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## Bank Stock Risk and Return

There is currently a widespread perception that banks in the U.S. have become riskier in the past several years. This view has been encouraged by a spate of bank failures, extensive media coverage of problems in the industry, and legislative efforts in Washington to restructure the banking system. Industry observers typically cite factors such as deregulation, increased competition, and financial innovation as potential contributors to this apparent increase in bank risk.

In this *Letter*, I analyze the recent behavior of bank stock returns. The results suggest that the question of bank risk in the 1980s is complex. Banks have *altered* their risk exposure, increasing the sensitivity of bank stock returns to some sources of risk, while reducing the effects of other types of risk. U.S. banks have thus changed their sensitivity to economic conditions and movements in interest rates.

### Bank stocks as a measure of bank risk

A crucial preliminary question is how to measure bank risk. From a policy standpoint, the relevant risk involves the likelihood that the bank's asset values will deteriorate, which raises the chances the bank will fail and require some form of government-financed intervention. Unfortunately, it is difficult to measure the risks associated with specific bank assets directly. The behavior of stock returns, however, provides reasonable, and readily available, information because there is a direct relationship between asset risk and stock risk. Changes in the cash flows and values of bank assets are reflected in bank earnings. Variations in bank earnings influence the returns on bank stocks. Although factors such as the deposit insurance system complicate the relationship, the risk of holding bank stocks is still informative about bank asset risk.

There are several ways to consider the riskiness of bank stocks. For example, the total volatility of returns is one indicator of bank equity risk. The greater the variability of returns, the more volatile is the value of bank equity and thus net worth. This total volatility of returns typically is meas-

ured by the variance or standard deviation of stock returns.

### Systematic and nonsystematic bank stock risk

Total volatility, however, may conceal change in the sources of risk. Asset pricing models from the finance literature suggest that the total risk of an asset's return may be due partially to systematic risk factors and partially to factors specific to the asset. The capital asset pricing model (CAPM), for example, argues that returns on individual assets can be explained by a single factor, namely, the return on the so-called "market portfolio," a perfectly diversified portfolio of all assets. The variability of the individual asset's return that is related to changes in the return on the market portfolio is called systematic, or market, risk. This systematic risk is characterized by the asset's "beta" value. An "average" asset whose return fluctuates one-for-one with the market return has a beta equal to one. Stocks with greater than average market-related risk exhibit betas greater than one, while betas less than one indicate low market-risk assets. Any remaining asset volatility that is unrelated to the return on the market portfolio is dubbed "residual" or nonsystematic risk.

Some economists argue that factors other than the return on the market portfolio are relevant in explaining asset returns. One alternative to the CAPM is a two-factor model in which the return on debt securities is included along with the return on the market portfolio of stocks to explain individual asset returns. This model identifies two sources of systematic risk in asset returns. As in the CAPM, market risk, as measured by the asset's stock beta, refers to asset volatility that is related to changes in the return on the market portfolio. In addition, assets exhibit systematic risk that is associated with changes in debt returns, or so-called interest rate risk. The two-factor model thus differentiates between stock market betas and interest rate betas to describe the systematic risks of asset returns. Nonsystematic risk in the two-factor model is any volatility that is unrelated either to stock market returns or to debt returns.

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Since banks hold broadly diversified portfolios of loans and other assets, bank stock returns often are expected to have stock betas near one. In contrast, many economists believe that bank stocks should exhibit little or no sensitivity to interest rates. This is because hedging techniques should enable bank managers to insulate their stocks from the effects of interest rate risk. Evidence of significant non-zero interest rate betas thus may reflect a failure on the part of bank managers to hedge effectively against interest rate risk.

## **Total bank stock risk**

As part of ongoing research at this Federal Reserve Bank, I investigated the behavior of monthly stock returns over the period 1979-1990 using a sample of 84 large U.S. bank holding companies. (For a more detailed discussion of this research, see the Fall 1991 issue of the *FRBSF Economic Review*.) The results from this research highlight a number of interesting aspects of the recent behavior of bank stock risk and returns.

First, the total volatility of bank stock returns rose during the 1980s. From 1979 to 1990, the total variance of bank holding company stock returns increased, both in absolute terms and relative to a sample of nonfinancial stocks and to government bonds. At the same time, the average returns on bank stocks fell relative to these other assets. This suggests that bank stocks became riskier during the 1980s and that investors were not compensated for this risk with higher returns. A simple look at the total variance of bank stock returns thus supports the popular notion of increased risk in banking.

## **Results from asset pricing models**

While the total variability of bank stock returns increased over the 1979-1990 period, finance theory suggests that what matters for stock returns is systematic risk, not total risk. An investigation of systematic risk in bank stocks, using the asset pricing models described above, can reveal changes in the response of bank stock returns to systematic factors like overall economic conditions or changes in interest rates.

Over the entire 12-year period, estimates from CAPM and two-factor model regressions revealed significant stock market betas between 0.8 and 0.9. These point estimates were relatively close to one, as expected, and implied that bank stock

returns exhibited somewhat less market risk than the average stock.

The sample of bank holding company stocks displayed significant positive interest rate betas, implying that bank stocks faced substantial interest rate risk during the 1980s. The sign of the estimated coefficient implies that an increase in market interest rates (as reflected by a decrease in bond returns) reduces the return on bank stocks. Thus, banks suffered during rising interest rate environments and benefited during periods of falling rates.

An analysis based on regression equations over subintervals of the 1979-1990 period confirmed that the sensitivity of bank stock returns to the two systematic risk factors changed during the 1980s. For example, stock betas rose during the interval. Estimated stock market betas increased from approximately 0.6 early in the period, to 1.3 in the last three years of the sample.

This finding of rising stock market betas during the 1980s suggests that bank stock returns were increasingly exposed to the same general economic factors that influence the stock market. It is difficult to pinpoint specific events that explain this increase in the market risk of the banking system. However, one possibility is that, after suffering losses on LDC loans and other foreign operations, U.S. banks returned their focus to the domestic market in the latter part of the 1980s. Compared to the late 1970s and early 1980s, loans occupied an increasing share of bank portfolios in this period, with particular emphasis on real estate lending. Performance of these loans depended on the state of the economy. As a result, banks were increasingly exposed to the same domestic economic conditions that affected the health of U.S. corporations.

In contrast to the estimated market betas, bank stock returns displayed decreasing interest rate risk from 1979 to 1990. Estimated interest rate betas fell from approximately 0.5 in the first half of the sample to zero by the end of the 12-year period. This finding is notable because it contrasts with previous studies of bank stock returns, as well as with the behavior of the same stocks earlier in the sample period. It probably should not be surprising, however. The banking system was buffeted during the 1970s and early 1980s

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by volatile interest rates. This experience led many depository institutions to push for financial innovations like adjustable rate CDs and mortgages, as well as interest rate swaps, which would help them insulate their portfolios from the effects of changes in interest rates. The results presented here confirm that banks largely succeeded in reducing the interest rate risk in their portfolios and stock returns.

Finally, the asset pricing regressions explain at most 40 percent of the total variance of bank holding company stock returns. This means that at least 60 percent of bank risk is not related to the two systematic risk factors. Bank stocks exhibit a large amount of nonsystematic, or idiosyncratic, risk. While this finding is true of most other stocks as well, it also implies that efforts to understand bank stock risks must consider factors that are specific to individual institutions, such as individual loan risk or local economic conditions.

#### **Bank stock risk and bank size**

Banks of different sizes may have different sensitivities to systematic risk factors. For example, larger banks may have greater opportunities than smaller banks to diversify their portfolios or to take advantage of economies of scale in hedging against interest rate risk. Cross-section regressions confirmed that there are significant differences in estimated betas across banks of different sizes. Of course, the sample of bank holding companies in this analysis is not fully representative of the size range of U.S. banks, since the smallest bank had over \$2 billion in assets (as of 1987) while the largest had over \$200 billion. The conclusions thus apply to relatively large U.S. bank holding companies.

Regressions on four different size groupings of banks showed that in the early 1980s, the smallest banks (assets less than \$5 billion as of 1987)

had larger stock market betas than any other size group, although all groups had stock betas less than one. At the same time, the smallest banks had the lowest interest rate betas of the banks in the sample. By the end of the 1980s, the estimated beta coefficients for the smallest banks showed little change from the earlier part of the period. The larger banks, however, exhibited higher stock market betas and lower interest rate betas. By the end of the 1980s, the larger banks all had market betas that were significantly above one. At the same time, they exhibited no evidence of interest rate risk. It is striking that, by the end of the sample period, no group of bank stocks exhibited any significant interest rate risk.

#### **Conclusion**

The research described here suggests that bank stock risks changed significantly during the 1980s. The returns on these stocks became increasingly sensitive to factors that influence overall stock market returns. At the same time, bank stocks were increasingly insensitive to changes in interest rates.

While these results add to our knowledge of bank stock risks and returns, they also highlight what we do not know about them. The portion of total stock return variance that is left unexplained by traditional asset pricing models increased during the 12 years between 1979 and 1990. This implies a rising proportion of risk that is unrelated to systematic risk factors, and suggests that it may be difficult to formulate policies that will successfully reduce risk across a broad sample of banks. At the very least, it also suggests that more research is needed to untangle the behavior of bank risk.

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The *FRBSF Weekly Letter* appears on an abbreviated schedule in June, July, August, and December.