Government Securities Investments of Commercial Banks

by Anthony P. Rodrigues

U.S. commercial banks have acquired federal government securities at a fast pace over the the last three years. At the same time, overall bank lending has slowed and even contracted for some classes of borrowers. These joint developments have raised concerns that banks are substituting securities investments for business loans to an extent that might be retarding economic recovery.

This article examines the reasons for the recent run-up in bank holdings of government securities and makes comparisons with earlier episodes. Although the current levels of government securities holdings relative to total assets at banks are not near post-World War II highs, growth in investments has been fast when compared with most other periods of securities acquisition. Typically, banks purchase government securities in recessions while waiting for attractive loan opportunities to develop. In the recent episode, however, factors in addition to slow business activity may have influenced banks' investment decisions. The article assesses other explanations for the buildup in securities holdings, including the unusual, sustained steep yield curve over 1990-92 and the imposition of risk-based bank capital standards.

The article also considers whether a rise in interest rates might unduly hamper future lending because of a "lock-in" effect. Banks that hold government securities when rates are relatively low may be unwilling to liquidate these instruments when rates rise if they would realize capital losses from the sale. And with their funds tied up in securities, these banks would have to raise deposits and capital to make new loans, an additional cost that could reduce their incentive to lend. A rough

estimate of the interest rate risk exposure created by banks' securities positions suggests, however, that this restraint is likely to be moderate. Further, banks were quite willing to make loans in the 1950s and 1960s during recovery periods, even though their potential capital losses as a share of bank assets were comparable to recent exposure.

The run-up in government securities

Recently, commercial banks have held a large share of government securities in their assets, at least when compared with the asset mix of the 1970s and 1980s (Chart 1). However, current holdings are much lower than levels in the 1950s and early 1960s, and the recent run-up conforms somewhat to bank behavior during and after earlier postwar recessions. Nevertheless, the share of U.S. securities held by banks has risen more than in earlier periods, particularly if the pre-recession increase starting in late 1989 is included.

A more detailed view of recent securities behavior suggests that this period has indeed been unusual. Before the beginning of the recent recession, the real level of bank holdings of U.S. Treasury securities declined at a pace near that of earlier recessions (Chart 2). However, during the recession, holdings grew more quickly than usual and stopped rising only during the fourth quarter of 1992, the last point plotted for the 1990-92 period. At the same time, *total* real U.S. securities holdings at banks—that is, Treasury *and* agency securities—were growing before the recession and continued to grow after the recession began (Chart 3).

The different trends exhibited by the two components of government securities holdings are illustrated in

Table 1.[1] Treasury holdings increased after 1990, more than reversing the decline through 1990 The large change in total Treasury and agency securities from 1988 to 1992 thus largely reflects the continued increase in agency mortgage-related securities over the period.[2] The overall impact of the Treasury and agency run-up has been to lengthen the maturity distribution of securities held by commercial banks While government securities have little or no credit risk, both the shift toward mortgage-related securities and the lengthening of the maturity distribution of securities potentially expose commercial banks to greater risk of loss in securities value if interest rates increase.

Partly because of the securities run-up, the securities-to-loans ratio has increased more quickly than

usual in past recessions (Chart 4). The ratio dropped before past recessions, largely because of loan growth. After the earlier recessions began, however, the ratio typically rose as banks added securities to their portfolios, and then dropped again after about eight quarters when loan growth recovered and securities acquisition stopped. In contrast, the ratio of government securities to loans was about flat until the end of 1989 (corresponding to three quarters before the peak on the chart). Since then, the ratio has steadily risen as U S. securities holdings have continued to outpace loan growth.
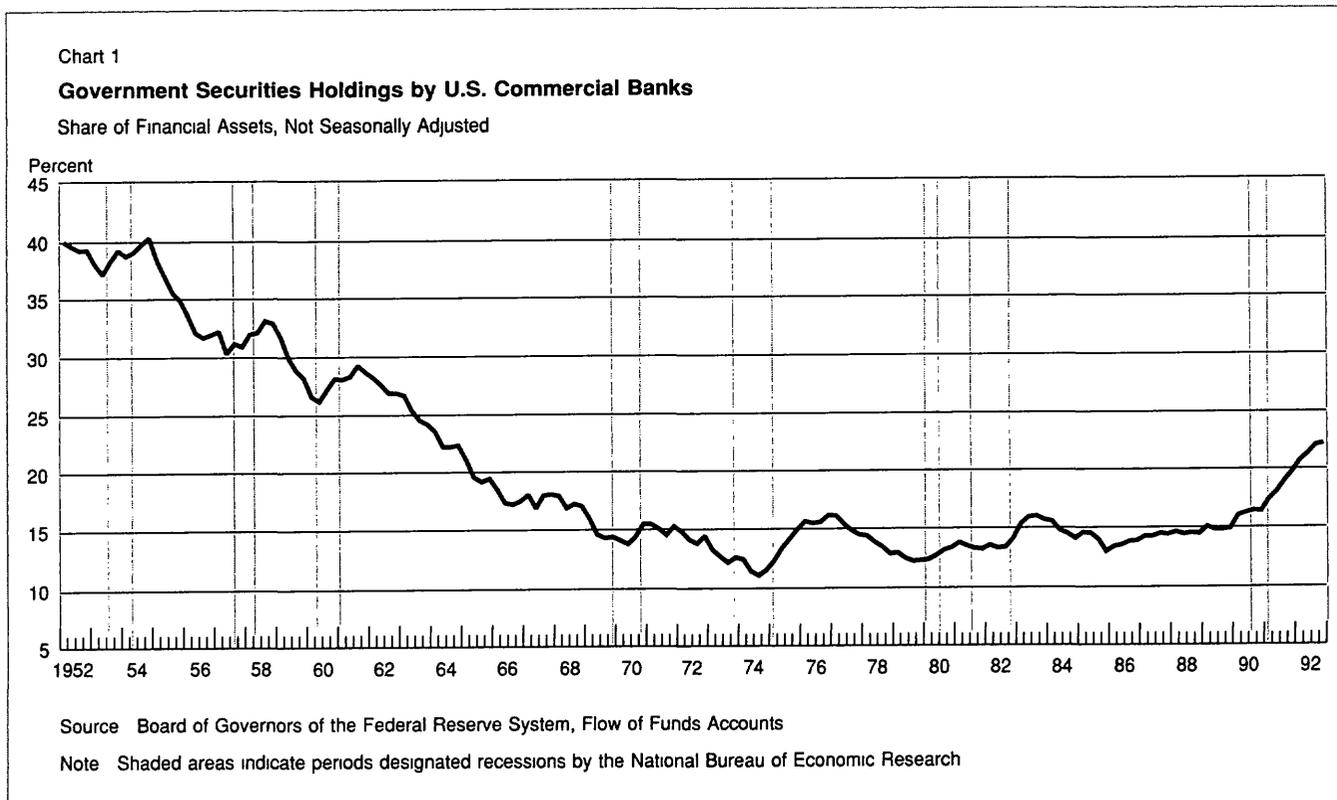
Reasons for the rise in securities holdings

Commentators have suggested several possible reasons for the recent sharp increase in government securities holdings. First, the slow pace of the economy and a widespread deleveraging of corporate balance sheets both before and after the recent recession could have weakened the demand for business loans.[3] Sec-

[1]The data in this table and the disaggregated data used in the following sections are obtained from bank responses to the Federal Financial Institutions Examination Council's Consolidated Reports of Condition and Income (Call Reports)

[2]This category includes Government National Mortgage Association (GNMA), Federal National Mortgage Association (FNMA), and Federal Home Loan Mortgage Corporation (FHLMC) certificates of participation in pools of residential mortgages, as well as collateralized mortgage obligations (CMOs) and real estate mortgage investment conduits (REMICs) issued by FNMA and FHLMC

[3]See, for example, testimony by John LaWare before the House Subcommittee on Economic Growth and Credit Formation, April 2, 1993, testimony by Alan Greenspan before the House Subcommittee on Small Business, March 25, 1993, and Jonathan Nueberger, Federal Reserve Bank of San Francisco Weekly Letter, March 19, 1993 In their testimony, both LaWare and Greenspan suggest that

Chart 1

Government Securities Holdings by U.S. Commercial Banks

Share of Financial Assets, Not Seasonally Adjusted

Source   Board of Governors of the Federal Reserve System, Flow of Funds Accounts

Note   Shaded areas indicate periods designated recessions by the National Bureau of Economic Research

ond, the sustained steepness in the term structure may have made longer term Treasury securities a relatively more attractive investment than bank lending. Third, new bank risk-based capital standards[4] may have

Footnote 3 continued
the weak demand for loans may also be related to the strict documentation requirements imposed on banks by the Federal Insurance Corporation Improvement Act of 1991 These requirements may represent a significant additional cost, particularly for small loans Recently, however, a joint initiative by the Federal Reserve, Comptroller of the Currency, Federal Deposit Insurance Corporation, and the Office of Thrift Supervision was announced to reduce the requirements for small-business and selected farm loans

[4]The risk-based capital standards, adopted in 1989 with final rules in effect at the end of 1992, created risk weights for various asset classes These weights were intended to reflect in part the credit risk associated with different asset types Tier 1 capital (essentially comprising common stock plus preferred stock) must exceed 4 percent of risk-weighted assets, while tier 1 plus tier 2 capital (including subordinated debt and loan loss reserves up to 1 25 percent of risk-weighted assets) must exceed 8 percent of risk-weighted assets In addition, tier 1 capital must exceed at least 3 percent of unweighted assets See Board of Governors of the Federal Reserve System, Capital Adequacy Guidelines, 12 CFR 208 and 12 CFR 225 The Federal Reserve Board, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency are currently developing interest rate risk regulations A proposal for their implementation has been circulated for comment by the Federal Reserve Board

raised pressures on banks to increase their capital and to shift assets toward lower risk categories. These three explanations are not mutually exclusive; all of these factors could have played a role to varying degrees.

Weak loan demand

Two forces have combined to produce an environment of weak demand for bank loans. First, final demand has been unusually weak during the recovery from the 1990-91 recession, and manufacturing inventories, which play an important part in the cycle of bank lending, have been tightly managed. Second, U.S. corporations, reacting to the stresses of heavy indebtedness, have adopted a more conservative financial attitude and have begun to reverse the long-standing trend toward increasing leverage In consequence, loan opportunities have dried up and banks have turned to securities investment as an alternative use of funds

In the past, commercial bank loan growth typically paused after the onset of a recession (Chart 5, left panel) as the number of creditworthy borrowers requiring funds dropped Strong loan growth resumed on average only about eight quarters after the recession peak or about three quarters after real GDP had recovered to previous peak levels (Chart 5, right panel).

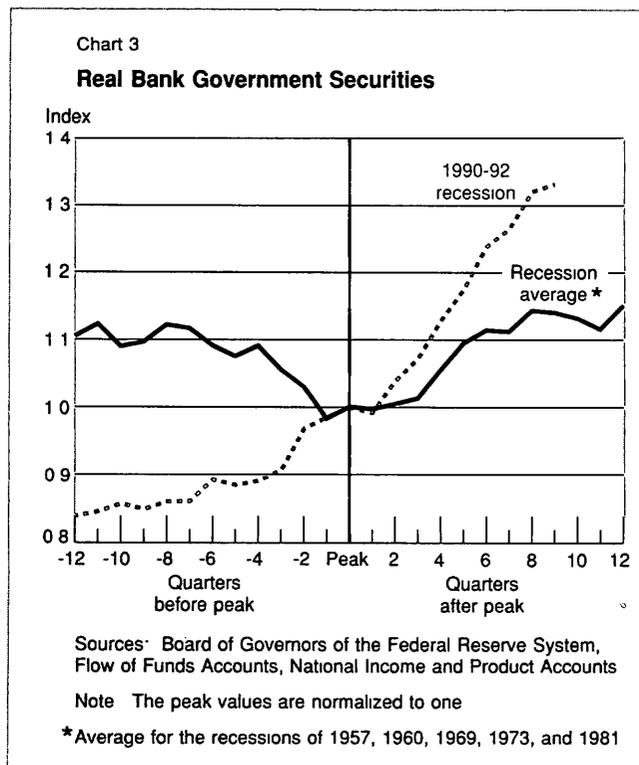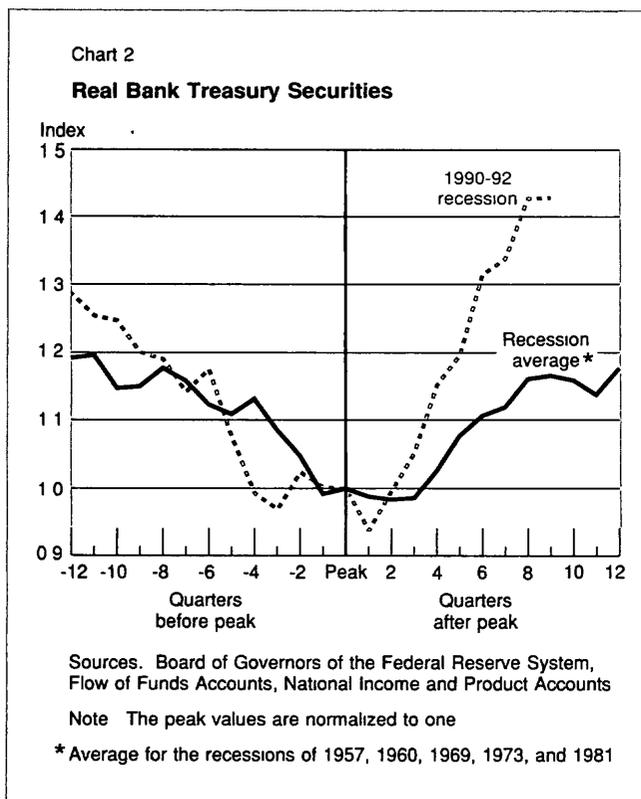The recent period appears different, both because

Chart 2

Real Bank Treasury Securities

Sources. Board of Governors of the Federal Reserve System, Flow of Funds Accounts, National Income and Product Accounts

Note The peak values are normalized to one

* Average for the recessions of 1957, 1960, 1969, 1973, and 1981

Chart 3

Real Bank Government Securities

Sources· Board of Governors of the Federal Reserve System, Flow of Funds Accounts, National Income and Product Accounts

Note The peak values are normalized to one

* Average for the recessions of 1957, 1960, 1969, 1973, and 1981

Commercial Bank Treasury and Agency Securities
(Percent)

Calendar Year through	Total[†]	Treasury Securities[†]	Non-Mortgage-Related Agency Securities[†]	Mortgage-Related Agency Securities[†]	Maturity Distribution of Fixed Rate Securities[‡]		
					0–1 Year	1–5 Years	More than 5 Years
December 1988	10 35	5 47	2 29	2 59	25	41	34
December 1989	10 78	4.75	2 76	3 27	23	37	40
December 1990	11 85	4 34	2 10	5 41	20	37	43
December 1991	13 58	4 88	2 17	6 53	19	38	43
December 1992	17 03	6 78	2 25	8 00	18	41	41

Sources Federal Reserve Bulletin, Federal Financial Institutions Examination Council, Reports of Condition and Income
†Share of average assets
‡Share of total fixed rate securities held

real loan growth stopped before the recession started and because the real level of outstanding loans has continued to fall during the recovery, dropping well below the previous peak level. While the real value of loans outstanding has been more cyclically volatile than activity on average during postwar recessions and recoveries, the decline in real loans outstanding since the start of the 1990 recession means that loans have not kept pace even with the unusually slow recovery in activity[5] This observation suggests that factors in addition to the business cycle are at work

The weak recovery aside, loan demand has also been affected by the deleveraging trend in the corporate sector. After significantly adding to debt both through bond issuance and bank borrowing during the 1980s (in part to retire equity as part of the merger and acquisition boom), the corporate sector has recently slowed its acquisition of debt The desire to restructure balance sheets has restrained demand for additional debt, including bank loans, resulting in a drop in the aggregate ratio of credit market debt to assets (Chart 6)

While corporate deleveraging and a sluggish economy have reduced the demand for loans, other factors may have contributed to the run-up in securities holdings by encouraging banks to tighten their supply of loans These factors—including the steep term structure of interest rates and the regulatory pressures on banks—are discussed next.

Term structure of interest rates
The persistent steep term structure during the 1990-91 recession and subsequent recovery very likely influenced banks' investment decisions. If bank lending

[5]Cara Lown and John Wenninger reach a similar conclusion in "The Role of the Banking System in the Credit Slowdown," Federal Reserve Bank of New York, mimeo, 1993

Chart 4

Ratio of Bank Securities to Loans
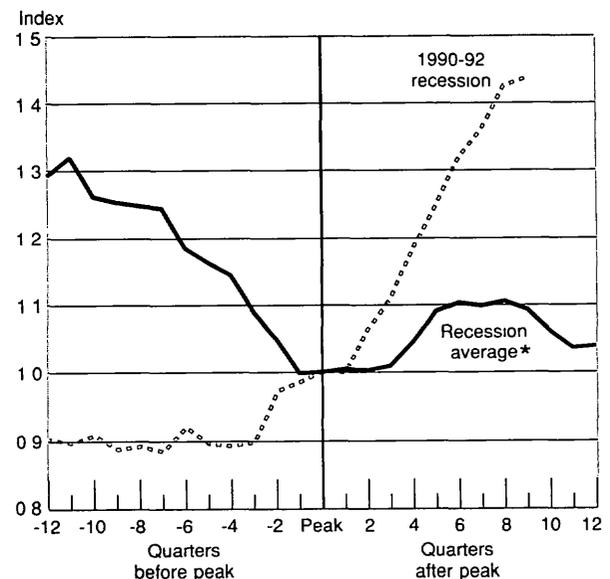
Sources Board of Governors of the Federal Reserve System, Flow of Funds Accounts, National Income and Product Accounts

Note The peak values are normalized to one

*Average for the recessions of 1957, 1960, 1969, 1973, and 1981

rates decline with shorter term rates while investment securities retain relatively high yields, then banks would have an incentive to increase their securities holdings while limiting their lending activity. Although the spread of the prime rate, a proxy for lending rates, over the five-year Treasury rate, a proxy for securities rates, was

somewhat higher in this cycle several quarters before the recession and slightly lower afterward, recent behavior seems very similar to recession averages (Chart 7, left panel). However, the prime rate may not provide an adequate benchmark for bank loan pricing since a large fraction of commercial and industrial loans extended during the 1980s had rates below prime.[6] Using the effective rate on new commercial and industrial loans after fourth-quarter 1979 as the bank lending rate suggests that bank rates are somewhat low relative to Treasury rates, a differential that would reduce the incentive to hold bank loans (Chart 7, right panel). Moreover, loan performance has been significantly worse in the recent recession than it was after the 1982

[6]For example, the Federal Reserve's quarterly survey of the term of bank commercial and industrial lending, reported in the E 2 statistical release, shows that the percentage of newly extended commercial and industrial loans with maturities under one year that were priced below prime grew from nearly 25 percent in the late 1970s to over 80 percent after the 1982 recession After declining, albeit not steadily, from 1982 through 1990, this percentage rose slightly and has remained close to 67 percent

recession;[7] this observation suggests that, on a risk-adjusted basis, the current spread between loan rates and securities rates may be especially low Thus, the recent behavior of lending rates relative to Treasury rates may have played some role in the shift toward government securities.

Capital requirements
Another possible explanation for the run-up in bank government securities holdings is that the risk-based capital requirements created incentives to substitute low-risk-weighted assets (U.S. government securities[8])

[7]Alan Brunner et al , "Recent Developments Affecting the Profitability and Practices of Commercial Banks," *Federal Reserve Bulletin,* July 1992, show that charge-off rates on commercial and industrial, consumer, and real estate loans at commercial banks were at least twice as high during the recent recession as they had been during 1982

[8]The weights are 0 percent for Treasury and GNMA-guaranteed securities, and 20 percent for FHMA and FHLMC mortgage pass-throughs A significantly higher weight, 100 percent, is assigned to non-CMO securities based on stripped payment streams from these securities

Chart 5

Bank Loans and GDP in Recessions
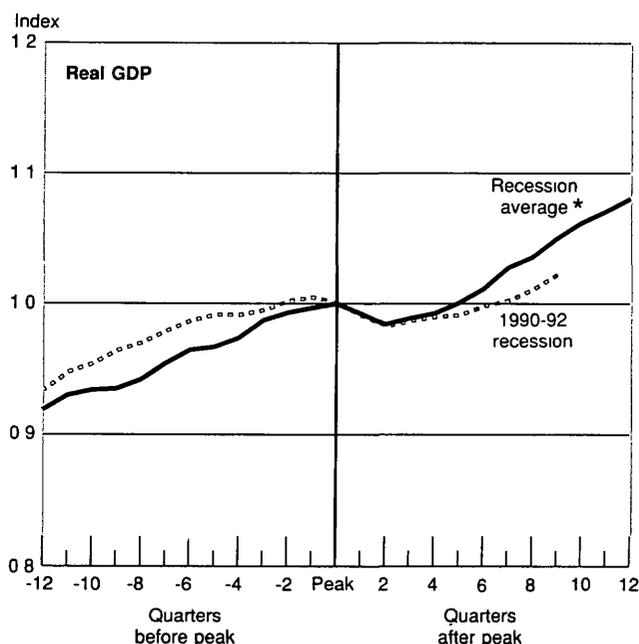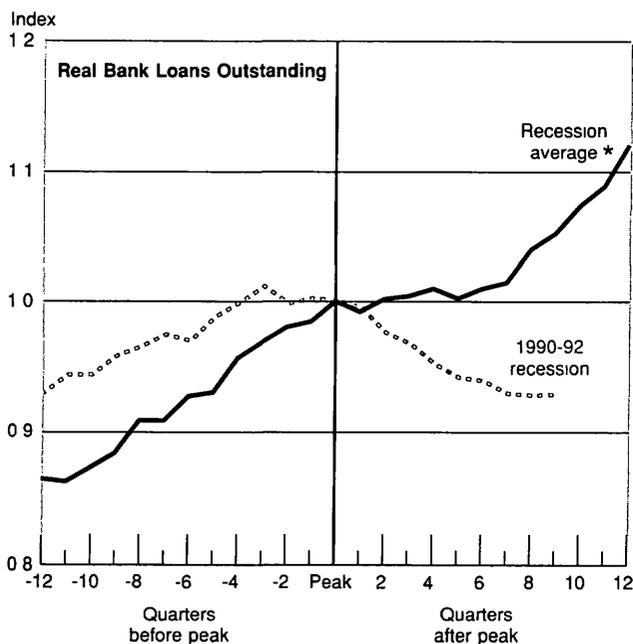
Sources Board of Governors of the Federal Reserve System, Flow of Funds Accounts, National Income and Product Accounts

Note The peak values are normalized to one

*Average for the recessions of 1957, 1960, 1969, 1973, and 1981

for high-risk-weighted assets (loans). These incentives could have worked both by lowering the relative return on loans or other high-risk-weighted assets in the portfolio and by constraining poorly capitalized banks to shift toward low-risk-weighted assets in order to satisfy the requirements

Because more capital is needed for high-risk-weight assets and capital costs for banks are usually substantially higher than the cost of deposits, the capital requirements raise the cost of funding high-risk-weight assets (Box 1). The capital requirements also introduce a differential in cost across assets that did not exist in earlier periods when capital requirements for assets were uniform. A result is that the net return on high-risk-weight assets is lowered relative to the return on low-weight assets. This differential could thus restrain growth in high-weight assets.

The risk-based standards could also have promoted bank securities growth by compelling poorly capitalized banks to shift to low-weight assets. An analysis of a constant sample of commercial banks from 1990 to 1992[9] suggests, however, that direct capital constraints

[9]The sample includes all commercial banks that had data available to compute risk-based assets, securities holdings, and the maturity distribution of securities over each quarter in the years from 1990

Chart 6

Corporate Credit Market Debt

Percent of total assets

Source   Board of Governors of the Federal Reserve System, Flow of Funds Accounts

Notes   Credit market debt includes bonds, mortgages, bank commercial and industrial loans, commercial paper, finance company loans, foreign loans, thrift loans, and bankers' acceptances   Shaded areas indicate periods designated recessions by the National Bureau of Economic Research

probably were *not* a major factor in securities growth In the constant sample, banks that were initially well capitalized had the largest increase in portfolio holdings of Treasury and agency securities as measured by the change in the government securities-to-assets ratio (Table 2)[10] The well-capitalized banks were least constrained by the capital requirements.[11] These banks also currently hold a larger share of agency (and Treasury) securities than either adequately capitalized or undercapitalized banks

A more general piece of evidence suggesting that factors other than the risk-weighted capital requirements were largely responsible for bank securities growth is the behavior of intermediaries not subject to these capital requirements Credit unions, which are not constrained by the risk-based capital standards, have also significantly increased their share of securities in financial assets (Chart 8, top panel). Further, life insurance companies, which faced asset quality problems similar to those of banks, also shifted toward government securities holdings (Chart 8, bottom panel). Although insurers were bound by capital requirements that made government securities more attractive than junk bonds, these capital requirements did not provide an incentive to invest in government securities over investment grade bonds.

More generally, the current regulatory environment has been implicated for fostering a bank reluctance to extend loans. The major complaint is that intense oversight of examiners, particularly following the thrift deba-
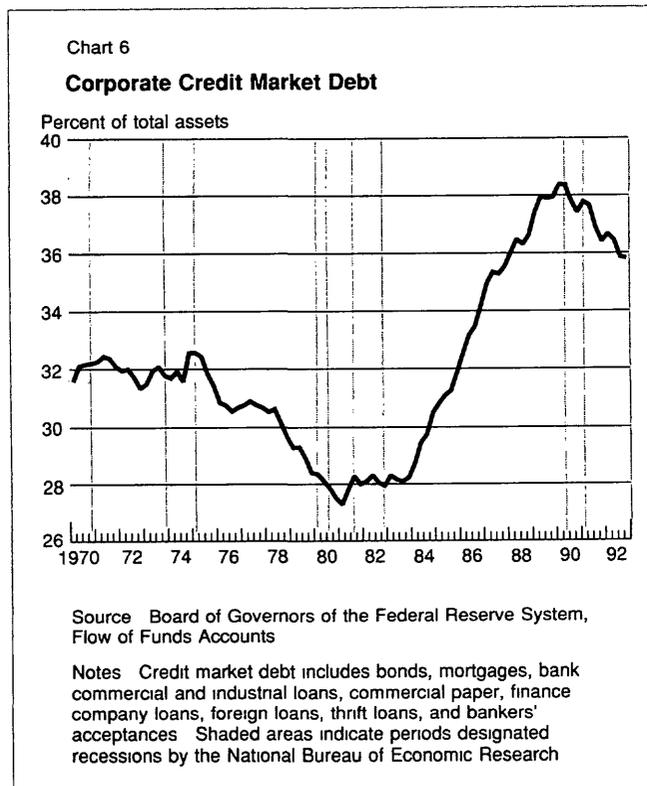
Footnote 9 continued
through 1992 Because the analysis is based on banks that survived through 1992, the extent of securities acquisitions by undercapitalized banks may be underestimated if failing, undercapitalized banks are acquired by well-capitalized banks

The sample is divided into three groups based on initial capital adequacy Well-capitalized banks are those whose tier 1 risk-based capital ratio exceeds 6 percent, whose total risk-based capital ratio exceeds 10 percent, and whose leverage ratio exceeds 5 percent Undercapitalized banks have a tier 1 capital ratio below 4 percent, a total risk-based ratio below 8 percent, or leverage ratio below 4 percent Adequately capitalized banks are those that do not fall into the well-capitalized or undercapitalized groups

[10]Although the *growth rates* of government securities relative to assets increase as the initial bank capital position deteriorates, this comparison seems less germane than the text argument for two reasons First, the comparison overstates differences in securities growth because asset growth varied substantially by initial capital position Assets declined for banks that were initially undercapitalized and grew most quickly at the well-capitalized banks Second, given a bank's decision about asset growth, *changes* in asset shares provide more information about changes in portfolio allocation and changes in exposure relative to assets than does growth in asset shares

[11]Internal capital targets could still explain the run-up in securities holdings if well-capitalized banks had set high target ratios of capital to risk-weighted assets See Diana Hancock and James Wilcox, "Bank Capital and Portfolio Composition," mimeo, 1993

cle and the early estimates of very large losses in the Federal Deposit Insurance Corporation (FDIC) insurance fund, led bank examiners to question closely loans that would earlier have been acceptable.[12] This evidence has tended to be anecdotal, and some have argued that the rigorous scrutiny of loans represents a return to earlier standards rather than the imposition of a new, more severe standard. Partly in response to complaints, however, the Administration and the major regulatory agencies recently announced an agreement that would reduce the documentation burden for some banks' loans to small businesses and farmers.
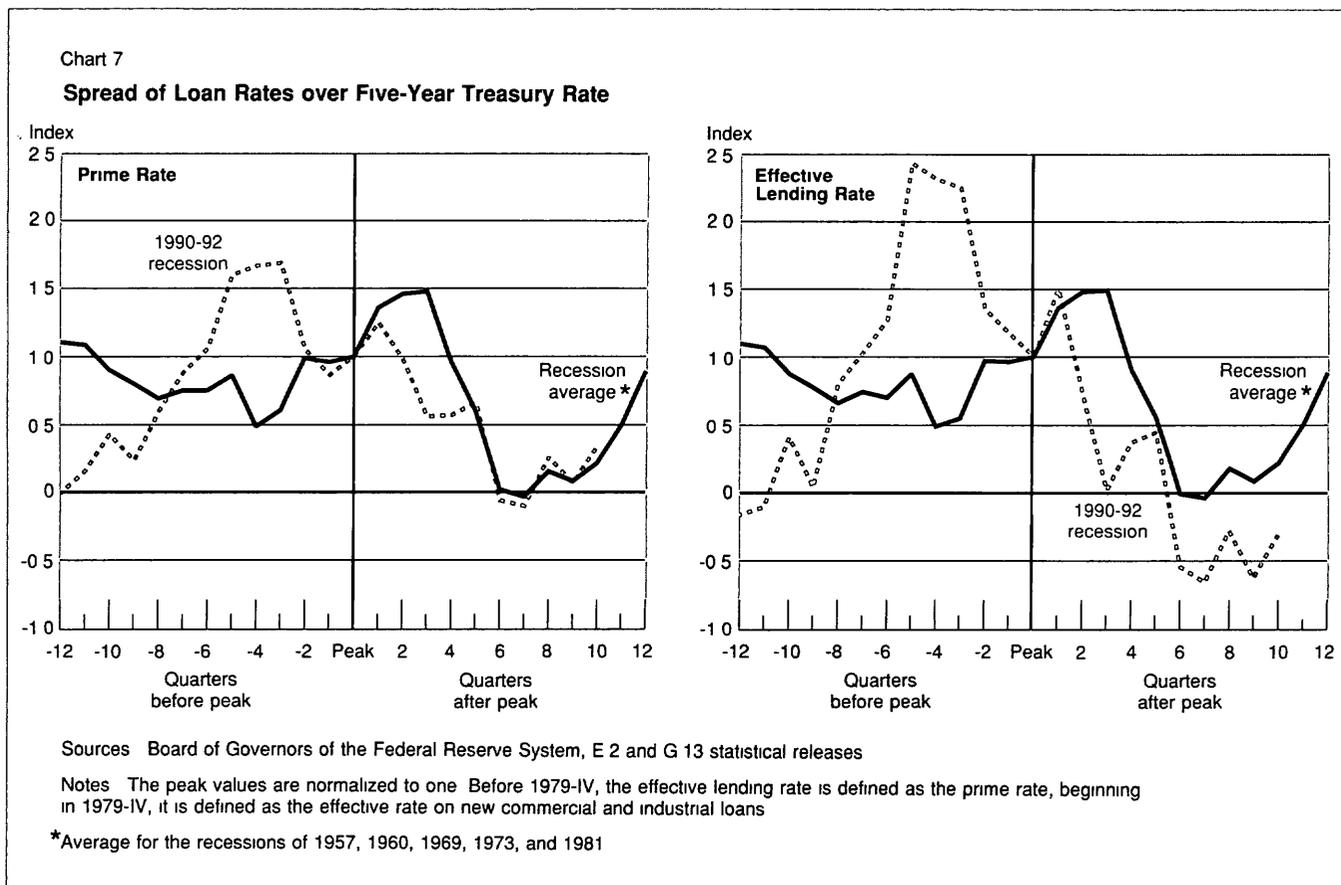
Models for securities acquisitions

To clarify the effects of the various factors on bank holdings of government securities, two groups of models describing changes in the government asset shares at commercial banks were developed: The first group consists of aggregate models relating securities hold-

[12]See the testimonies of Stephen Steinbrink and Paul Fritts before the House Subcommittee on Economic Growth and Credit Formation, April 2, 1993

ings to the growth of GDP and the spread between loan rates and Treasury rates. These models are used to estimate how much of the securities run-up can be attributed to recent economic conditions, including unusually slow activity growth and small lending margins. The models in the second group describe changes in securities holdings at individual banks over the 1990-92 period. In these disaggregate models, a proxy for loan performance reflects loan return factors affecting individual bank portfolio choice Given these factors, the models seek to measure the differential effect of initial capital status.

Time series models

The descriptive analysis above suggested that the recent slow growth in activity and the steep term structure might explain some part of securities growth at commercial banks. To capture the historical relation between activity and interest rates, a regression model connecting changes in securities' share of assets to real GDP growth and to a measure of the spread between bank loan rates and Treasury rates was estimated using

Chart 7

Spread of Loan Rates over Five-Year Treasury Rate

Sources   Board of Governors of the Federal Reserve System, E 2 and G 13 statistical releases

Notes   The peak values are normalized to one Before 1979-IV, the effective lending rate is defined as the prime rate, beginning in 1979-IV, it is defined as the effective rate on new commercial and industrial loans

*Average for the recessions of 1957, 1960, 1969, 1973, and 1981

Box: The Impact of Risk-Based Capital Requirements on Funding Costs

Because the risk-based capital requirements impose different capital requirements on different assets, they have changed marginal funding costs across asset classes, altering the net returns that banks may receive from assets Before the risk-based standards were put into place, all bank assets were subject to the same capital requirements Hence, a differential in funding costs only exists in the current period This differential will reduce the return on high-weighted assets relative to lower weighted assets The accompanying table illustrates the relative effects, where r^D is the rate on deposits and r^C is the cost of capital.

The reduction in relative returns can be fairly large. For example, assume that a bank has a target ratio of tier 1 capital to risk-weighted assets of 6 percent and a ratio of

tier 1 plus tier 2 capital to assets of 10 percent Suppose also that the cost of tier 1 capital (represented by equity) is 15 percent, the cost of tier 2 capital is 7 0 percent, and the deposit rate is around 3.4 percent.[†] The implied difference in funding costs would reduce the return on commercial and industrial loans relative to Treasury securities by about 84 basis points from the spread of the lending rate over the Treasury yield.

[†]This cost of tier 1 capital is somewhat above the historical return on equity during the 1980s The cost of tier 2 capital is assumed to be about 100 basis points above the ten-year Treasury rate in June 1993, and the deposit rate is approximated by the secondary market six-month certificate of deposit rate in June 1993

Impact of Risk Weights on Bank Asset Returns

Asset	Return	Risk Weight (Percent)	Funding Cost	Net Asset Return Relative to Return on Treasury Securities
Treasury security	r^T	0	r^D	0
Agency security	r^A	20	$98\ r^D + .02\ r^C$	$r^A - r^T - 02\ [\ r^C - r^D\ ]$
Mortgage[†]	r^M	50	$95\ r^D + 05\ r^C$	$r^M - r^T - 05\ [\ r^C - r^D\ ]$
Other loan	r^L	100	$90\ r^D + 10\ r^C$	$r^L - r^T - 10\ [\ r^C - r^D\ ]$

[†]The 50 percent risk weight only applies to first liens on single-family or one-to-four-family units

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quarterly data over 1970-89 [13] Both GDP growth and the loan-Treasury spread were expected to have negative signs because high GDP growth raises the demand for loans and a large spread suggests that bank loans are attractive relative to Treasury securities The change in the securities-to-assets ratio, lagged four quarters, was included in the models to account for seasonality in the flow of funds data

The regression models, shown in Table 3, have the expected signs, both fast GDP growth and a wide loan-Treasury spread are associated with a declining share of securities in bank portfolios The loan-Treasury spread adds some additional explanatory power to the

model containing activity alone.[14]

The models were used to forecast the change in the securities-to-assets ratio over the 1990-92 period. They generated a prediction based on the historical relation of the ratio to activity and spreads and the recent development of those variables (Chart 9) The regression model containing GDP growth alone accounts for about four-fifths of the portfolio shift toward securities from 1990 to 1992 The model that adds the loan-Treasury spread to GDP growth largely accounts for the entire portfolio shift toward securities over the period Both models display a shortfall throughout most of the 1990-92 period, suggesting that other factors also contributed to the shift Nevertheless, the models provide

[13]The spread is the prime loan rate over the five-year Treasury rate before fourth-quarter 1979 and the effective commercial and industrial loan rate over the five-year Treasury rate starting in fourth-quarter 1979

[14]The F-test for the restriction that all the spread coefficients are zero gave $F(7,70) = 1\ 68$, which has a marginal significance level of about 12 percent

some support for the view that demand factors, proxied by activity, and the steep term structure have played the major role in bank securities growth. Since aggregate time series models can only provide a crude estimate of the importance of factors such as the risk-based capital standards, the next section presents models estimated at the bank level to provide a more detailed analysis of individual bank responses

A cross-section bank model
If the risk-based capital requirements constrained the lending behavior of some banks over the 1990-92 period, they could account in part for rising securities holdings even if they were not the primary factor. This section presents models relating changes in the portfolio shares of Treasury or agency securities to a proxy for loan performance and to controls for initial risk-based capital condition. The models were designed to show whether bank loan performance or the capital requirements account for changes in bank securities holdings.

The regression specification assumed that individual bank managements had target portfolio shares of Treasury or agency securities that varied predictably with bank characteristics. Among the factors included as explanatory variables were bank loan performance, bank size, asset growth over 1990-92, and dummy variables describing bank capital status at the beginning of 1990. Average bank loan performance (the ratio of loan loss provisions to loans) is likely to influence bank portfolio choice since banks with better performing

loans will continue to be attracted to the loan market and will have less incentive to shift toward securities. Dummy variables indicating that a bank was initially either well capitalized or adequately capitalized determined whether the undercapitalized banks added securities at a different rate than better capitalized banks, once other bank characteristics were held constant. The 1990 asset shares of Treasury and agency securities were included in the model to allow for partial adjustment behavior over the observation period.[15] The regressions also contained initial bank size, to control for possible systematic differences in the desired securities-to-asset ratio by size, and asset growth, a proxy for extraordinary lending opportunities at the bank that is likely to be negatively related to securities growth. The Treasury and agency models were estimated over a constant sample of banks constructed from the Call Reports by dropping banks that 1) exited the industry between 1990 and 1992, 2) merged with other banks between 1990 and 1992,[16] or 3) were missing data on

[15]If, for example, the Treasury/asset ratio adjusts slowly toward the desired level, then the regression model implicitly specifies the determinants of the desired Treasury securities/asset ratio

$$\Delta(\text{Treasury/Asset}) =$$
$$\delta(\text{Desired Treasury/Asset} - \text{Actual Treasury/Asset})$$

[16]A bank with otherwise complete data is excluded if the bank acquired equity capital through mergers over 1990-92 This may reduce the influence of asset growth if mergers and acquisitions are a major method of growth Regression results similar to those described below were obtained for the Treasury model estimated over all banks, while the importance of initial capital status declined in the agency model

Table 2

Commercial Bank Treasury and Agency Securities by First-Quarter 1990 Capital Status
(Percent)

Calendar Year Ending	Total[†]	Treasury Securities[†]	Non-Mortgage-related Agency Securities[†]	Mortgage-related Agency Securities[†]	Maturity Distribution of Fixed Rate Securities[‡]		
					0-1 Year	1-5 Years	More than 5 Years
Well-capitalized Banks 1990-I							
December 1990	15 80	5 83	3 44	6 53	21 06	41 11	37 83
December 1991	18 46	6 89	3 37	8 20	19 81	40 08	40 11
December 1992	20 75	8 47	3 47	8 81	17 75	44 34	37 91
Adequately Capitalized Banks 1990-I							
December 1990	7 74	2 12	46	5 16	10 73	30 03	59 24
December 1991	10 10	3 89	35	5 86	14 40	31 75	53 84
December 1992	11 51	4 06	35	7 10	12 12	35 04	52 84
Undercapitalized Banks 1990-I							
December 1990	4 98	2 07	57	2 34	21 64	35 37	42 99
December 1991	6 69	3 13	49	3 07	19 62	38 26	42 12
December 1992	7 60	3 97	39	3 24	23 35	41 63	35 02

Sources *Federal Reserve Bulletin*, Federal Financial Institutions Examination Council, Reports of Condition and Income
[†]Share of average assets
[‡]Share of total fixed rate securities held

securities holdings, assets, or loan loss provisions over the sample

The regression results are presented in Table 4 As expected, loan loss provisions enter positively for both the Treasury and agency models. The lagged Treasury/ asset ratio and agency/asset ratio appear significant in the Treasury and agency models, respectively, as expected in a partial adjustment model. While not statistically different from zero in the Treasury model, initial asset size enters the agency model negatively. This

Chart 8

Government Securities Holdings by Selected Nonbank Financial Institutions

Share of Financial Assets, Not Seasonally Adjusted

Percent
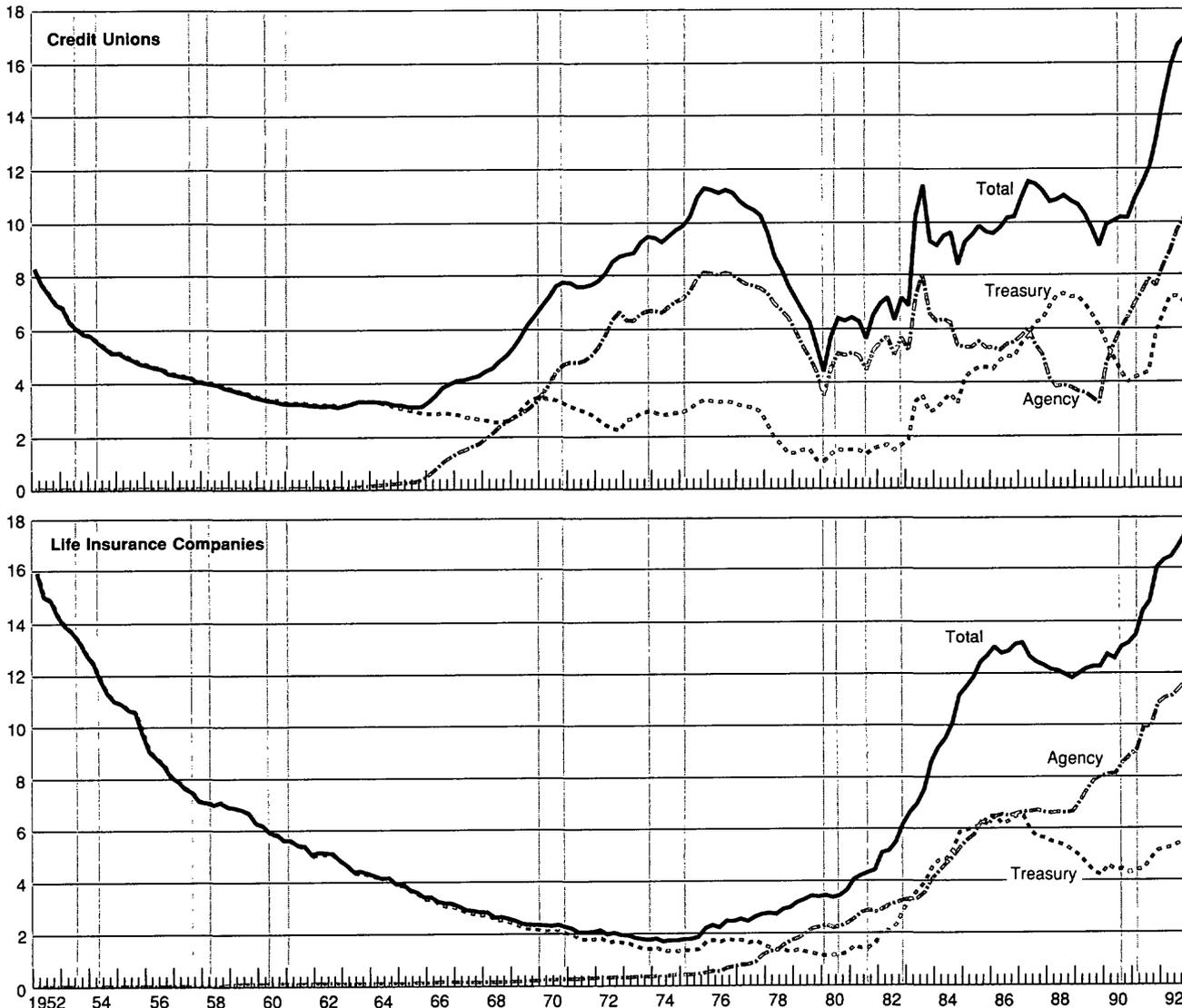
Source   Board of Governors of the Federal Reserve System, Flow of Funds Accounts

Note   Shaded areas indicate periods designated recessions by the National Bureau of Economic Research

finding suggests that if loan performance is held constant, larger banks in 1990 had a slight tendency to lower their portfolio share of securities Asset growth is not significantly different from zero in either model, perhaps because loan performance is a sufficient proxy for loan opportunities at banks

When significant, initial capital status appears to be quantitatively important for subsequent securities growth Both well-capitalized and adequately capitalized banks have lower target Treasury holdings than undercapitalized banks. In the agency model, well-capitalized banks also tend to have lower agency securities holdings than do undercapitalized banks (and implicitly also have a lower agencies/asset target than ade-

quately capitalized banks) The models imply that undercapitalized banks added over 1 percent more Treasury securities to their assets than did banks with other capital levels while they added over 1 percent more agency assets than did well-capitalized banks

The time series models presented in this section suggest that weak demand and the recent unusual term structure had an important role in the securities buildup at banks The disaggregate models imply that the risk-based capital requirements did lead undercapitalized banks to increase their securities holdings beyond the amounts implied by their loan performance. Since initially undercapitalized banks contracted substantially in size from 1990 through 1992, this direct impact of the capital requirements was probably greatest in 1990

Implications of large Treasury holdings

We have seen that banks have increased their government securities holdings significantly in recent years. This move may expose banks to additional interest rate risk if rates should rise substantially Unwillingness to realize losses on the securities portfolio could discourage banks from liquidating part of their securities

Table 3
Time Series Models for Bank Securities Holdings
1970-I to 1989-IV
Dependent variable Change in ratio of government securities to assets

|	Activity Model	Activity and Interest Rate Model
Real GDP growth		
t	- 03	- 07
	(03)	(04)
t-1	- 07	- 11*
	(05)	(04)
Spread of effective loan rate over five-year Treasury rate		
t		03
		(04)
t-1		- 03
		(04)
t-2		- 06
		(04)
t-3		- 01
		(05)
t-4		- 06
		(05)
t-5		- 02
		(05)
t-6		- 05
		(04)
Change in ratio of government securities to assets		
t-4	39*	45*
	(09)	(09)
Constant	36*	62*
	(07)	(13)
R²	39	41
Box-pierce test for residual autocorrelation[†]	22 3	26 7

[†]The test statistic has a chi-squared distribution with twenty degrees of freedom
*Statistically different from zero at 1 percent level

Chart 9
Government Securities Holdings by U.S. Commercial Banks
Share of Financial Assets, Not Seasonally Adjusted
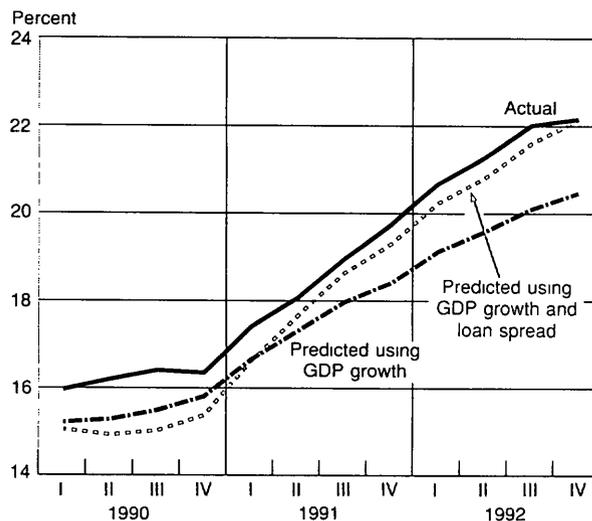
Sources Board of Governors of the Federal Reserve System, Flow of Funds Accounts, National Income and Product Accounts

Note Predicted values are derived from the models in Table 3 relating the change in securities holdings to real GDP growth and the spread of the bank lending rate over the five-year Treasury rate

holdings to finance loans as demand recovers

Table 5 provides a very rough approximation of the impact that a 100 basis point increase in interest rates across the yield curve would have on the value of banks' government securities portfolios. The top row gives the assumed distribution of securities, using the fourth-quarter 1992 distribution of fixed rate securities to describe non-mortgage-backed government securities[17] and treating all agency mortgage-backed securities as mortgage pass-throughs [18] The second row gives the estimated losses by security category, it suggests that a 100 basis point rise would lead to an overall drop in the value of government securities of about 74/100 of 1 percent of assets

While fairly large compared with recent average bank earnings, this cost need not prevent banks from substantially reducing their securities portfolios in the event of additional loan demand If we assume that banks liquidate their government securities uniformly across their holdings, the holdings would lose about (74) divided by (17 03), or 4 3 percent, of their aggregate value Losses of this magnitude would be partially off-

Table 4
Determinants of Commercial Bank Government Securities Holdings

	Dependent Variable	
	Change in Ratio of Treasury Securities to Assets (Percent)	Change in Ratio of Agency Securities to Assets (Percent)
Loan loss provision/loans‡	50*	1 10*
	(09)	(10)
Treasury securities/assets‡	- 24*	02*
	(01)	(01)
Agency securities/assets‡	01	- 22*
	(01)	(01)
Assets (billions of dollars)‡	-.03	- 07*
	(03)	(04)
Asset growth‡	2 × 10⁵	6 × 10⁵
	(5 × 10⁵)	(5 × 10⁻⁵)
Well-capitalized banks‡	- 1 88*	- 1 28*
	(.59)	(70)
Adequately capitalized banks‡	- 2 05*	- 07
	(82)	(96)
R²	11	08
Number of banks	10042	10042

Notes All variables except assets and capital ratio dummies are measured in percent Standard errors of coefficients are reported in parentheses

‡Average of year-end 1990, 1991, and 1992 values
‡Measured in 1990-I
*Significant at the 10 percent level

[17]This assumption likely overestimates the fraction of non-mortgage-backed securities with long maturities One major reason is that mortgage-backed securities are included in the Call Report maturity distribution at their stated maturities, which are significantly larger than their average life because of prepayments Thus, the aggregate interest sensitivities of non-mortgage-backed securities reported here may exceed those that would be realized if interest rates rose

[18]Specifically, this computation assumes that the mortgage-backed securities are all pass-through securities backed by thirty-year mortgages with rates near the average rate for new Federal Housing Administration mortgages in December 1992, and with prepayment rates of about 12 percent per year The February 1993 Senior Loan Officer Survey indicates that most of the surveyed banks had fixed-rate CMO and mortgage pass-through securities with average maturities of less than five years, suggesting that the actual response of mortgage-backed securities value is likely to be smaller than that reported here

The calculation significantly simplifies the actual response of the value of a mortgage-backed securities portfolio The prepayment rates on a portfolio of mortgages will typically decline when interest rates rise, raising the duration of the portfolio and causing the value to drop more quickly than assumed in the calculation here See James Gilkeson and Stephen Smith, "The Convexity Trap Pitfalls in Mortgage Portfolios and Related Securities," Federal Reserve Bank of Atlanta *Economic Review*, November-December, 1992, for an introduction to these issues

Table 5
Interest Rate Effect on Commercial Bank Government Securities Portfolios: Share of Average Assets
(Percent)

	Securities	Treasury and Agency Securities (Non-Mortgage-backed)			Agency Securities (Mortgage-backed)
		0–1 Year	1–5 Years	More than 5 Years	
Securities (December 1992)	17 03	1 65	3 71	3 66	8 00
Estimated loss	74	02	09	27	37

Sources Federal Financial Institutions Examination Council, Reports of Condition and Income, Federal Reserve Bank of New York staff estimates

Notes Assets equaled $3 4 trillion in December 1992 The calculation assumes an increase of 100 basis points in all yields and approximates the maturity distribution of non-mortgage-backed securities with the maturity distribution of fixed-rate securities

Table 6

Interest Rate Effect on Commercial Bank Government Securities Portfolio by Capitalization in Fourth-Quarter 1992: Share of Average Assets
(Percent)

| | Securities | Treasury and Agency Securities (Non-Mortgage-backed) | | | Agency Securities (Mortgage-backed) |
		0–1 Year	1–5 Years	More than 5 Years	
Well-capitalized Banks (Assets = $3 0 trillion)					
Securities (December 1992)	18 06	1 67	3 82	3 88	8 70
Estimated loss	80	.02	09	28	41
Adequately Capitalized Banks (Assets = $397 billion)					
Securities (December 1992)	9 60	1 59	3 05	1 97	2 99
Estimated loss	37	01	08	14	14
Undercapitalized Banks (Assets = $27 billion)					
Securities (December 1992)	11 40	3 61	2 08	1 77	3 95
Estimated loss	40	03	05	13	18

Sources Federal Financial Institutions Examination Council, Reports of Condition and Income, Federal Reserve Bank of New York staff estimates

Note The calculation assumes an increase of 100 basis points in all yields and approximates the maturity distribution of non-mortgage-backed securities with the maturity distribution of fixed-rate securities

Chart 10

Commercial Bank Loans and Government Securities

Four-Quarter Growth, Not Seasonally Adjusted
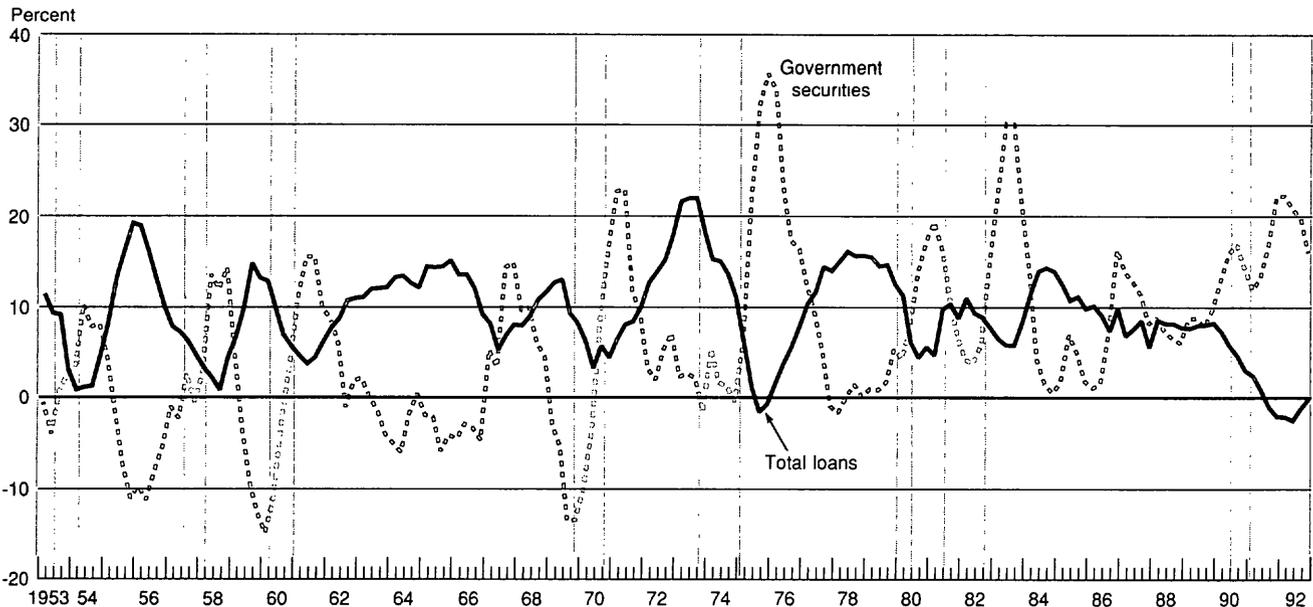
Source Board of Governors of the Federal Reserve System, Flow of Funds Accounts

Note Shaded areas indicate periods designated recessions by the National Bureau of Economic Research

set by the banks' reported excess of market to book value on government securities [19] Of course, these calculations are at best only suggestive of the actual interest exposure created by bank securities holdings, not only because Call Reports collect very limited information on the actual securities held by banks but also because the calculation ignores possible exposure (or hedges) from off-balance-sheet activity or other balance sheet items

Table 6 repeats this calculation for banks classified by capital status in fourth-quarter 1992 The well-capitalized banks have the greatest exposure to a large interest rate increase, largely because they hold significantly more longer term securities Adequately and undercapitalized banks have smaller exposure.

As the comparison of securities holdings to loans in earlier recessions suggested, changes in bank loans and government securities holdings are negatively correlated (Chart 10) During recoveries in the 1950s and 1960s, potential capital losses from rising interest rates could have limited bank asset shifts from U S securities to loans [20] Table 7 presents rough estimates of the potential loss in aggregate asset portfolio value during earlier periods of significant securities sales. These periods generally had ratios of losses to assets similar to the loss estimates computed from recent portfolios Since banks typically sold much less than 10 percent of their total securities holdings, the actual losses realized from securities sales were substantially smaller than

[19] Government securities represented 17 03 percent of assets in December 1992 and had market values about 1 8 percent over book value, giving a potential cushion about $3\frac{1}{100}$ of assets or about 1 8 percent of the value of government securities

[20] Albert Wojnilower, "The Central Role of Credit Crunches in Recent Financial History," Brookings Papers on Economic Activity, 1980, calls this phenomenon the "lock-in" effect

the aggregate loss of securities value. During these earlier periods, when banks generally held a much larger share of securities in their portfolios, the potential loss of value realized by securities sales did not discourage banks from resuming lending in recoveries In short, there was no "lock-in" effect even when conditions supporting it were stronger than they are today

While the lock-in effect appears to have been limited in these earlier periods, the risk-based capital requirements might restrain bank lending as the current recovery proceeds if many banks are near their regulatory capital constraints The fraction of banks that were undercapitalized and directly subject to the capital constraints in fourth quarter 1992, however, was in fact quite small, slightly more than 1 percent of banks These banks control less than 1 percent of commercial bank assets and loans. Moreover, most banks are well capitalized, with capital ratios at least 2 percent above regulatory minima Thus, well-capitalized banks could accommodate some lending growth even at their current levels of regulatory capital. Their earnings performance has been good, a result that, if continued, would further relax their regulatory capital constraint

Conclusions

The recent buildup in U S government securities holdings of commercial banks is faster than typical and has been driven in large part by acquisitions of mortgage-backed securities issued or guaranteed by U S agencies. Slow growth in activity appears partially responsible for the run-up in securities holdings The sustained steepness in the term structure could also have played some role Although the risk-based capital standards may have influenced some bank decisions to add securities, this effect seems important only for the relatively small fraction of banks with weak capital positions The

Table 7

Interest Rate Exposure from Treasury Holdings
(Millions of Dollars)

Period	Loss in Portfolio Value	Realized Loss on Sales	Assets	Capital
June 1950–June 1951	389	36	154,701	11,078
December 1952–June 1953	385	55	186,682	12,585
December 1954–June 1956	833	54	200,588	14,279
December 1958–June 1960	857	21	237,473	18,191
December 1962–June 1964	452	12	295,983	23,752
December 1964–June 1966	391	20	345,130	27,438

Sources Board of Governors of the Federal Reserve System, Banking and Monetary Statistics, 1941–1970, Federal Reserve Bank of New York staff estimates

Notes Losses in government securities value are computed using the reported maturity distribution of securities and assuming a change from an average yield over the three years preceding the period to yields at end-of-period Yields for the midpoint of maturity ratings are used

growth in government securities may have exposed banks to some additional interest rate risk, but a fairly large rise in rates of, say, 100 basis points would lead to only a moderate loss in securities value. Moreover, this loss would be partially offset by the current excess of market to book value for commercial banking as a whole. While this lock-in effect may have been an important deterrent to lending for short periods in the past, it did not prevent banks from shifting to loans when loans became attractive during the 1950s and 1960s.