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EXCESS RESERVES AND

BANK SIZE

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Economists, bankers, and policymakers have long been concerned with the relationship between bank size and bank performance. This article examines the influence of bank size on one aspect of bank behavior: holdings of excess reserves. First, the nature of excess reserves and the advantages such reserves afford a bank are explained. This is followed by a review of a test made to determine if the reserve experience of a sample of banks is consistent with the view that individual banks, under specified circumstances, attempt to hold excess reserves. Finally, the observed relationship between bank size and excess reserve holdings is examined.

WHY EXCESS RESERVES?

Member banks of the Federal Reserve System are required by Regulation D to hold vault cash and deposits with the Federal Reserve equal to a specified fraction of their deposit liabilities. Most non-member banks are subject to some form of state regulations regarding the holding of reserves. The amounts held over (or below) the required levels are considered excess (or deficit) reserves. Since cash reserves do not earn a pecuniary return for a bank, it might be expected that banks would limit their reserve holdings to the required level. However, the cash reserves of a bank are subject to a continuous series of random "shocks" resulting from deposit flows into and out of the bank. This activity increases the cost to a bank of maintaining precise control of its reserve position and, given the high cost of deficits, may cause the deliberate holding of excess reserves.

To illustrate, suppose that a bank suddenly receives a large number of checks for payment and that all the checks are presented over the counter for notes and coin. As the bank draws down its holdings of vault cash, its reserve holdings decline; and they may dip below the required level.[1] The bank must then choose from a number of alternative means of dealing with this deficit, each of which has a cost.

For instance, the bank may do nothing. Daily reserve deficits are permissible provided the average reserve position over the reserve settlement period is sufficient to meet requirements. It is also possible for a bank to incur a deficit for a reserve settlement period. This can be a very high-cost alternative, however. Prior to September 12, 1968, penalties on deficits were assessed at an annual interest rate two percent above the Federal Reserve discount rate.[2]

Fundamental changes were made in the calculation and treatment of reserve deficiencies on September 12, 1968. As of that date, reserve requirements for member banks were calculated on the basis of deposits two weeks earlier, and provision was made for the carryover of either excesses or deficiencies of reserves (not exceeding two percent of required reserves) to the next reserve week.[3] It seems probable that the routine carryover of reserve deficits and surpluses substantially reduces the cost of a reserve deficit in any single reserve settlement period. Therefore—although research into the effect of the Regulation D change is continuing—this study was restricted to a consideration of excess reserves prior to September 12, 1968. It is assumed for simplicity that, before the changes in Regulation D, the costs of reserve deficits were of sufficient magnitude to insure that a bank selected some alternative to a reserve deficiency.

Some such alternatives—termed reserve adjustment transactions—include obtaining additional reserves by purchasing Federal funds,[4] borrowing from the Federal Reserve, or selling assets—such as

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[1] Because deposits are lower, required reserves will be lower; but with a fractional reserve system, deposit outflows reduce reserve holdings more than required reserves.

[2] Penalties were waived on deficits not exceeding 2 percent of required reserves where the deficit was made up in the subsequent reserve settlement period.

[3] See *Federal Reserve Bulletin,* May 1968, pp. 437-438.

[4] See "Federal Funds Revisited," *Economic Review,* Federal Reserve Bank of Cleveland, February 1970.

Treasury bills—from the investment portfolio. Although these transactions are almost always less costly than a reserve deficit, they do have cost. For example, someone whose time and energies have alternative uses must choose, arrange for, and carry out the transaction.

A third type of response to the phenomenon of fluctuations in reserve holdings is to hold a buffer of excess reserves as protection against a deficiency in the event of a sudden outflow of funds and for absorbing inflows. Yet excess reserve holdings also have a cost, which consists of the interest that could have been earned had the excess reserve funds been placed in some income-producing investment.

Although excess reserves constitute an alternative to reserve adjustment transactions, an either-or choice is not necessary. That is, a bank can carry out reserve adjustment transactions and also hold excess reserves. A profit-maximizing bank must choose that combination of average excess reserves and frequency of reserve adjustment transactions that minimizes the total cost of meeting reserve requirements for the bank, given some level of deposit instability.

Higher reserve transactions costs will induce banks to reduce the number of reserve adjustment transactions per time period and, consequently, to hold greater amounts of excess reserves. Similarly, higher interest rates (and hence cost of excess reserves) will induce a bank to hold lower average excess reserves and to make more reserve adjustment transactions. Bank holdings of excess reserves may be explained, therefore, as a special case of the general proposition that average holdings of non-interest bearing cash vary directly with the cost of investing cash in noncash assets and changing noncash assets into cash and

inversely with the level of interest rates.[5] Thus, individual banks endeavor to hold excess reserves to the point where the interest not earned on an additional dollar of excess reserves equals the cost savings resulting from a fewer number of reserve adjustment transactions.[6]

EXCESS RESERVES AND BANK SIZE

If excess reserves are held as a cost-saving buffer against fluctuations in deposits and reserves and if large banks experience greater deposit shifts— simply because they have more dollars of deposits to lose or gain than do small banks—then, other things equal, the larger the bank the greater its holdings of excess reserves. Furthermore, it is possible that the relationship between excess reserves and bank size (as measured by total deposits) is linear; i.e., for every $1,000 increase in deposits, excess reserve holdings increase by a constant amount.

Another possible form of the relationship between excess reserves and bank size is curvilinear; i.e., for every $1,000 increase in deposits, excess reserve holdings may increase, but the increases become smaller and smaller. This

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[5] For a derivation of a more specific form of this proposition see William Baumol, "The Transactions Demand for Cash: An Inventory Theoretic Approach," *Quarterly Journal of Economics,* November 1952, pp. 445-456. Furthermore, A. J. Meigs, among others, has shown that the level of free reserves (i.e., excess reserves less borrowings from the Federal Reserve) held by the banking system is inversely related to interest rates. See A. J. Meigs, *Free Reserves and the Money Supply* (Chicago: University of Chicago Press, 1962).

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[6] For another application of the concept of transactions cost to bank behavior see: William G. Dewald and C. Richard Dreese, "Bank Behavior with Respect to Deposit Variability" *The Journal of Finance,* XXV (Sept. 1970), pp. 869-879.

possibility is suggested by the notion that there are economies of scale in holdings of excess reserves. These economies may arise from a number of factors, including lower reserve adjustment transactions costs and a lower degree of deposit instability at larger banks.[7]

If transactions costs are lower or if deposit instability declines as bank size increases, this may offset some or all of the effect of a greater dollar volume of deposits on excess reserves. Excess reserves may, therefore, increase at a decreasing rate as bank size increases and, indeed, may eventually decrease with an increase in bank size.[8]

An attempt was made to find evidence that either supports or refutes these hypotheses. Specifically attention was directed towards three questions: Do banks attempt to hold excess reserves? Do large banks hold greater amounts of excess reserves than smaller banks? Is there evidence of economies of scale in the holding of excess reserves?

DO BANKS TRY TO HOLD EXCESS RESERVES?

A sample of 49 member banks in the Cleveland Territory of the Fourth Federal District was selected at random, except that the size distribution of the selected banks was forced to approximate the size distribution of member

TABLE I

Distribution of Banks in Sample by Size
Deposits at Year-end 1967
(Millions of Dollars)

	Number of Banks
Less than $2	2
$2 to $5	10
$5 to $10	11
$10 to $25	14
$25 to $50	5
$50 to $100	3
$100 and over	4

Source: Federal Reserve Bank of Cleveland

banks in Ohio.[9] The frequency distribution of sample banks by size is shown in Table I.

The excess reserve position for each sample bank was obtained for each reserve settlement period from September 15, 1966 through September 11, 1968—two years ending immediately prior to the revision of Regulation D, which permitted banks to carry forward excess reserves and deficits (up to 2 percent of required reserves) one reserve settlement period. The annual average daily level of excess reserves was then computed for each bank for each of the two years: September 15, 1966-September 13, 1967 and September 14, 1967-September 11, 1968. It was found that each bank did hold positive excess reserves, on average, during each year. However, this evidence is not conclusive that banks actually

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[7] See Baumol, *op. cit.* and Lyle Gramley, "Deposit Instability at Individual Banks," *Essays on Commercial Banking,* Federal Reserve Bank of Kansas City, 1967, pp. 41-53.

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[8] It must be recognized that the analysis is stated in terms of dollar levels of excess reserves and not in terms of excess reserves as a ratio of required reserves or total deposits. Also, the analysis pertains to individual banks rather than to aggregate excess reserves for a group of banks.

[9] That is, the sample was stratified. Originally a sample of 50 banks was selected. The data for one bank, however, were well outside the range of values for all other banks; i.e., its average excess reserves for one year exceeded its average required reserves; whereas, the next highest average excess reserve to required reserves ratio of 0.51 was recorded by a smaller bank. As is customary with an outlier (See N. R. Draper and H. Smith, *Applied Regression Analysis,* [New York: Wiley, 1966, pp. 94-95], this bank was dropped from the sample. The exclusion of this bank does not appreciably affect the conclusions of this study.

try to hold excess reserves. The unpredictable, random nature of the ebb and flow of deposits and reserves makes the control of excess reserves extremely difficult. Even if a bank intended to hold zero excess reserves, it would rarely succeed in doing so with precision during a single reserve settlement period or a series of reserve settlement periods. Thus, positive mean levels of excess reserves may simply reflect the random fluctuations of excess reserves. However, if banks are aiming at zero excess reserves, the (unobserved) mean of the population of excess reserves will be equal to zero and the average level of the sample of excess reserves will not be significantly different from zero. A test for determining whether the average of the sample of excess reserve holdings of the individual banks differed significantly from zero was carried out in the following manner.

The mean and standard deviation of excess reserve holdings for each bank for each year was computed. The standard deviation of excess reserves for each bank was then divided into the product of the mean level of excess reserves and the square root of the number of reserve settlement periods for each bank.[10] The quotient is referred to as a t-statistic. Values of t above 2.485 indicate that such a sample of excess reserve observations could have been drawn from a population with a mean of zero in at most 1 case out of 100.[11] In other terms, t-values of 2.485 or greater

indicate the hypothesis that the population mean of excess reserves is zero can be rejected at the one percent significance level (or 99 percent confidence level).[12]

The 49 banks were ranked in increasing order of size as measured by total deposits on December 31, 1967 and assigned numbers 1 through 49. Bank 1 had deposits of less than $2 million and Bank 49 had deposits over $1 billion. Table II presents the calculated t-statistics for each bank. As may be seen in the table, in all but six cases, the mean level of excess reserves is significantly different from zero at the 99 percent confidence level. These results indicate either (a) that, in the overwhelming majority of cases, the desired level of excess reserves for each bank was larger than zero, or (b) that these banks were attempting to hold zero excess reserves, but failed to a degree beyond that which can be explained by the variability of excess reserves. In the absence of an explanation for alternative (b), alternative (a) seems more likely.

DO EXCESS RESERVE HOLDINGS INCREASE WITH BANK SIZE?

In order to summarize the actual, observed relationship betwen bank size and excess reserves for the sample banks, regression equations were used. Excess reserves were considered to be the dependent or explained variable and total deposits

[10]The number of reserve settlement periods was 26 per year for the 47 country banks in the sample and 52 per year for the 2 reserve city banks.

[11]The t-value is for a one-tail test. It is hypothesized that the mean level of excess reserves for the population is either zero or greater than zero. This excludes the possibility that the mean level of excess reserves can be negative and is consistent with the assumption that the costs of deficits were prohibitive.

[12]If observed excess reserves for individual banks are autocorrelated, i.e., not independent, borderline t-values should be interpreted with caution. However, a Chi-square test for autocorrelation established that autocorrelation was present at the 95 percent confidence level in only 7 of the 49 excess reserve series. These banks were Numbers 5, 6, 9, 11, 20, 21, and 24 in Table II. None of these banks, with the possible exception of Number 20, had t-values that could be considered borderline.

TABLE II

Ratio of the Mean Level of Excess Reserves
Multiplied by the Square Root of the Number of
Reserve Settlement Periods to the Standard
Deviation of Excess Reserves for 49 Member Banks
September 15, 1966 through September 13, 1967
September 14, 1967 through September 11, 1968

Bank Number	t-statistic 1966–1967	t-statistic 1967–1968	Bank Number	t-statistic 1966–1967	t-statistic 1967–1968
1	9.28	7.94	26	7.39	2.52
2	7.22	4.63	27	2.00*	3.36
3	6.65	3.73	28	4.38	5.84
4	6.84	5.61	29	6.65	5.67
5	5.76	5.89	30	9.57	5.37
6	9.44	8.67	31	4.00	4.52
7	5.67	4.95	32	3.33	4.05
8	2.70	3.45	33	5.92	5.06
9	9.40	11.29	34	1.54*	0.47*
10	8.57	9.83	35	5.13	7.55
11	6.04	5.39	36	1.62*	4.05
12	3.83	7.16	37	21.24	9.96
13	4.04	3.99	38	3.58	2.53
14	8.63	7.24	39	4.12	2.68
15	2.05*	4.60	40	4.12	4.41
16	2.84	0.70*	41	5.54	4.23
17	9.83	8.46	42	7.28	7.49
18	7.94	4.57	43	4.11	5.68
19	7.59	4.41	44	6.18	2.67
20	3.20	3.69	45	3.65	3.75
21	7.16	7.07	46	2.84	2.65
22	14.25	15.16	47	5.20	7.07
23	9.18	6.00	48	8.77	5.92
24	9.14	6.06	49	5.87	4.42
25	7.74	8.82			

* Not significant at 99 percent confidence level (1-tail-test).

Source: Federal Reserve Bank of Cleveland

the independent or explaining variable. The
relationship was then estimated as follows:

$$(1) \quad ER_{67} = 24{,}580 + 0.23123 \ TD_{67} \qquad R^2 \ .81$$
$$\phantom{(1) \quad ER_{67} = } (4.89) \quad\ (14.29)$$

$$(2) \quad ER_{68} = 21{,}024 + 0.25136 \ TD_{68} \qquad .85$$
$$\phantom{(2) \quad ER_{68} = } (4.17) \quad\ (16.24)$$

where:

ER_{67} = average excess reserves (in dollars)
for September 15, 1966-September 13, 1967

ER_{68} = average excess reserves (in dollars)
for September 14, 1967-September 11, 1968

TD_{67} = total deposits (in thousands of
dollars) for June 30, 1967.

TD_{68} = total deposits (in thousands of
dollars) for June 29, 1968.

According to these equations, a bank with $50
million in deposits, for example, is predicted to
have had average excess reserves of $36,142
($24,580 + $11,562) in 1967 and $33,592
($21,024 + $12,568) in 1968.

The most important features of Equations 1
and 2, in terms of the earlier discussion, are the
positive signs of the coefficients relating bank size
(in terms of total deposits) to excess reserves and
the size of the t-statistics, given in parentheses just
below the coefficients. The positive sign means that,
as had been predicted, excess reserve holdings do
increase with bank size. This may also be seen in
Chart 1, where the relationships depicted by
Equations 1 and 2 are graphed. The size of the
t-statistic indicates a very high confidence that the
relationship found between excess reserves and
total deposits is not due to chance or random
factors. Moreover, this is further evidence against
the hypothesis of zero-mean excess reserves, since
the hypothesis is incompatible with a non-zero
coefficient of TD. The R^2 values of 0.81 and 0.85
mean that 81 and 85 percent of the variation in
excess reserves at different banks is explained by
bank size.

IS THE RELATIONSHIP BETWEEN BANK SIZE AND EXCESS RESERVES NONLINEAR?

The earlier discussion indicated that there are a
number of reasons—e.g., lower reserve adjustment
transactions costs and lesser degrees of deposit
instability—for suspecting the relationship between

excess reserves and bank size to be non linear. In order to test for this possibility, the square of total deposits was entered as an independent variable in the regression for each of the two years. The results are Equations 3 and 4.

$$(3) \ ER_{67} =$$

$$17,882 + 0.48164 \ TD_{67} - 0.000000148 \ TD^2_{67} \quad \overset{R^2}{.88}$$
$$(4.23) \quad (9.71) \quad\quad (-5.23)$$

$$(4) \ ER_{68} =$$

$$15,786 + 0.42733 \ TD_{68} - 0.000000098 \ TD^2_{68} \quad .88$$
$$(3.31) \quad (8.16) \quad\quad (-3.49)$$

where: The terms are defined as in Equations 1 and 2.

These equations are also depicted graphically in Chart 2. Note that excess reserves again increase as total deposits increase (at least for banks with less than $1.6 billion in deposits), but that the increase in excess reserves per additional dollar of deposits diminishes as bank size increases. The t-statistics for TD and TD^2 indicate that both variables are highly significant; i.e., at a very high confidence level, the relationship between excess reserves and bank deposits is not due to chance. The R^2 values of 0.88 means that 88 percent of the variation in individual bank holdings of excess reserves is explained by bank size for each year.[13]

Equations 3 and 4 not only differ from Equations 1 and 2 structurally, but also in terms of the predicted level of excess reserves for a given size bank. For example, a bank with $50 million in deposits is predicted to have had average excess reserves of $41,594 ($17,882 + $24,082 - $370) in 1967 and $36,908 ($15,786 + $21,367 - $245) in 1968. These figures are higher than the excess reserves predicted for the same size bank by Equations 1 and 2. These differences in predicted excess reserves raise the question of which set of equations is better. The t-statistics for the coefficients of TD^2 show that the addition of the squared total deposits term significantly improves the ability of the equation to explain the level of excess reserves at the 99 percnt confidence level. Equations 3 and 4 are therefore superior to Equations 1 and 2.[14]

The superiority of the quadratic equations (3 and 4) over the linear ones (1 and 2) supports the notion that there are economies of scale in holdings of excess reserves. The issue of whether excess reserves might eventually decrease as bank size increases is not resolved. The quadratic equations do contain downward sloping portions (beyond $1.6 billion in total deposits in 1967 and $2.2 billion in 1968), but the sample contains only two banks at which total deposits exceed $500 million. Therefore, little can be said with confidence about excess reserves at large banks.

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[13] For a markedly different result, see J. A. Cacy, ''Reserve Adjustments—Some Empirical Findings,'' *Monthly Review*, Federal Reserve Bank of Kansas City, June 1971. Cacy used required reserves as a measure of bank size and averaged excess reserves over four-year periods.

[14] In addition, the Glejser test for homoscedasticity indicates that the results for Equations 3 and 4 are not distorted by hetroscedasticity; i.e., regressing the absolute values of the residuals on total deposits and total deposits squared does not yield significant coefficients. However, the tests revealed that hetroscedasticity was present in the residuals for Equations 1 and 2.

Chart 1.

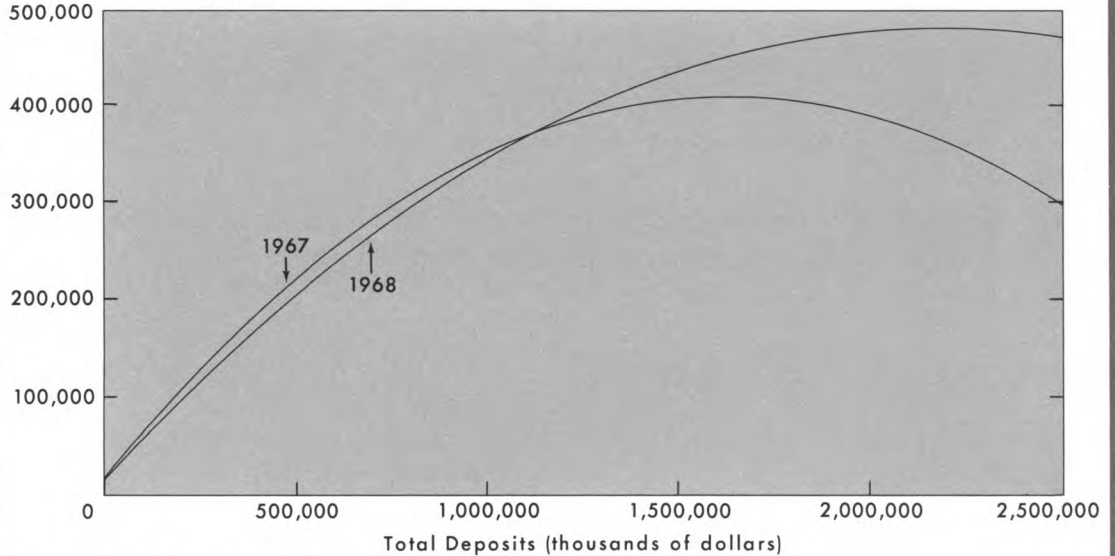## LINEAR RELATIONSHIP BETWEEN EXCESS RESERVES and BANK SIZE

Excess Reserves (dollars)
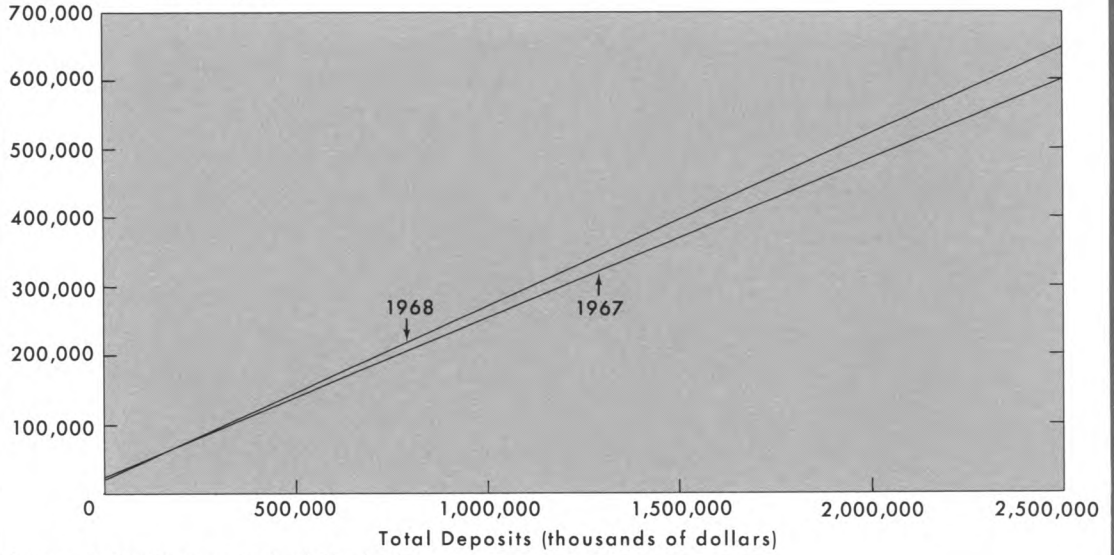
Source: Federal Reserve Bank of Cleveland

Chart 2.

NONLINEAR RELATIONSHIP BETWEEN EXCESS RESERVES and BANK SIZE

Excess Reserves (dollars)

Source: Federal Reserve Bank of Cleveland

SUMMARY

The results of this study may be summarized as follows: During the period September 15, 1966 through September 11, 1968, a very large number of sample banks held significant amounts of excess reserves. The levels of reserves were found to be positively related to a significant degree with bank size. In addition, evidence was found that supports the concept of economies of scale in the holding of excess reserves.

CAPITAL MARKET DEVELOPMENTS, 1952–1970

Edward J. Stevens

Almost half of the estimated $4 trillion of financial instruments outstanding in the United States are capital market instruments, taking the form of corporate stocks and bonds, long-term municipal and U. S. Treasury securities, mortgages, and Federal Agency issues. The other half of the $4 trillion is divided about equally between specialized claims on financial institutions, such as deposits, and "other debt," which includes money market instruments, business and consumer loans of financial institutions, and miscellaneous debts.[1]

This article reviews major developments in the capital markets in the United States since 1952, as reflected in the amounts outstanding and secondary market yields on capital market instruments. The discussion is limited to debt instruments, because changes in the combined volume of debt and equity instruments outstanding are dominated by fluctuations in stock prices. The first section of the article discusses the nature of capital markets and their place in the financial system as the dominant source of funds for nonfinancial borrowers, and as the dominant investment outlet for financial institutions. The second section analyzes changes in the volume of outstanding capital market instruments relative to the amounts outstanding in the other two broad sectors of debt markets. There is no consistent cyclical pattern in the capital market share of total debt outstanding, although there is a clear cyclical pattern in the shares of debt held as claims on financial institutions and as "other debt." The third section traces major changes in the composition of outstanding capital market debts. Since 1952, the most visible relative changes have been a steep decline in long-term U. S. Treasury securities, rapid growth of mortgage debt up until 1964, and a pronounced increase in corporate bond and Federal Agency debt since 1965. Finally, the article investigates yield spreads among the capital markets, as they reflect major changes in supply and demand conditions.

THE ROLE OF CAPITAL MARKET INSTRUMENTS IN THE FINANCIAL SYSTEM

In general, capital market instruments have long original maturities or, in the case of corporate

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[1] Estimates of total financial instruments outstanding and components are those defined in data published by the Board of Governors of the Federal Reserve System as Financial Assets and Liabilities in the Flow of Funds accounts, in the revised form of March 1970. Capital market instruments as defined here are presented individually as "transaction categories" in the accounts. Financial intermediary claims, as defined here, correspond to transaction categories of similar titles in the accounts. Other debts, as defined here, correspond to the residual after subtracting capital market and financial intermediary instruments from total financial instruments.

"Long-term" U. S. Treasury securities are defined as all those with current maturities in excess of two years and a portion of those with current maturities between one and two years. "Long-term" municipal debt includes all debts with original maturities in excess of one year. It should be noted that these definitions may differ from other specifications of "long-term."

stocks, no maturity; many can be traded in secondary markets; and most are issued to finance durable capital assets. These characteristics help to distinguish capital market instruments from specialized claims issued by financial institutions and from other financial instruments available. For example, "long-term"—meaning a long time period before the borrower has to repay—distinguishes capital market instruments from short-term money market instruments, even though both types of debt may be readily marketable, and from most claims against financial institutions, which can be redeemed on relatively short notice. "Marketability"—meaning the ability to be sold to another investor—distinguishes most capital market instruments from consumer and business term loans. Such loans may be as long-term as capital market instruments and just as likely to finance durable capital assets, but they do not enjoy a developed secondary market in which existing issues are traded.

Variations in the share of outstanding instruments in the capital market category are frequent and wide, and reflect the waxing and waning attractiveness of features of capital market instruments to both borrowers and investors. Borrowers face a choice among capital market issues, loans from financial institutions, short-term securities, and self-financing; investors face a choice among capital market instruments, claims on financial institutions, short-term securities, and real capital assets. The amount outstanding and the yield on each kind of instrument are determined by continuous interaction among borrowers, investors, and market-making institutions of the financial system, within the context of a policy-influenced economic system in which capital is largely privately accumulated and held.

Capital market instruments represented a larger percentage of all outstanding debt and equity instruments in 1970 than at the end of 1952, the first year for which a complete and consistent data source is available (Chart 1). But this net growth, from 40 percent of total debt and equity instruments in 1952 to 44 percent in 1970, came entirely from equity instruments; capital market debt instruments alone declined slightly as a percent of total debt and equity instruments outstanding. Moreover, the net increase conceals sharp fluctuations in intervening years, especially in the equity component.

Distinguishing between the behavior of debt and equity instruments is important. While there is no necessary analytic reason to set aside equities as a separate subject, the nature of the available data dictates such a course. Flow of Funds estimates of the volume of financial instruments outstanding include equities at market value, while debts are included at book value or, in the case of U. S. Government debt, at par value.[2] Only separate

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[2] Different valuation methods may be unavoidable in engineering the collection of data, but they obscure the meaning of asset data which include both debts and equities. For example, there are large year-to-year changes in the ratio of capital market instruments to total debt and equity instruments outstanding, but these changes match exactly the direction of, and have a correlation of 0.74 with, year-to-year changes in stock prices. This dominant influence of stock prices reflects two things. First, changes in stock prices are much more significant than the volume of new issues of stock as a source of change in the market value of stock outstanding. New issues account for only 5.7 percent, on average, of the change in the value of stock outstanding for those ten years in which both new issues and the change in value outstanding moved in the same direction. Second, the different methods of valuing equities and debts bias the capital market ratios because book and par valuation of marketable debts will not fully reflect variations in their market value, while variations in the market value of corporate stocks will be fully reflected in the estimated volume outstanding.

Chart 1.

CAPITAL MARKET DEBT and EQUITY INSTRUMENTS OUTSTANDING
as PERCENT of TOTAL FINANCIAL INSTRUMENTS

Percent
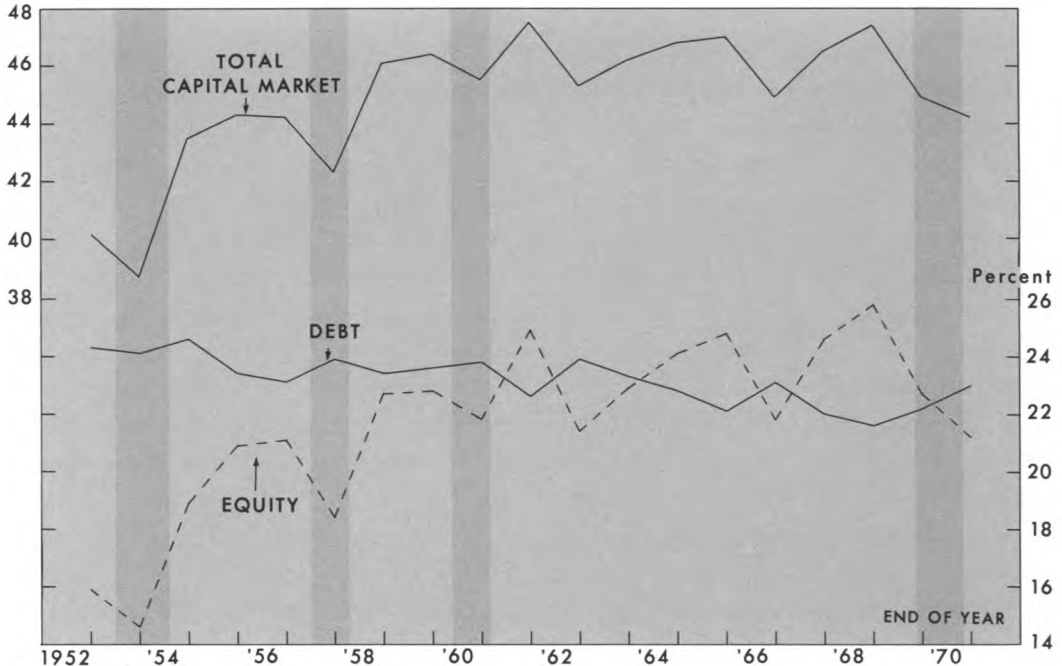
Last entry: 1970
NOTE: Shaded areas indicate periods of economic contraction as defined by the National Bureau of Economic Research.
Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts

treatment of equities and debts can clearly disentangle the influence of different valuation bases. Therefore, the remainder of this article is restricted to consideration of debt instruments.

A second, and analytically important, distinction must be made here between the issuers and the holders of debt instruments, because their relation to the capital markets is markedly different. As shown in Table I, nonfinancial units (including households, nonfinancial businesses, governments, and foreigners) are the dominant issuers of capital market instruments, with their issues (liabilities) accounting for over 90 percent of the total volume outstanding. On the other hand, financial institutions (such as commercial and savings banks, savings and loan associations,

and pension funds) are the dominant holders of capital market instruments, with their holdings (assets) accounting for almost 80 percent of the total volume outstanding. This pattern of issue and holding is reflected in balance sheet characteristics as well. Nonfinancial units issue almost half of their liabilities in the capital markets but draw only about 10 percent of their assets from those markets. In contrast, financial institutions issue only 5 percent of their liabilities in the capital markets but draw almost 60 percent of their assets from those markets. Financial institutions borrow largely outside the capital markets in order to lend largely in the capital markets. (Nonfinancial units do the same thing, but not to the same extent or as their primary business.) It is this "layering of

TABLE I

Debt Instruments Outstanding
1970
(Billions of Dollars)

Type of Instrument	Nonfinancial Sector		Financial Institution Sector	
	Assets	Liabilities	Assets	Liabilities
Capital Market				
Outstandings	$ 199.7	$869.5	$736.9	$ 67.2
As percent of all capital market instruments outstanding	21.3%	92.8%	78.7%	7.2%
As percent of total financial assets or liabilities of sector	10.7	47.0	56.6	5.1
Claims on Financial Institutions				
Outstandings	$1,002.1	$ 34.8	$ 54.9	$1,064.9
As percent of all claims outstanding	94.8%	3.2%	5.2%	96.8%
As percent of total financial assets or liabilities of sector	53.6	1.9	4.2	80.9
"Other Debt" Instruments				
Outstandings	$ 653.7	$946.4	$510.8	$ 183.7
As percent of all "other debt" instruments outstanding	56.1%	83.7%	43.9%	16.2%
As percent of total financial assets or liabilities of sector	35.0	51.1	39.2	14.0

* Types of instruments are as defined in text and Footnote 1.

Sources: Board of Governors of the Federal Reserve System and Federal Reserve
Bank of Cleveland

claims," or "indirect finance," or "intermediation" that specialized financial institutions contribute to the highly developed financial system of the United States.
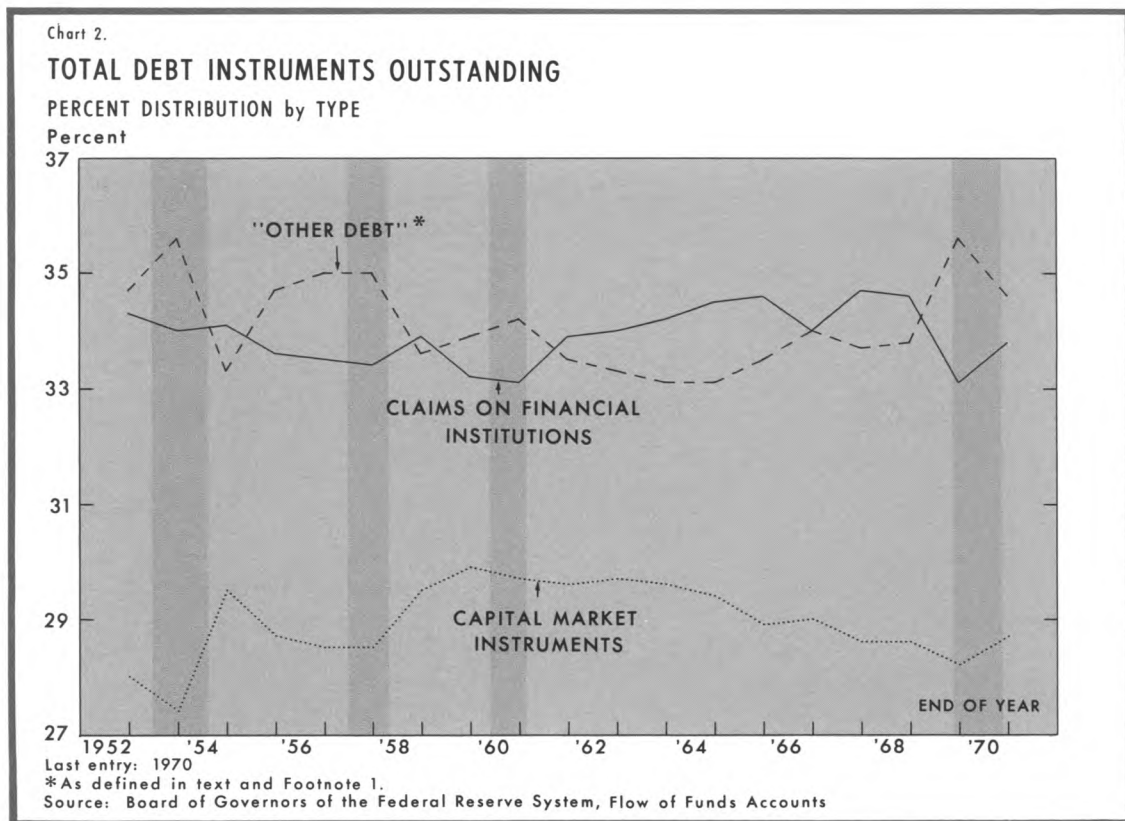
DEBT MARKETS

Capital market debt instruments represented slightly less than 30 percent of total debt instruments outstanding in 1970 (Chart 2). Enormous, but offsetting, changes in the relative volume outstanding of various kinds of capital market instruments, particularly Government long-term debt and mortgages, occurred during the 1950's and 1960's. In addition, within the short run, there were substantial changes in the capital market share of total debt, including a period of growth in the decade of the 1950's and an ensuing period of retrenchment after 1959. These short-term variations mainly reflect the differential behavior of components of the capital markets, rather than any common response of the capital markets as a whole to competitive influences from markets for financial institutions' claims or markets for "other debts."

A clear example of the nonhomogeneity of behavior of the capital markets may be seen by comparing the cyclical behavior of these markets with financial institutions' claims and "other debt." There is an obvious cyclical factor visible in the latter two markets (Chart 2), but not in the

Chart 2.

TOTAL DEBT INSTRUMENTS OUTSTANDING

PERCENT DISTRIBUTION by TYPE

Percent

Last entry: 1970
*As defined in text and Footnote 1.
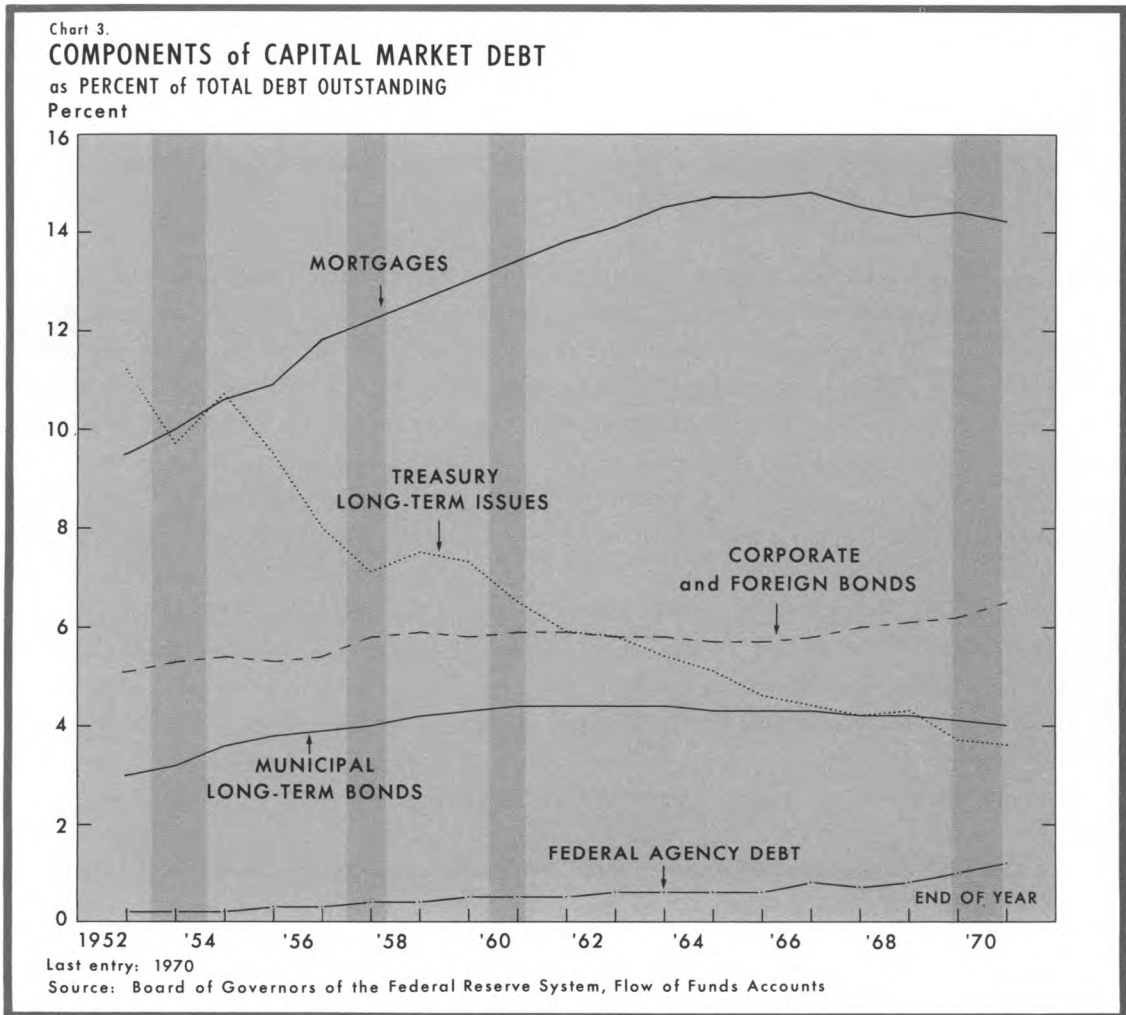Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts

capital markets. During periods of relatively rapid economic growth (1953; 1955-1957; 1959-1960; 1966; 1969), claims on financial institutions grew less rapidly than total debt. During years of recession or slow economic growth when monetary policy was generally expansionary (1954; 1958; 1961-1965; 1967; 1970), claims on financial institutions (including the "monetary aggregates") expanded more rapidly than total debt. These alternating periods of "disintermediation" and "reintermediation," as they have come to be called, have been discussed widely in recent years and are attributed to the inability of financial institutions to compete with rates of interest in securities markets when those rates are forced up by real economic expansion or restrictive financial

policy. When economic expansion is curtailed and market interest rates decline, financial institutions become competitive again and funds return to them.

The dominant interplay over the period since 1952 has been between claims on financial institutions and "other debt" instruments. This interplay is indicated in Chart 2 by the striking coincidence of comparable size movements—in opposite directions—by the financial institution and "other debt" shares in most years. However, the capital market share of total debt outstanding has not shown any such consistent cyclical variation. In some years of slow economic growth and rapid growth of financial institutions' claims (1954; 1958; 1970), the capital market share has grown;

Chart 3.
COMPONENTS of CAPITAL MARKET DEBT
as PERCENT of TOTAL DEBT OUTSTANDING

Percent

MORTGAGES

TREASURY
LONG-TERM ISSUES

CORPORATE
and FOREIGN BONDS

MUNICIPAL
LONG-TERM BONDS

FEDERAL AGENCY DEBT

END OF YEAR

1952   '54   '56   '58   '60   '62   '64   '66   '68   '70

Last entry: 1970
Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts

in other comparable periods, the capital market share has declined. One reason for this variable behavior of the capital market share is that in 1954, 1958, and 1970 the U. S. Treasury issued relatively large amounts of long-term debt, but did not do so in 1961 and 1967. However, even allowing for swings in the outstanding volume of Treasury issues in the capital markets, there has been no consistent cyclical pattern in the capital market share of total debt outstanding or in any of the segments of the capital markets.

CHANGES WITHIN THE
CAPITAL MARKETS

Two secular trends dominated capital market developments from 1952 until 1965—a shrinking proportion of long-term Treasury debt outstanding and a growing proportion of mortgage debt (Chart 3). These two trends reflect familiar, fundamental shifts in the composition of demand for output between the World War II economy and the postwar economy. As the massive debt financing of World War II receded into history, Treasury

debt of all kinds decreased rapidly relative to total debt outstanding. Long-term Treasury debt bore the brunt of this adjustment: about 57 percent of the reduction in the Treasury portion of total debt was concentrated in capital market issues, while only 25 percent was in short-term securities and 18 percent in Savings Bonds.

Mortgage debt accumulated rapidly throughout most of the post-World War II period. New construction activity, which depends heavily on mortgage financing, rebounded after World War II, reversing almost twenty years of depression and war-induced stagnation. Although the immediate postwar housing boom peaked in 1950, when private housing starts totaled almost 2 million units, the following twenty-year period in general exhibited high levels of residential construction activity compared with the previous twenty years. In addition, nonresidential construction showed strong growth throughout most of the post-World War II period.

Since 1965, changes in the relative volume of various capital market instruments outstanding have reflected the differential responses of the capital markets to high interest rates during an inflationary period. These responses are most apparent when viewing the markets separately, as shown in Chart 3.

Corporate Bonds. Among non-Federal capital market issues, the outstanding supply of corporate bonds has been relatively less sensitive to high interest rates than have been the supplies of mortgages and long-term municipal bonds. That is, as interest rates rose after 1965, the supply of corporate bonds—unlike mortgages—was not choked off. Corporate bonds increased as a percentage of outstanding debt in every year between 1965 and 1970, while, on average, mortgages and the volume of outstanding long-term municipal

securities declined. Apparently, issuers of corporate bonds were not as sensitive to higher interest rates as were issuers of mortgages and municipal bonds; and, equally important, high interest rates induced investors to accumulate corporate holdings.

A major factor underlying the rapid expansion of corporate bonds outstanding was the poor performance of internal sources of funds at non-financial corporate businesses during the period. Gross internal funds[3] had increased by about 50 percent between 1962 and 1966, but then varied only slightly around the 1966 dollar value in the following four years, largely because undistributed after-tax profits declined sharply. Capital expenditures increased relative to internal sources of funds during the same period, leaving a widening margin of capital expenditures to be financed by external sources. This growing need for external funds was translated into new corporate bond issues with some time lag. New issues were largest during the cyclical slowing of interest rate increases in 1967 and 1970, when corporations funded their debt while capital expenditures were cyclically depressed. Nevertheless, over the past five years, a growing need for external funds brought about rapid growth of corporate bonds relative to all other capital market instruments outstanding. This occurred despite a level of interest rates high enough to attract new investors to the corporate market.

Municipal Bonds. Long-term municipal debt declined slightly from 1965 to 1970, relative to both total debt outstanding and outstanding corporate debt. Municipal debt had been declining as a proportion of total debt outstanding in the early

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[3]Including undistributed after-tax profits, foreign branch profits, inventory valuation adjustment, and capital consumption allowances.

1960's, reflecting somewhat faster growth of state and local receipts than payments. However, as the level of interest rates rose after 1965, the decline in municipal debt was accelerated in 1967 as state and local governments economized on short-term assets (currency, demand deposits, and U. S. Government securities). When interest rates escalated toward unprecedented levels in 1969, long-term municipal debt issues were often severely constrained by legal ceilings on permissible interest rates, a situation that continued throughout much of 1970 as well. Under these circumstances, short-term borrowings provided a safety valve for state and local borrowing. As a percentage of total debt outstanding, increased short-term debt more than offset decreased capital market debt of state and local governments in both 1969 and 1970.

Mortgages. Mortgage debt also declined relative to total debt outstanding between 1965 and 1970, but the year-by-year pattern was quite different from that of municipal debt. For the period as a whole, the tendency of the stock of mortgage debt to shrink relative to total debt is associated with the declining share of total debt intermediated by financial institutions (see Chart 2). Whereas financial institutions acquired over 96 percent of the increase in outstanding mortgages between 1960 and 1965, they acquired only 78 percent of the increase between 1965 and 1970. Within this latter period, mortgage debt grew slightly faster than total debt only in years when disintermediation was evident (1966; 1969), but decreased relative to total debt and corporate bonds in years when reintermediation took place (1967; 1970). This odd pattern reflects the combination of cushioning effects of Federal Agency operations on the mortgage market and of cyclical portfolio adjustments by financial institutions.

Agency operations, both in lending to mortgage-purchasing institutions and in underwriting the development of secondary market arrangements, expanded enormously in both 1966 and 1969, channeling funds into the mortgage market from the bond and short-term securities markets in which the Agencies float their own debt. At the same time, and no doubt in part for the same reason, financial institutions allocated a larger-than-normal percentage of their assets to the mortgage market. This portfolio adjustment, matched by similar adjustments in financial institutions' corporate bond holdings, was accomplished by economizing on shorter-term assets in institutions' portfolios. In both 1966 and 1969, there was a significant increase in the percentage of their asset growth placed in capital market instruments. On the other hand in 1967-1968, as financial institutions grew more rapidly in a period of reintermediation and less restrictive monetary policy, Federal Agency operations were curtailed and financial institutions allocated a much smaller proportion of asset growth to capital market instruments, especially mortgages.

Long-term Treasury Bonds. Long-term Treasury debt has fluctuated around the $100 billion level since 1952. This means that long-term Treasury issues have declined appreciably relative to the growing volume of total public and private debt outstanding.[4] Shrinkage of the long-term Treasury

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[4] The decline would be even sharper were intermediate-term issues—with maturities in the 1-5 year or 1-10 year range—excluded from the "long-term" category. Flow of Funds data make only one maturity distinction for Treasury debt, on a sliding scale, between less than two years and more than two years. For a discussion of long-term Government bonds using five years to maturity as the dividing line, see James L. Kochan, "U. S. Government Bonds as Capital Market Instruments," *Economic Review,* Federal Reserve Bank of Cleveland, August 1971, pp. 3-18.

share of total debt was slower after 1965 than in the preceding years, just as the entire Federal share of total debt outstanding has shrunk more slowly in the past five years. This in turn was a reflection of the budgetary position of the Federal Government, which showed relatively large deficits in 1967—when tax receipts were depressed by a slow-down in economic growth—and in 1970—when receipts were again depressed by a recession. In 1968, over $9 billion of long-term Treasury securities were issued, briefly reversing the continuing decline in the Treasury portion of total debt outstanding.

Federal Agency Issues.[5] Agency debt grew modestly from 1952 to 1965 and much more rapidly since then. Most of this recent buildup in volume outstanding was concentrated in 1966, 1969, and 1970 as a result of Federal National Mortgage Association (FNMA) and Federal Home Loan Bank System (FHLB) issues. These reflected Agency operations to support the mortgage market through FNMA mortgage purchases and FHLB loans to savings and loan associations to finance mortgage holdings. Expansion of these mortgage support operations was a major factor allowing the previously noted expansion of mortgage debt in 1966 and 1969.

Summary. This discussion of divergent capital market developments since 1965 may be summed up briefly. As interest rates escalated during an inflationary period, the capital markets contracted relative to other debt markets. Within the capital markets, corporations issued an increasing supply of bonds to the capital market for financing, and these supplies were bought as corporate bond yields were bid up relative to most other capital market yields. The only additional source of growth in the capital market share of debt was a marked increase in the volume of Federal Agency issues. Long-term Treasury debt continued to decline, although at a reduced rate. Despite interludes in 1966 and 1969 and in spite of a sizable expansion in Agency support operations, the mortgage market contracted as financial institutions lightened their mortgage acquisitions. Similarly, the long-term municipal bond market share of total debt shrank, triggered by interest rate ceilings and accommodated by state and local governments' reduced liquid asset holdings and increased reliance on short-term debt.
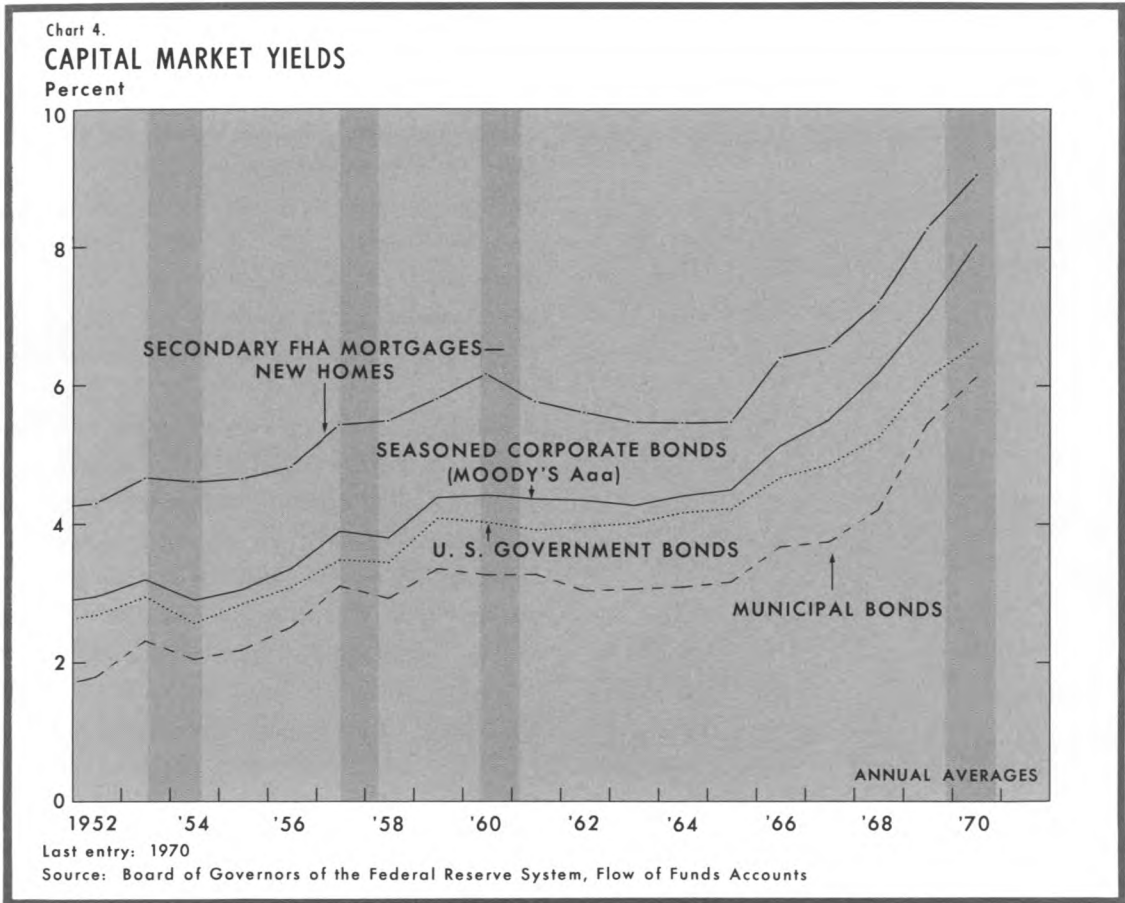
YIELDS IN CAPITAL MARKETS

Capital market yields vary among securities, reflecting different visible features such as maturity dates, coupon rates, call provisions, conversion privileges, and quality ratings. But even holding these features constant, some securities normally have higher yields than others, reflecting less readily quantified differences in default risk, holding costs, and tax treatment. The normal pattern of yield spreads is apparent from the four capital market yields shown in Chart 4. During the period from 1952 through 1970, on an average annual basis, the municipal bond yield was always lower than each of the other three yields; the Treasury long-term bond yield was always lower than the corporate bond yield and the mortgage yield; the corporate bond yield was always lower (by a minimum of 98 basis points) than the mortgage yield.

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[5]Agency debt refers to the issues of the five privately owned Federal credit agencies that are excluded from the U. S. Government Budget. They include the Federal Home Loan Banks, Federal National Mortgage Association, Federal Intermediate Credit Banks, Banks for Cooperatives, and Federal Land Banks. All agency debt, short or long, is included in these calculations. Flow of Funds data do not permit a distinction between short- and long-term Agency issues, which are somewhat arbitrarily included in this discussion of capital markets because of their relation to the mortgage market.

Chart 4.

CAPITAL MARKET YIELDS

Percent

SECONDARY FHA MORTGAGES—
NEW HOMES

SEASONED CORPORATE BONDS
(MOODY'S Aaa)

U. S. GOVERNMENT BONDS

MUNICIPAL BONDS

ANNUAL AVERAGES

Last entry: 1970
Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts

There are plausible explanations for the usual ranking of yields within the capital markets. Treasury long-term bonds carry a lower yield than comparable corporate bonds because default on U. S. Government bonds is inconceivable, while even the most blue-chip of contemporary corporations might encounter future difficulties resulting in default. Municipal bonds are not riskless (municipalities have been known to default on their debts), but interest on such debt is exempt from Federal income taxation so that these bonds are able to sell at lower yields than comparable Treasury and corporate taxable bonds. Mortgage yields—even the yield on Government insured

mortgages shown in Chart 4—exceed yields on the highest quality corporate bonds. Several factors contribute to this particular yield spread, including the costs and uncertainties of originating and servicing small denomination mortgage instruments and, especially in the case of uninsured mortgages, limited marketability.

While there are good reasons for yields on some capital market instruments to be always higher or lower than yields on other capital market instruments, the resulting yield spreads are not constant over time. (The annual averages also conceal important cyclical variations in these spreads.) All capital market yields increased dramatically

TABLE II

Capital Market Yield Spreads
1952-1970
(Basis Points)

Change In	1952–1960	1960–1965	1965–1970
Mortgage yield minus yield on:			
Municipal bonds	+46	−75	+60
Corporate bonds	+47	−83	+1
Long-term Treasury bonds	+59	−95	+118
Municipal yield minus yields on:			
Corporate bonds	+1	−18	−59
Mortgages	−46	+65	−60
Long-term Treasury bonds	+13	−30	+58
Corporate yield minus yield on:			
Municipal bonds	−1	+18	+59
Mortgages	−47	+83	−1
Long-term Treasury bonds	+12	−12	+117
Long-term Treasury yield minus yield on:			
Municipal bonds	−13	+30	−58
Corporate bonds	−12	+12	−117
Mortgages	−59	+95	−118

Sources: Board of Governors of the Federal Reserve
System and Federal Reserve Bank of Cleveland

between 1952 and 1969 along with yields on all other types of debt instruments, but the upward thrust of yields was not in unison. Basis point spreads among the four capital market yields changed continually over the period, as summarized in Table II.

The general contour of these changes in yield spreads indicates that one important factor influencing yield spreads is the elemental pressure of supply and demand. At times, yield spreads have responded to changes in supply, as indicated by the relative volume of outstanding instruments in the various capital markets. For example, between 1952 and 1960, mortgage yields rose relative to other capital market yields (Table II) as mortgage debt grew faster than other capital market debt outstanding (Chart 3); at the same time, long-term Treasury yields fell relative to

other capital market yields (Table II) as long-term Treasury debt declined relative to other capital market debt outstanding (Chart 3).

At other times, yield spreads have responded to changes in demand, as indicated by the changing portfolio behavior of financial institutions, the major holders of capital market instruments. For example, between 1960 and 1965, mortgage and municipal bond yields declined relative to other capital market yields (Table II) even though the relative volume of mortgage debt grew more rapidly, and the relative volume of municipal debt declined less rapidly than corporate and long-term Treasury debt (Chart 3). The explanation for this yield behavior is that financial institutions absorbed 96 percent of the increase in outstanding mortgage market instruments in this period, compared with 82 percent in the 1952-1960 period, and they absorbed 75 percent of the increase in municipal bond market instruments during 1960-1965, compared with only 42 percent in the earlier period. On the other hand, financial institutions absorbed about the same proportion of the change in outstanding corporate and Treasury long-term instruments in 1960-1965 as in 1952-1960 (and their yield spread changed very little). Apparently, the redirection of demands for capital market instruments allowed the mortgage and municipal bond market shares to increase relative to corporate bond and Treasury long-term bond market shares and, at the same time, bid down yields on mortgages and municipal bonds relative to the other two yields.

Finally, there appear to be distinct differences among the capital markets in the responsiveness of both borrowers (suppliers of instruments) and nonfinancial investors (demanders of instruments) to yields. The performance of the corporate bond market since 1965 tends to confirm the view of many observers that, as compared with the mort-

gage market, borrowers have been less sensitive, and nonfinancial investors more sensitive, to higher yields. This has allowed the corporate bond market share to increase relative to other capital market shares in recent years, even though financial institutions absorbed a relatively smaller percentage of corporate bonds outstanding. As corporate bond yields rose relative to most other capital market yields from 1965 through 1970 (Table II), nonfinancial units acquired 50 percent of the addition to corporate bonds outstanding, as compared with only about 25 percent from 1952 through 1965. On the other hand, the performance of the mortgage market suggests that, as yields rose, borrowers quickly cut back on mortgage financing, but nonfinancial units did not increase their holdings substantially. They acquired only 22 percent of the addition to mortgages outstanding from 1965 through 1970, as compared with 18 percent from 1952 through 1960 and 4 percent from 1960 through 1965. Consequently, even though mortgage yields have increased relative to other capital market yields, the mortgage market has suffered a decreased market share in recent years when, on balance, financial institutions experienced disintermediation. This happened despite the efforts of various Governmental and quasi-governmental programs to counteract these apparent characteristics of borrowers and nonfinancial portfolio managers by channeling funds from other securities markets into the mortgage market. Of course, this is not to say that Federal efforts to reduce the volatility of the mortgage market have failed, compared with what might have been.

CONCLUSION

There are three general conclusions to be drawn from the experience of capital markets since 1952 and more especially since 1965. First, the relative decline of long-term Treasury debt and growth of mortgage debt have altered substantially the composition of capital market debt outstanding; mortgages have risen as a proportion of capital market debt, while long-term Treasury issues have fallen as a proportion of capital market debt outstanding. These offsetting changes, in conjunction with modest growth of corporate, Agency, and long-term municipal bonds maintained the share of capital market debt at roughly 30 percent of total debt outstanding in the United States since 1952.

Second, from 1965 through 1970, corporate bonds and Agency debt supplanted mortgage debt as the major source of growth in capital market debt outstanding. Corporations turned to capital market financing because internal sources of funds were depressed. Although Agency operations expanded in support of the mortgage market and mortgage yields rose by more than other capital market yields, the share of mortgages in the capital market declined from 1965 through 1970.

Third, and related to the second, the capital markets have shown different responses to changing interest rates in the inflationary period starting in 1965. This is most readily apparent in the differential behavior of the corporate bond and mortgage markets. Corporate bond yields increased no more than did mortgage yields; but, whereas corporate bonds have increased as a percent of total debt outstanding, mortgages have declined. Apparently, as interest rates were bid up, corporate borrowers were not deterred as much as mortgage borrowers, and corporate bond holders were more readily induced to increase holdings than were potential mortgage holders. Thus, the consequences of high and rising interest rates fell more heavily on the mortgage market. It was this sector of the capital market that could not compete for funds with the corporate bond market.