan in *Deposit Insurance Reform and Financial Modernization,* Hearings before the Senate Banking Committee, 101st Cong. 2d sess. (Washington, D.C.: GPO, 1990) pp. 3-109.

Table 4
Comparison of Cost of Equity for Industry and Banking

(Percent)

	Period Averages		1984-88 Only	
	Industry	Banking	Industry	Banking
Germany	9.8†	6.9	7.8†	6.9
Japan	6.7	3.0	4.5	3.2
United States	10.5	11.9	11.2	12.0
United Kingdom	10.6	9.9	6.4	10.0

Source: Federal Reserve Bank of New York staff estimates.
Note: Period is 1977-88 for industry and 1984-1990 for banking.
†German industrial cost of equity includes estimated cross-holding adjustment not incorporated in McCauley and Zimmer, "Explaining International Differences," *Quarterly Review.*

[40]Use of the Tokyo Stock Price Index (TOPIX) rather than the Nikkei index did not materially affect the Japanese bank betas. Further, addition of a bond return variable did not materially affect either the U.S. or Japanese bank betas. The results for Japan are consistent with an analysis of daily returns in 1984-86 by Richard H. Pettway, T. Craig Tapley, and Takeshi Yamada, "The Impacts of Financial Deregulation upon Trading Efficiency and the Levels of Risk and Return of Japanese Banks," *Financial Review*, vol. 23 (August 1988), pp. 243-68; the results contradict the analysis of annual returns by Edward J. Kane, Haluk Unal, and Asli Demirguc-Kunt, "Capital Positions of Japanese Banks," in *Game Plans for the '90s, Proceedings of the 26th Annual Conference on Bank Structure and Competition* (Chicago: Federal Reserve Bank of Chicago, 1990), pp. 509-35. Our results for the U.S. money centers are consistent with Haluk Unal and Edward J. Kane, "Two Approaches to Assessing the Interest Rate Sensitivity of Deposit Institution Equity Returns," in Andrew Chen, ed., *Research in Finance*, vol. 7 (1988), pp. 113-37.

overall stock market only in 1990, a year in which the U.S. economy entered a recession. Indeed, U.S. bank share prices exaggerated the movement of general U.S. share prices most markedly in late 1990, as the economy contracted. By contrast, in 1986, a recession year for the Japanese economy, Japanese bank stocks seem, if anything, less risky than the market. This contrast is consistent with foreign banks' enjoying lower downside earnings volatility as a result of stronger official safety nets and, in some countries, industrial organization.

The limits of equity-market arbitrage

If equity costs are lower in Tokyo, why do firms from other countries not raise equity there? The experience of U.S. firms that have listed their shares in Tokyo shows that the mere exchange trading of shares in Tokyo does not result in share valuations different from the New York norm. Public offerings of shares in Tokyo by U.S. firms' Japanese subsidiaries or joint ventures, however, suggest that earnings streams *in Japan* as well as the earnings of Japanese firms were priced at

Table 5

Equity Shareholding by Banks in Japan, Germany, and the United States

(Percent)

	Book Value of Equity Securities Held as a Share of Bank's Book Shareholder Equity	Market Value of Equity Securities Held as a Share of Bank's Shareholder Equity Adjusted for Unrealized Gains on Equities	Market Value of Equity Securities Held as a Share of Total Assets
United States	11.7	11.7†	0.55
Japan	125.2	107.0	11.00
Germany	35.1	57.9	3.81
(including book value of equity participations)	(75.3)	(83.5)	(5.37)

Sources: Annual reports; Federal Financial Institutions Examination Council, Call Reports; International Bank Credit Analysis; *Nikkei Newsletter on Bond and Money*; Stephen Lewis, "German Banks' Ten-Month Results—A Solid Performance," *Salomon Brothers Germany Equity Research*, December 19, 1990; Federal Reserve Bank of New York staff estimates.

Notes: Data cover sample banks for Japan and Germany; data for U.S. average cover six sample banks in the second Federal Reserve district. Data for Japan are from March 1990.

†Book value of equity securities held is taken as a proxy for market value because of recent acquisition and high turnover.

Table 6

Relation of Bank Share Returns to Returns on Respective Market Indexes in Four Countries

	U.S. Money Center Banks			Japanese City Banks			German Gross Banks			U.K. Banks		
Period	Beta	Standard Error	R^2	Beta	Standard Error	R^2	Beta	Standard Error	R^2	Beta	Standard Error	R^2
1986-90	1.14†	0.067	.52	.92	.084	.32	1.03	.037	.75	1.01	.053	.57
1986	1.12	0.16	.52	.75	.15	.34	1.28†	.088	.81	1.10	.21	.35
1987	1.07	0.10	.70	1.40	.27	.35	.94	.052	.87	.97	.084	.73
1988	.92	0.13	.50	.68	.17	.25	1.20†	.093	.77	.67†	.12	.37
1989	1.16	0.20	.40	.37†	.18	.08	.89	.10	.60	1.11	.11	.66
1990	1.52†	0.23	.47	.82	.16	.39	.95	.094	.67	1.20	.13	.64

Sources: Standard and Poor's, Daiwa, Deutschebank, and *Financial Times*.

Notes: Data are weekly. Market indexes are Standard and Poor's 500 and Nikkei, Commerzbank, and Financial Times 100 indexes. Standard and Poor's money center bank index is a capitalization-weighted average of the share prices of Bankers Trust, Chase Manhattan, Chemical, Citicorp, Manufacturers, and Morgan. City bank index is a capitalization-weighted average of all thirteen city banks' share prices. Gross bank index is a capitalization-weighted average of the share prices of Commerzbank, Deutsche, and Dresdner. Financial Times bank index is a capitalization-weighted average of the share prices of the four sample banks plus Abbey National, Bank of Scotland, Royal Bank of Scotland, Standard Chartered, and Trustee Savings Bank.

†Betas are significantly different from 1 on a two-tailed test at 5 percent significance.

high multiples.[41] Whether U.S. financial firms with substantial presence in Tokyo could float equity in their Japanese subsidiaries at favorable prices is not clear.

Implications of the cost of capital disadvantage of U.S. banks

The measured cost of capital disadvantage of U.S. banks offers a simple account of U.S. banks' loss of market share at home and abroad as displayed in Chart 1. U.S. bankers would have had to offset relatively high capital costs with *much* better risk assessment or cost control to have maintained their share of corporate loans.

Bank strategies do not really offer an alternative explanation for U.S. banks' loss of market share. If U.S. bankers came to view wholesale lending as a commodity business not worth room on their balance sheets, then they would quite consistently shift their strategies toward consumer lending or reorient their corporate business to origination and risk management products. Such strategies, however, can be considered adaptations by banks burdened with high capital costs.

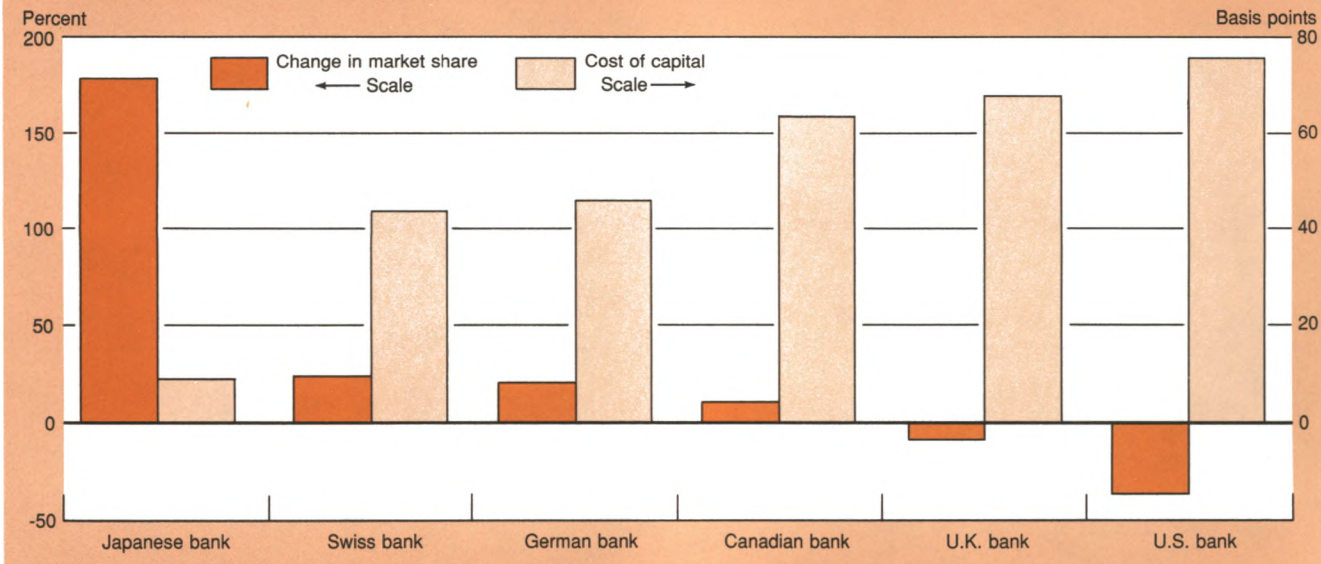
A more detailed look at commercial lending in the United States reinforces the connection between competitive outcomes and capital costs in the late 1980s. Here we consider only loans booked in the United States to commercial and industrial firms in the United States and take no notice of loans to U.S. businesses booked abroad, despite their importance, because it is not possible to decompose them by the nationality of foreign bank. The percent change in market share of sample banks from the six countries, that is, the share in March 1989 as a percentage of the share in March 1984, shows quite marked differences. Japanese banks almost tripled their share, Swiss and German banks showed substantial gains, Canadian banks slightly increased their shares, British banks lost market share somewhat, and U.S. banks suffered a 36 percent loss of market share (Chart 8). Banks with low capital costs gained market share at the expense of banks with high capital costs.

That foreign banks gained even more market share in the standby letter of credit (L/C) market than they did in commercial lending offers further evidence for the importance of capital costs in wholesale banking com-

[41]See Ted Fikre, "Equity Carve-outs in Tokyo," in this issue of the *Quarterly Review*.

Chart 8

Change in Market Share in Commercial Lending to Firms in the United States, 1984-89, and Cost of Capital for U.S. Loans



Source: Federal Financial Institutions Examination Council, Reports of Condition, as analyzed by George Budzeika, "Competitiveness in Commercial Lending in the United States," Federal Reserve Bank of New York working paper, appendix.

Note: Cost of capital bars show weighted average of the required spread for branch and subsidiary commercial loans, where weights reflect shares of commercial loans booked in branches and subsidiaries by each country's banks in 1989.

petition in the late 1980s. In the standby L/C market a bank sells a contract to pay a maturing obligation of a company or a municipality should the issuer fail to pay. Having paid for this contract, lower quality companies and state and local government agencies can raise money by selling commercial or municipal paper because buyers regard the writer of the standby L/C as the ultimate obligor. Unlike a commercial loan, a standby L/C is not funded under normal circumstances: the issuer usually retires the obligation that the bank

Table 7
Market Shares in Standby Letters of Credit

	Commercial Paper (Percent)				Industrial Revenue Bonds (Percent)	
	1985		1989		1985	1989
Sample Banks from	Number	Amount	Number	Amount	Number	Number
Canada	1	1	3	3	2	2
Germany	1	1	2	1	0	0
Japan	18	18	39	42	12	21
Switzerland	11	6	8	9	5	7
United Kingdom	11	10	7	6	13	10
United States	34	34	10	7	38	20
Memo:						
All U.S. Banks	51	57	18	14	59	43

Source: *Moody's Global Short-term Market Record,* as analyzed by Pat Wertman, "Letter of Credit Enhancement of Commercial Paper Issues: A Case Study of the Competitiveness of U.S. Banks," Federal Reserve Bank of New York working paper, January 1991.
Note: Data are for third-quarter 1985 and 1989.

Chart 9
U.S. and Japanese Bank Stock Indexes

Sources: Standard and Poor's index of share prices of Banker's Trust, Chase Manhattan, Chemical, Citicorp, First Chicago, Manufacturers Hanover, and J.P. Morgan; Daiwa Securities data on Japanese bank share prices.

Note: Japanese index is a capitalization-weighted index of share prices of twelve Japanese city banks.

has in effect guaranteed. As a result, any disadvantage faced by foreign banks in borrowing dollars in the United States, a disadvantage which may partially offset a cost of equity advantage in commercial lending, is largely irrelevant to competition in the L/C market.

In the event, foreign banks' cheaper cost of equity did find forceful expression in the standby L/C market in the 1980s (Table 7). U.S. banks in the sample wrote an estimated one-third by value of the $8 billion in identified standby L/Cs backing U.S. commercial paper in 1985 but only about 7 percent of the $19 billion in 1989.[42] Japanese banks' cost of equity advantage helped to raise their market share from 18 percent in 1985 to 42 percent in 1989. And much the same development is evident in the market for L/Cs backing industrial revenue bonds. It may be noted that some foreign banks in the sample, such as Deutsche Bank, wrote no L/Cs in 1989, although all sample banks had commercial loans outstanding then.

Should U.S. banks' loss of market share owing to a cost of capital disadvantage cause concern? Some would answer that if foreign banks can keep their shareholders happy while lending cheaply to U.S. corporations, then we should welcome the effect and not bemoan the cause. A year ago, some might have gone further to hold that foreign banks' lending to U.S. firms amounts to an insurance policy: should the capacity of U.S. banks to extend credit to the corporate sector become impaired, foreign banks could easily take up the slack. The greater the penetration of foreign banks, the more readily they could substitute for U.S. banks.

But events have called this view into question. Even as U.S. banks experience asset price declines that may dispose them to restrict corporate credit, the most prominent foreign banks operating in the United States have suffered their own asset price problems, in the form of lower equity prices in Tokyo. The extraordinary correlation of strains in the U.S. and Japanese banking systems is illustrated by the parallel movements of the share prices of money center and city banks (Chart 9). U.S. and Japanese bank share prices bore no relation to each other in the period 1987-89 but in 1990 showed strikingly high correlation.

As U.S. corporations that have borrowed from foreign banks or have backed their commercial paper with foreign bank L/Cs experience difficulty, how will foreign banks respond to private efforts and public policies designed to maintain the flow of corporate credit? The answer is important because a cost of capital disadvantage has shrunk U.S. bank market share.

Conclusion

Equity markets in different countries imposed very different capital costs on banks in the late 1980s. New York, London, and Toronto burdened U.S., U.K., and Canadian banks with equity costs around 10 percent; Frankfurt and Zurich presented German and Swiss banks with equity costs in the 5 percent to 7 percent range; and Tokyo gave Japanese banks an edge with equity costs around 3 percent.

Subordinated debt costs appear to rise more quickly in response to lower ratings for U.S. than for foreign banks. For a U.S. average, higher cost of subordinated debt worsens the cost of equity disadvantage.

Taxes can exert a more powerful influence on the cost of capital for banks than on the cost of capital for industry. Nevertheless, differences in the cost of capital for banks appear to arise primarily from differences in household savings behavior and from differences in relations among banks, corporations, and governments. For Japan, the success of macroeconomic policy in smoothing economic growth may also help to cheapen bank capital.

In the wake of the Basle Agreement, cost of equity differences assert themselves as very different required spreads or fees on specific financial products. Banks facing a high cost of capital encounter substantial difficulty in competing in low-margin business lines. In the 1980s, banks with low capital costs gained market share in the U.S. wholesale market, while those with high capital costs suffered a loss of market share. Whether equity market valuations will converge and the current widening of spreads in banking persist long enough to reverse this trend remains to be seen.

[42] U.S. banks in total saw their market share shrink from 57 percent to 14 percent over the same period. See Pat Wertman, "Letter of Credit Enhancement of Commercial Paper Issues: A Case Study in the Competitiveness of U.S. Banks," Federal Reserve Bank of New York working paper, January 1991.

Appendix A: Cost of Equity Adjustments

The first three adjustments to reported earnings are outlined in this appendix. For the depreciation adjustment, see our earlier article.†

Adjustment for developing country reserves
For British and Canadian banks, we add the following to stated profits:

(4) $R_t\ (1-tc_t) - WR_t\ (1-tc_t)$,
where
R_t = reported addition to developing country reserve
tc_t = effective corporate income tax rate
WR_t = warranted addition to developing country reserve
= (developing country exposure in or about 1985) $*\ .14(1\text{-}.14)^n$, n = year-1982.

For Japanese banks, no tax benefit is recognized for reserves, so the following is added to stated profits:

(5) $R_t - WR_t\ (1-tc_t) - (CO_t * tc_t) - NOL_t$,
where
CO_t = developing country charge-offs, including losses recognized on debt-equity swaps
NOL_t = net operating loss carry-forwards.

For U.S. banks, only a state and local tax benefit is recognized, so the following is added:

(6) $R_t\ (1-tsl_t) - WR_t\ (1-tc_t) - (CO_t * tc_t) - NOL_t$,
where tsl_t = combined state and local corporate income tax rate.

Cross-holding adjustment
For both German and Japanese banks, we add the following to stated profits:

(7) $\{[MVE_t * (ev_t - divd_t)] - CG_t\} * (1-tc_t)$,
where
MVE_t = market value of equity shares held at time t
ev_t = true profit rate on cross-held shares as calculated in McCauley and Zimmer, "Explaining International Differences."
$divd_t$ = dividend payout rate on market value of equity
CG_t = periodic realization of capital gains on cross-held shares

We calculate the market value of equity shares held by German banks as follows:

†McCauley and Zimmer, "Explaining International Differences," *Quarterly Review.*

(8) $MVE_{1990} = BVE_{1990} + \dfrac{UCG_{1990}}{(1-tc_{1990})}$

where
BVE_t = value of cross-held shares as carried on books
UCG_t = value of accumulated unrealized capital gains, given on after-tax basis.

Since accumulated unrealized capital gains for German banks are available only for mid-December 1990,‡ we estimate the market value of equity for previous years as follows:

(9) $MVE_{t-1} = MVE_t * \dfrac{DAX_{t-1}}{DAX_t} - dMVE_t * \left(\dfrac{DAX_{t-1}}{DAX_t}\right)^{0.5}$,

where
DAX_t = German stock market index at time t
$dMVE_t$ = net additions to equity portfolio $-$ $(divd_t * MVE_t)$.

Here we move backward from MVE_{1990}, iteratively estimating the earlier equity positions.

Inflation-related adjustments
To correct misstatements of profit due to differing time profiles of real and nominal returns, we make the following adjustments. First we adjust for the misstatement of flows owing to growth of assets by subtracting the following from profits:

(10) $(NOM_t - NOM_{t-1}) * [(1+\pi_t)^{0.5} - 1]$,

where
NOM_t = nominal assets less nominal liabilities at time t
π_t = inflation rate at time t.

To correct for the misstatement of profits owing to varying inflation rates, we subtract the following from stated profits:

(11) $NOM_t * \dfrac{(\pi_t - \pi^*_t)}{1+\pi_t}$,

where

$$\pi_t^* = \left[\sum_{i=t-k}^{t-1} w^{t-i} * \pi_i\right]$$

‡Stephen Lewis, "German Banks' Ten-Month Results—A Solid Performance," *Salomon Brothers Germany Equity Research*, December 19, 1990.

Appendix A *(continued)*

where

$$\sum_{i=t-k}^{t-1} w^{t-i} = 1, \quad 1 > w > 0,$$

and k is the average life of real assets.

We then subtract from stated profits the amount that is needed to maintain the real value of shareholder equity:

$$(12)\ (SE_t - Ad_t) * \frac{\pi_t}{1+\pi_t},$$

where
SE_t = shareholder equity
Ad_t = depreciable assets.

Appendix B: Tier 2 capital and the cost of capital for financial products

The way in which cost of tier 2 capital enters into the cost of capital for a specific product varies with the source of tier 2 capital. If preferred shares are used, then the treatment is the same as tier 1 equity—the required return will have to be met out of after-tax earnings as shown for a funded asset in equation 3:

$$(13)\ 0.92 * S * (1-tc_t) + 0.08 * \{\frac{1+[r_t * (1-tc_t)]}{1 + (\pi_t * 0.5)} - 1\}$$

$$= (RW * 0.04) * (COE + CPS),$$

where CPS = cost of preferred shares.

Note that inflation is halved to reflect the fact that preference shares typically carry a nominal coupon.

The corresponding equation for an unfunded asset is similar except that the required fee is multiplied by 1 instead of 0.92. If the bank's marginal source of tier 2 equity is subordinated debt, then we can rewrite equation 13 as:

$$(14)\ 0.96 * S * (1-tc_t) + 0.04 * \{\frac{1+[r_t * (1-tc_t)]}{1 + \pi_t} - 1\}$$

$$= (RW * 0.04) * \{COE + [CSD * (1-tc_t)]\},$$

where CSD = cost of subordinated debt.

If the bank's marginal source of tier 2 funds is reserves, then the treatment is less clear. If the bank voluntarily takes reserves from shareholder equity, without an associated tax benefit, then the cost of tier 2 capital is the same as that of tier 1 capital. If there is an associated tax benefit, then the cost of capital can be written:

$$(15)\ 0.92 * S * (1-tc_t) + 0.08 * \{\frac{1+[r_t * (1-tc_t)]}{1 + \pi_t} - 1\}$$

$$= (RW * 0.04) * \{COE * (2-tc_t)\}.$$

The inclusion of tier 2 capital raises the calculated product-specific cost of capital. To the extent that banks use preferred shares or voluntary general loan reserves as tier 2 capital, the tier 2 capital costs will be a significant fraction of tier 1 capital costs. The cost of subordinated debt is low for banks in most countries—with the possible exception of the United States—and is unlikely to change the results significantly.

Our observation that bank cost of capital is highly sensitive to corporate income tax rates is not true for certain tier 2 capital. Subordinated debt and reserves with tax benefits are both tax deductible and consequently paid out of pretax income; the cost of these items is therefore insensitive to tax rates. Since tier 2 capital costs are likely to be much smaller than tier 1 costs, it will generally be the case that the overall product-specific cost of capital is still very sensitive to corporate tax rates.

Appendix C: Implications of Risk for Required Returns

If bank cost of capital is positively related to risk, then the required return on an individual product should be adjusted to reflect its effect on the overall risk of the bank. Specifically, we should determine the required return as:

$$(16)\ S + \left\{ \frac{\mathrm{dCOE}}{dloan} * \frac{E}{1-tc_t} \right\} + \frac{\mathrm{dCSD}}{dloan} * SD.$$

The first term is the required spread or fee as calculated with equation 5. The second term is simply the change in the average cost of equity of the bank in response to the addition of the product and the capital allotted to it, multiplied by the value of outstanding equity. The third term is the sensitivity of the cost of subordinated debt to an additional unit of the loan, multiplied by the amount of outstanding subordinated debt.

If the new product is particularly risky relative to the capital allotted to it, then the third term will be positive and the second term will probably be positive; if the product is particularly safe, then the third term will be negative and the second term will probably be negative. Our earlier calculations implicitly apply to products with average risk relative to allotted capital in the sense that the second and third terms are zero.

Two important implications follow from the assumption that bank cost of capital is sensitive to risk. First, banks facing a high cost of capital cannot mitigate their disadvantage by concentrating on products that have low regulatory capital weight relative to their risk. Second, it may be economical for some banks to carry excess capital.