JOINT TREASURY — FEDERAL RESERVE
STUDY OF THE U.S. GOVERNMENT
SECURITIES MARKET
Staff Studies — Part 2

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Staff Studies—Part 2

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NOTE TO READERS

The papers in this pamphlet were prepared as background material for a joint Treasury–Federal Reserve study of the U.S. Government securities market initiated in early 1966 to evaluate how that market was functioning in light of the institutional and public policy changes that had taken place in the first half of the 1960's. The final REPORT OF THE JOINT TREASURY–FEDERAL RESERVE STUDY OF THE U.S. GOVERNMENT SECURITIES MARKET was published in April 1969.

For the most part the individual papers do not include data or comments concerning the period after mid-1967.

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FINANCIAL AND ECONOMIC ENVIRONMENT
OF THE 1960's IN RELATION TO
THE U.S. GOVERNMENT SECURITIES MARKET

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I. INTRODUCTION

The U.S. economy since 1960 has been quite different from that of the earlier post-World-War-II period.[1] In the earlier period, the gross national product showed considerably more cyclical movement (Chart 1). During the second half of the 1940's the economy was dominated by the large deferred demands of the 1930's and of the World-War-II period, which culminated in a recession in 1949—the first of the postwar period. The early 1950's were dominated by the Korean conflict. After

1 | GROSS NATIONAL PRODUCT

a second recession, in 1954, the economy moved into a capital goods boom, which ended in another recession, in 1957–58. A sharp but

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[1] This paper focuses on the 1960–65 period, with only passing reference to later developments. The first half of the decade was a period of innovation in financial markets and in public policies, and it encompasses the essential background for an analysis of the changing structure and performance of the U.S. Government securities market.

brief expansion occurred in 1958–60, but it failed to bring the economy to full employment before the mild economic downturn of 1960.

Throughout most of the first half of the 1960's, on the other hand, economic growth was steady—tracing out the longest peacetime expansion on record—and prices and costs were remarkably stable. This desirable state of affairs was marred, however, by a relatively high, although declining, rate of unemployment and by a continued deficit in our balance of payments. And then after mid-1965 the greater expenditures associated with the war in Vietnam, superimposed on the expanding economy, led to increasing prices and shortages of goods in some areas.

In part as a result of the different problems faced over the period and in part as a result of the lessons learned earlier in the postwar years, public policies were altered—in some cases markedly. At the same time, and interacting with basic economic forces and with the public policies being followed, there were a number of innovations and evolutions in the financial system itself.

All of these changes in the 1960's were reflected in financial markets. This paper attempts to relate the different economic and financial environment of the 1960's to developments in one financial market: that for marketable U.S. Government securities. The second section discusses the basic characteristics of the economy during the 1960's; the third, public policy; and the fourth, changes in the financial environment originating basically outside of shifts in public policy. In the final section all of these factors will be related to the changing nature of the Government securities market. The appendix discusses in more detail international developments and their effects on this market.

II. BASIC CHARACTERISTICS OF THE U.S. ECONOMY IN THE 1960's

During the first 6 years of the 1960's, the U.S. economy experienced the longest peacetime period of uninterrupted expansion on record. Growth during most of the period was accompanied by unusual stability in financial markets and in prices. In the latter part of 1965 and in 1966, however, large and rising defense expenditures related to the conflict in Vietnam contributed to an erosion of price stability and to the emergence of conditions—such as large inventory accumulation and increased plant and equipment outlays—that in the past had been associated with the development of cyclical instabilities in the economy.

The average annual rate of growth of real GNP over the 1960–65 period was 4.7 per cent, twice the rate shown from 1957 to 1960 and two-thirds larger than from 1953 to 1957. While the length and size of the upswing from 1960 to 1965 are the hallmarks of the period, other characteristics are also of great importance. Throughout the period, for example, the U.S. balance of payments deficit remained quite large. Even though our exports continued to exceed our imports, the combined effects of capital outflows (both private and governmental), prosperity abroad, attractive substitute assets, and foreign policies both widened the U.S. payments deficit and caused the rate of gold outflow to accelerate. As a result, U.S. policies had to cope with a payments deficit—which had presented little difficulty in the earlier postwar period—in such a way as to reduce net outflows during a period when output of the domestic economy was below the full-employment level.

On the domestic scene, growth in output was steady and balanced, and prices and costs showed unusual stability from early 1961 until the first half of 1965. The average rate of unemployment, on the other hand, remained higher than in the mid-1950's. After declining in 1961, it showed little change until 1964, when it started to move down again. After

about mid-1965, output began to accelerate, capital expenditures continued to rise sharply —increasing as a share of GNP, the unemployment rate declined to its mid-1950 level, and price increases became more general.

The orderliness of the expansion in the early 1960's stands in sharp contrast to the 1950's when expenditures for plant and equipment and for inventory increased more rapidly than consumer demands. At the same time, the cost and price stability of this period was in sharp contrast to the mid-1950's and contributed importantly to the reversal of expectations of continued inflation, which had characterized the 1950's. With fears of inflation sharply reduced, investors became more willing buyers of long-term fixed-return securities. In addition, because capital expenditures were restrained by excess capacity during much of the period and profits were large and growing, businesses were able to finance most of their outlays from internally generated funds.

Both the end of "inflationary psychology" and the reduced rate of new capital issues by businesses were important factors in maintaining the relative stability of long-term interest rates prior to mid-1965—a sharp contrast to previous periods of expansion (Chart 2). Total credit demands increased each year, of course, but only a little faster than output. In the earlier part of the expansion, much of the increased demand for credit was accounted for by the Federal Government and by foreigners, who found U.S. markets attractive sources of funds; but as the expansion progressed, private requirements provided the upward thrust to total credit demands.

Other factors, such as institutional changes in the financial mechanism, also contributed to this relative stability of long-term yields, but the more receptive market for long-term securities and the limited demand for funds in the capital markets until mid-1965 were the crucial factors. After mid-1965 and in 1966,

however, greater concern about inflationary pressures, increased demands to finance growing private capital outlays, and a marked tightening of monetary policy were major factors in the sharp run-up in interest rates. Interest rates not only rose sharply but also fluctuated more than they had earlier in the decade, as financial markets became sensitive to uncertainties concerning public policies, the Vietnamese conflict, and the stability of the economy. □

2 INTEREST RATES, 1954-66
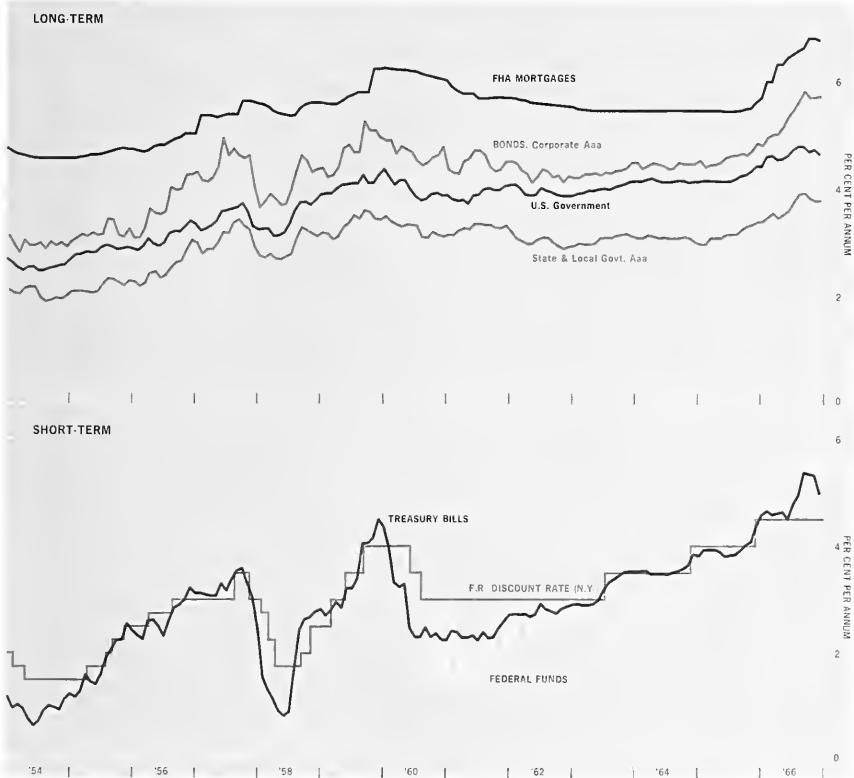
Monthly averages of daily or weekly figures except for mortgages (based on quotations for 1 day each month). Yields: FHA-insured mortgages, weighted averages of private secondary market prices of certain new-house mortgages converted to annual yield; State and local Aaa-tax-equivalent, from Moody's Investors Service, adjusted to a tax-equivalent basis assuming a 36 per cent individual income tax rate; corporate Aaa new issues, calculated from bonds rated Aaa, Aa, and A by Moody's Investors Service and adjusted to an Aaa basis; U.S. Govt. bonds, market yields adjusted to constant maturity (20 years) by U.S. Treasury; U.S. Treasury bills, market rates on 3-month issues.

III. PUBLIC POLICY

In this section, the various public policies—fiscal, monetary, and debt management—that influenced economic expansion in the 1960–65 period will be discussed in turn. Underlying most of the policy actions taken was the desire to foster the growth of the economy from its reduced operating rate of 1960–61—within the constraint of a persistent balance of payments deficit.

FISCAL POLICY

Throughout the early 1960's fiscal policy was used more aggressively to stimulate aggregate demand than at any other time in our history. Fiscal policy measures to increase such demand contributed importantly to the public's expectations that the economy—once recovery was under way—would continue to advance and that the power of the Federal Government would be used quickly to counter any economic reversal.

In an economic environment such as that of the early 1960's, fiscal policy was a particularly valuable tool in stimulating demand. One of the advantages of fiscal actions is that they have such a broadly based economic influence. Furthermore, unlike stimulative monetary policies, they bring no direct downward pressures on interest rates and consequently do not contribute to capital outflows, which in the 1960's would have enlarged the U.S. payments deficit.

Stimulative fiscal policy actions encompassed both increased expenditures and reductions in tax rates. Cash expenditures of the U.S. Government over the 5 years 1961–65 expanded by more than $33 billion. Not all of these increased outlays were associated with anticyclical policies, but three reductions in tax rates—in 1962, 1964, and 1965—were enacted essentially in order to expand demand. Reductions in these rates are estimated to have reduced tax inflows by $23.4 billion in the years the adjustments were effective.[2] With re-

duced tax rates and higher outlays, "fiscal drag"—as indicated by the full-employment surplus, which estimates the amount by which tax revenues would exceed expenditures at full employment—was sharply reduced as the 1960's progressed.

With the expansive fiscal policy of the 1960's, the annual cash deficit of the Federal Government increased to an average of $5.1 billion for the period 1961–65.[3] For various technical reasons, this much larger cash deficit translated into an average annual increase in the marketable debt of $5.8 billion, which was more than the $4.9 billion average annual increase in such debt for the period 1954–60. The major reason for the large increase in marketable debt in the first half of the 1960's was the retirement of nonmarketable debt, which was financed by increased marketable issues. Agency issues, participation certificates (PC's), changes in the Treasury cash balance, purchases for Treasury trust accounts, and special issues also influenced the relationship between the deficit and the volume of marketable securities sold. While this paper is concerned primarily with marketable issues, it should be remembered that increased reliance on agency securities and PC's—especially in 1966—increased the stock of financial assets that compete directly with marketable Treasury issues for the funds of investors.

DEBT MANAGEMENT AND FEDERAL RESERVE OPEN MARKET OPERATIONS

In this section open market operations of the Federal Reserve System and Treasury pol-

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[2] In 1962, in an effort to increase investment, depreciation guidelines were revised and on certain investments, businesses could apply a credit against their tax liabilities in the year of the expenditure. It is estimated that these actions reduced tax inflows in 1962 by $1.25 billion and $1.0 billion, respectively. In 1964, in two stages, personal and corporate income tax rates were lowered, reducing estimated tax inflows by $7.6 billion in 1964 and $11.5 billion in 1965. In 1965 a reduction in certain excise taxes reduced tax inflow in that year by $1.9 billion. The $5.6 billion increase in social security taxes in 1966 is ignored.

[3] The average cash deficit of $5.1 billion was lowered by $0.3 billion as a result of sales of participation certificates from 1962 through 1965, which cumulated to $1.9 billion. These PC's are negative expenditures, which reduce the cash deficit.

icies will be considered more or less jointly. During the early 1960's both the Federal Reserve and the Treasury were guided mainly by the same general objectives: to foster economic expansion while minimizing downward pressure on short-term market rates of interest, which could contribute to accelerated capital outflows. In addition, the Treasury sought to lengthen and balance the structure of its outstanding debt in order to ease the problems of refunding maturing issues.

Stance of monetary policy. As the decade of the 1960's began, monetary policy was concerned primarily with contributing to expansion in domestic output, which was considerably below the capacity of the economy. In furthering this objective, the Federal Reserve System supplied reserves more rapidly than in the 1950's, and a part of the increase in total reserves of member banks in the first half of the decade was indicative of the expansive stance of policy. Nevertheless, a large part of the increase in the reserve base reflected the acceleration of time deposit inflows, as is discussed below. As funds were shifted to commercial bank time deposits from other financial assets, banks' needs for reserves increased, and the System generally supplied the funds to meet such needs.

In addition to fostering economic expansion, the Federal Reserve attempted to reduce downward pressures on short-term interest rates, which had declined to very low levels in previous periods of expansive monetary policy. Open market operations were the major vehicle for restraining the downward pressure on short-term rates, but other methods were also used. For example, in 1960 the discount rate was reduced—but only to 3 per cent, whereas in 1958 it had been lowered to 1¾ per cent. The discount rate was changed infrequently in the period 1960 to mid-1965; it was raised to 3½ per cent in mid-1963 and to 4 per cent in late 1964. The relative stability of the discount rate during the period reflected the steady course of monetary policy, and it was taken by the market as indicative, in part, of the likelihood for interest-rate stability.

Reflecting the expansive monetary policy, borrowings at the Federal Reserve by member

banks remained relatively small until mid-1965. Over the period from mid-1960 until late 1964 excess reserves had exceeded such borrowings —the longest time span of continuous free reserves since the Treasury–Federal Reserve accord. Moreover, the level of free reserves was generally kept more stable than in earlier periods—a factor tending to reinforce expectations that monetary policy would not be sharply changed. In turn, these expectations contributed to generally reduced week-to-week fluctuations in short-term interest rates.

Federal Reserve open market operations: Size and activity. In the first half of the 1960's, as compared with the 1950's, the Federal Reserve System was a much larger factor over-all in the Government securities market: It more than doubled its average annual gross transactions (purchases and sales), almost tripled its outright transactions in the market, and almost doubled its repurchase agreements (RP's) with Government securities dealers (Table 1). Moreover—and of greater

TABLE 1: FEDERAL RESERVE SYSTEM TRANSACTIONS IN U.S. GOVERNMENT SECURITIES, SELECTED PERIODS

Annual averages

Item	1954–60	1961–65
	Billions of dollars	
Total transactions[1]	**14.9**	**32.5**
Outright	5.6	15.0
Repurchase agreements	9.4	17.5
Net purchases[2]	**.2**	**2.7**
	Per cent	
Net purchases/net new issues of marketable securities:		
Including repurchase agreements	4.4	52.3
Excluding repurchase agreements	4.9	52.7

[1] Purchases, sales, and repurchase agreements.
[2] Change in holdings of the System Open Market Account.

importance—the System increased the rate at which it added to its portfolio. Average annual net purchases increased from $200 million to $2.7 billion. As a result, the System Open Market Account absorbed an amount equal to more than one-half of the new issues of marketable securities in the 1960's as compared with less than 5 per cent in the 1950's.

The increased operations of the System in the Government securities market reflected both technical factors and the generally expansive monetary policy, which required a larger in-

crease in the banking system's stock of required reserves.[4] One reason, for example, for the increase in gross operations was that fluctuations in factors affecting reserves showed a net increase, and this made it necessary for the System to take greater offsetting actions. Both float and public holdings of currency showed wider swings in the late 1960's—due to the increased pace of transactions, the increased demand for currency, and the revision in regulations permitting the use of vault cash to satisfy reserve requirements—and these fluctuations were only partially offset by the reduced variation in Treasury deposits at the Federal Reserve Banks following adoption of a new procedure for making calls on tax and loan accounts. The increased holdings of Treasury issues by the Federal Reserve, of course, reflected not only the System's objective of fostering expansion but also the increased holdings of currency by the public and the greater outflows of gold—both of which the System offset through open market operations. In addition, the sharper increase in bank credit that resulted from the movement of funds from nonbank institutions and the market into bank time deposits and the reduced use of changes in reserve requirements increased the need for the Federal Reserve to supply additional reserves to the banking system.

In the 1960–65 period, the System also made greater use of RP's and of direct transactions with foreign accounts, both of which are believed to be factors that tend to reduce fluctuations in interest rates. That is, the use of RP's with dealers to supply temporary reserve needs, it is thought, reduces fluctuations in short-term interest rates by eliminating the downward rate pressure caused by outright System purchases and the upward pressure caused by System sales.[5] And transactions with foreign accounts may have less effect on market rates

of interest than similar transactions with dealers. Generally, the transactions with foreign accounts coincided with the needs of the System to supply or absorb reserves and eliminated the necessity for the System to, say, sell for foreign account and simultaneously buy for its own account.[6] The effect of simultaneous transactions on interest rates is uncertain, however. According to the Axilrod–Krummack study, "If the market sees both types of transactions, there is no certainty that the rate effects will cancel out, because of the likelihood that undue weight will be given to the System's own transactions."[7]

Federal Reserve operations: Maturity structure. In addition to increases in both the gross activity in, and the net absorption of, Treasury issues by the System Open Market Account, Federal Reserve transactions in Government securities were broadened to a wider range of maturities in the early 1960's. This action was required by the need for the System to supply reserves by open market purchases in order to foster economic expansion, while at the same time trying to avoid downward pressures on Treasury bill rates, which might accelerate the movement of short-term interest-sensitive funds abroad. In order to further these conflicting goals, the Federal Open Market Committee abandoned its "bills usually" policy and authorized the Manager of the System Open Market Account to operate in coupon

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tories to rise above desired levels. With RP's the dealer knows that inventory used in an RP agreement will soon be available to satisfy customer demand. Increased use of RP's—by making favorable financing available to dealers—may also cause dealers to hold larger inventories at each level of prices. See Axilrod and Krummack, *op. cit.*

[6] Annual purchases by the System from foreign accounts rose from an average of $0.5 billion in the period 1954–60 to $2.1 billion in 1961–65; and sales to foreign accounts rose from $0.8 billion to $1.8 billion. Increased transactions were made possible, in part, because of larger foreign holdings of Treasury issues, a result of the cumulative impact of the U.S. deficit with the rest of the world. The relatively greater increases in purchases reflected the System's need to supply relatively more reserves. The greater purchases than sales, however, tended to shield the market from some downward pressure.

[7] Axilrod and Krummack, *op. cit.*, p. 827.

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[4] This discussion is based on S. H. Axilrod and J. Krummack, "Federal Reserve Security Transactions," Federal Reserve *Bulletin,* July 1964, pp. 822–37.

[5] If it is assumed that dealers are content with their inventories at current prices, System purchases may cause dealers to bid for new inventories, and subsequent sales by the System may cause dealer inven-

issues. But it still contemplated that the bulk of the System's operations would continue to be in bills.

As indicated in Table 2, the System continued to transact most of its operations in bills, and increasingly so during each year of the 1960's as the need to avoid downward pressure on bill rates receded with the general upward movement in short-term yields. However, over the 5 years 1961 through 1965, about 65 per cent of the net purchases of the System took the form of bills as compared with 87 per cent for the 1954–60 period (third panel of Table 2). Almost all of the remaining 35 per cent of net purchases in the 1960's were in coupon issues with maturities of more than 1 year, with almost two-thirds of these in the 1- to 5-year maturity category (bottom panel of Table 2). These ratios should be compared with the 1950's when less than 1 per cent of the net purchases represented coupon issues maturing in more than 1 year.

Net acquisitions of coupon issues by the System were relatively the largest in the early 1960's—when the need to avoid downward pressure on short-term yields was greatest. Thus, in 1961 more than 85 per cent of its net purchases were in coupon issues with maturities of more than 1 year, and almost one-third of these matured after 5 years. Net purchases of after-10-year maturities were never large. However, most of the reduction in net purchases of coupon issues as the 1960's progressed centered in the 1- to 5-year maturity range. As a result, purchases of issues maturing after 5 years became a larger proportion of System coupon acquisitions; in the 3 years 1963–65 such purchases accounted for nearly one-half of all net acquisitions of coupon issues by the System Account.

TABLE 2: MATURITY DISTRIBUTION OF FEDERAL RESERVE SYSTEM TRANSACTIONS, SELECTED PERIODS

In per cent

Type and maturity of issue	Average 1954–60	Average 1961–65	1961	1962	1963	1964	1965
	Total purchases						
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Bills	93.0	79.6	63.6	69.3	82.8	90.2	90.6
Coupon issues maturing (in years):							
Within 1	6.7	3.6	6.6	11.0	.6	...	...
1 to 5	.1	11.0	21.1	16.0	9.6	4.4	5.1
After 5	.2	5.7	8.7	3.7	7.0	5.3	4.3
	Total sales						
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Bills	97.3	91.9	74.1	92.4	97.7	100.0	100.0
Coupon issues maturing (in years):							
Within 1	2.6	7.2	24.3	6.0	1.2	...	...
1 to 5	.1	.9	1.6	1.6	1.1	...	...
After 5	...	...	...	...	...	...	...
	Net purchases (purchases less sales)						
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Bills	87.3	64.0	42.9	19.4	67.0	79.6	83.6
Coupon issues maturing (in years):							
Within 1	12.1	—.9	—28.7	22.0	(1)	.1	...
1 to 5	(1)	23.9	59.9	47.0	18.6	9.3	8.8
After 5	.5	13.0	25.9	11.7	14.4	11.0	7.6
	Net purchases of coupon issues maturing after 1 year						
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Maturing (in years):							
1 to 5	5.2	64.8	69.9	80.1	56.5	45.8	53.8
5 to 10	46.6	29.7	25.2	17.9	38.7	43.3	36.6
After 10	48.3	5.6	4.9	2.0	4.8	10.9	9.7

[1] Less than one-tenth of 1 per cent.

NOTE.—Includes purchases from and sales to dealers and foreign accounts directly. Details may not add to totals because of rounding.

It should be noted that transactions in coupon issues were not used for day-to-day reserve adjustment purposes by the System, but rather as one vehicle for supplying reserves. As indicated in the first and second panels of Table 2, coupon issues maturing in more than 1 year, while they were not an insignificant share of gross purchases in the 1960's, were never of much consequence relative to gross sales. No securities maturing after 5 years were sold by the Account, and 1- to 5-year issues were never as much as 2 per cent of sales.

Treasury operations: Maturity structure of new issues. While the Federal Reserve was absorbing a greater quantity of Government securities, deficits in the Federal budget rose, and the Treasury increased the supply of marketable issues by more than $25 billion. In determining the maturity of issues to finance these deficits, the Treasury was guided by two conflicting goals. On the one hand, it wanted to place upward pressure on short-term yields while reducing such pressures on long-term yields, a goal that the Federal Reserve System shared. On the other hand, in order to ease refinancing problems, it also wanted to extend the average maturity of the public debt.

To further the first objective, the Treasury financed about 80 per cent of its deficit by issues of bills (Table 3). The annual increase in bill issues during the 1961–65 period exceeded that of all other post-accord years except 1959 —when outstanding bills increased sharply as the statutory 4¼ per cent rate ceiling on bonds forced the Treasury to finance its large deficit in the short-term market. Within each year of the period 1961–65, the timing of Treasury bill offerings for new cash was such as to contribute

to modifying the tendencies for bill rates to decline. Moreover, the reduced market stock of bills resulting from larger Federal Reserve net purchases tended to cause the Treasury to continue to increase new bill offerings so as to add to the supply of bills available for public purchase.

The second debt management objective— extension of the average maturity of the debt— was obviously in conflict with the increase in bill issues. To offset the effect of these larger issues, the Treasury sold more than $68 billion of new bonds in the period 1961 through 1965 (Table 4). Of these new issues, $50 billion were marketed by means of the new advance refunding technique; the remainder represented other exchanges, cash refinancings, and new cash issues. As may be seen from Table 3, these sales of bonds shifted 1- to 5-year coupon issues into the 5- to 10-year area and shifted 10- to 20-year maturities to the after-20-year area. This shifting of maturities outward did serve to increase the average maturity of the debt despite the net increase of only $5 billion in new coupon issues, the passage of time, and the greater net growth in bill issues.

Most of the Treasury's success in shifting maturities outward reflected the advance refunding technique, first used in 1960. Under this procedure, the Treasury offers holders of certain outstanding issues that will not mature for some time the option of exchanging their holdings for new securities of longer maturity. Advance refundings do not influence the cash position of the Treasury in the event of a low exchange ratio—since the old issue is not yet due—and they give the Treasury complete freedom of timing.

TABLE 3: CHANGE IN U.S. GOVERNMENT MARKETABLE SECURITIES OUTSTANDING BY MATURITY, SELECTED PERIODS

Maturity of issue	Billions of dollars						Per cent	
	1961	1962	1963	1964	1965	Total, 1961–65	1961–65	1954–60
Total	7.0	6.9	4.7	4.9	2.1	25.6	100.0	100.0
Bills	4.0	4.9	3.2	5.0	3.7	20.8	81.3	57.8
Coupon issues maturing (in years):								
Within 1	6.6	—2.0	—1.1	—5.9	1.2	—1.2	—4.7	—56.1
1 to 5	—5.9	—4.8	—3.1	5.5	—3.4	—11.7	—45.7	124.7
5 to 10	1.1	14.2	1.7	.7	—1.4	16.3	63.7	—4.7
10 to 20	—1.2	—7.5	3.9	—2.3	2.3	—4.8	—18.8	—49.1
After 20	2.4	2.1	.1	1.9	—.3	6.2	24.2	27.3

However, the major virtue suggested for the technique is its influence on longer-term yields. Since investor preferences as to the maturity of issues in their portfolios vary, investors that desire longer-term issues tend to sell issues from their portfolios as those issues move closer to maturity, whereas most holders of short-term issues do not want to exchange their holdings for long-term issues. Thus, the reasoning suggests, if exchanges can be offered before outstanding obligations are shifted to short-term investors, holders should be more willing to exchange their securities for longer-term issues. Indeed, there is evidence that advance refundings of longer-term issues ("senior" advance refundings) are in fact carried out with little market churning, and probably with less effect on market yields; those that are carried out when the issues that can be exchanged have shorter maturities ("junior" advance refundings and "pre-refundings") have been characterized by relatively greater market activity and probably more upward yield pressure.[8]

For two reasons, however, senior advance refundings were carried out only three times in this period, the last one being in early 1962. First, those three exchanges essentially cleared out the public holdings of issues that would be candidates for senior advance refundings—public holdings of after-5-year bonds held by groups that might be interested in exchanging their holdings for longer-term bonds before those bonds passed into the shorter-term category. Second, the core of the Treasury's refunding problem has been the large amount of issues with 1- to 5-year maturities; hence, pre-refundings and junior advance refundings have been carried out much more often.

Exchanges through advance refundings added almost $10.0 billion to the after-20-year maturity area and almost $4.0 billion to the 10- to 20-year maturity area from the end of 1960 to the end of 1965. After about mid-1965, the statutory 4¼ per cent rate ceiling on bonds

[8] See Thomas R. Beard, *U.S. Treasury Advance Refunding, June 1960–July 1964* (Washington: Board of Governors of the Federal Reserve System, 1965), especially Ch. 3.

made it impossible for the Treasury to sell longer-term issues.

TABLE 4: MATURITY OF BONDS ISSUED BY U.S. TREASURY, 1961–65
In billions of dollars

Year	Maturity (in years):			
	5 to 10	10 to 20	After 20	Total
Advance refundings:[1]				
1961	6.0	[3]1.2	[3]2.6	9.8
1962	5.4	.6	[3]1.8	7.8
1963	7.0	2.1	1.3	10.4
1964	10.4	...	1.9	12.3
1965	7.5	...	2.2	9.7
Total, 1961–65	36.3	3.9	9.8	50.0
Other:[2]				
1961	1.1	.5	...	1.6
1962	7.8	...	.4	8.2
1963	4.4	..	.6	5.0
1964	...	1.5	...	1.5
1965	2.1	..	...	2.1
Total, 1961–65	15.4	2.0	1.0	18.4
Total:				
1961	7.1	1.7	2.6	11.4
1962	13.2	.6	2.2	16.0
1963	11.4	2.1	1.9	15.4
1964	10.4	1.5	1.9	13.8
1965	9.6	...	2.2	11.8
Total, 1961–65	51.7	5.9	10.8	68.4

[1] Includes pre-refundings and junior and senior advance refundings. Table does not include a $0.3 billion junior advance refunding and a $4.0 billion senior advance refunding, both of which occurred in 1960; all of the senior issues matured after 20 years and all of the junior issues in 5 to 10 years.

The $50 billion of issues shown here as being offered in advance refundings include only bonds. An additional $9.6 billion of securities issued via advance refundings matured in less than 5 years. Of the total of $67.8 billion of securities issued in advance refundings from June 1960 through January 1965 (the last issue), $13.5 billion matured in less than 5 years.

[2] Includes other exchanges, cash refinancings, and new cash issues.

[3] Senior advance refunding.

Treasury operations: Investment accounts. In carrying out its goals, the Treasury not only changed the maturity structure of the debt but also became more aggressive in using its investment powers—in administering the portfolios of some Federal agencies and trust funds—to affect the market for its own securities. These investment accounts must allocate their funds to Government issues—either special issues or marketable debt. In the 1960's purchases of marketable issues for trust accounts were apparently used in part to enhance the market for Treasury debt through the subscription period of a refunding, to assist the market's digestion of new issues, and at other times to contribute to the smooth functioning of the market.

In the first half of the 1960's the Treasury investment accounts acquired $5.3 billion of marketable issues, or about one-fifth of the net

TABLE 5: CHANGE IN HOLDINGS OF U.S. GOVERNMENT MARKETABLE SECURITIES OF TREASURY OFFICIAL ACCOUNTS, SELECTED PERIODS, BY MATURITY

Maturity of issue	Billions of dollars						Per cent	
	1961	1962	1963	1964	1965	Total, 1961–65	1961–65	1954–60
Total	.5	1.0	2.3	.2	1.3	5.3	100.0	100.0
Bills	...	.3	.5	−.1	−.3	.4	7.5	10.9
Coupon issues maturing (in years):								
Within 1	−.2	...	−.2	−.1	...	−.5	−9.4	17.4
1 to 5	−.5	−.5	.5	.5	.8	.8	15.1	47.8
5 to 10	...	1.1	.3	.1	.3	1.8	34.0	26.1
10 to 20	.4	−.5	.8	−.5	.4	.6	11.3	−26.1
After 20	.8	.6	.3	.4	.1	2.2	41.5	23.9
Acquisitions as a percentage of net new issues	7.1	14.5	48.9	4.1	61.9	...	20.7	13.4

new issues, as compared with less than 15 per cent of such issues in the period 1954–60. Although such purchases rose less dramatically in both dollar and percentage terms than those of the Federal Reserve System over the first half of the 1960's, the maturity composition of Treasury acquisitions changed considerably.

During this period the Treasury investment accounts reduced their holdings of within-1-year issues—contributing to upward movements in short-term yields—and sharply increased their acquisitions of long-term bonds. Almost 90 per cent of their net purchases were in bonds maturing after 5 years—as compared with somewhat over 20 per cent in the 1950's—and over 40 per cent of their net acquisitions matured in more than 20 years—as compared with about 24 per cent in the 1950's. In addition to the fact that most of their purchases were concentrated in the long-term area, these purchases represented a large share of the new issues— 27 per cent of all new bonds maturing in over 5 years and 41 per cent of all bonds maturing after 20 years.

These aggregates clearly indicate the importance of the Treasury's investment operations in the 1960's as a factor influencing the long-term market. In the next section a more disaggregated analysis of Treasury open market operations will be presented within the context of all official operations in the 1960's.

PUBLIC POLICY: EFFECTS

Fiscal and monetary policies contributed importantly to the economic expansion of the first half of the 1960's. In addition, debt management and Treasury and Federal Reserve open market operations succeeded in furthering the secondary objectives of increasing short-term interest rates, as well as extending the maturity of the public debt, without bringing undue upward pressure on long-term rates.

Despite the slightly larger dollar-average annual increase in total marketable debt in the 1960's, the public actually absorbed considerably less of the increase, on the average, in the 1961–65 period than in 1954–60. As indicated in Table 6, official-account purchases absorbed almost three-fourths of total new issues in the 1961–65 period—over four times the share of official-account absorption in the 1950's—so the public, on the average, acquired only one-third the dollar volume of marketable Treasury issues that it had taken in the earlier period. After 1962, public holdings of marketable debt showed either a very small increase or actually declined. Under these circumstances, interest-rate pressures emanating from

TABLE 6: CHANGES IN OWNERSHIP OF U.S. GOVERNMENT MARKETABLE SECURITIES OUTSTANDING, SELECTED PERIODS

Annual averages

Owner	Billions of dollars		Per cent	
	1954–60	1961–65	1961–65	1954–60
Total	4.9	5.1	100.0	100.0
Official accounts, total	.9	3.8	73.0	17.8
Federal Reserve	.2	2.7	52.3	4.4
Treasury	.7	1.1	20.7	13.4
Public, total	4.0	1.3	27.0	82.3

NOTE.—Percentages based on actual change, not average annual change.

financing requirements of the Federal deficit were minimal.

However, as indicated in Table 7, the much greater increase in short-term securities outstanding led to a much larger increase in the public holdings of Treasury issues maturing within 1 year (bills and coupon issues). Public holdings of these securities rose by more than $10 billion in the period 1961–65, and this increase contributed to upward rate pressures in the short-term markets. On the other hand, public holdings of issues maturing in more than 1 year declined by more than $3 billion, and

TABLE 7: U.S. GOVERNMENT MARKETABLE SECURITIES OUTSTANDING
Changes in Ownership, 1961–65, by Maturity of Holdings
In billions of dollars

Maturity of issue	Total outstand-ing	Official-account holdings			Public hold-ings
		Federal Reserve	Treasury	Total	
Total	25.6	13.4	5.3	18.7	6.9
Bills	20.8	6.1	.4	6.5	14.3
Coupon issues maturing (in years):					
Within 1 ...	−1.2	3.5	−.5	3.0	−4.2
1-5	−11.7	3.4	.8	4.2	−15.9
5-10	16.3	.2	1.8	2.0	14.3
10-20	−4.8	−.1	.6	.5	−5.2
After 20 ...	6.2	.2	2.2	2.4	3.7

NOTE.—Details do not necessarily add, because of rounding. Note that data in Table 6 were average annual changes while these data are total changes.

public holdings of bonds due in more than 10 years declined by almost $2 billion—tending to reduce pressure on long-term rates. But mainly as a result of the advance refunding technique, total outstandings were shifted outward from the 1- to 5-year to the 5- to 10-year, and from the 10- to 20-year to the after-20-year maturity categories. As a result, even though total public holdings of longer-term issues declined, the average maturity of the debt was extended. And both official-account purchases of long-term bonds and the advance refunding technique itself, as described earlier, tended to limit the rate impact of the shifting outward in the maturity structure of the public's holdings of bonds.

Despite their importance, the gross movements in Treasury financing, described above, were not the only factors that affected interest rates. For example, the larger volume of Federal Reserve transactions in Treasury issues was not solely a passive reaction to greater swings in the factors affecting reserves. Given balance of payments considerations—as well as new debt management techniques—both the higher level of transactions and the greater use of RP's and direct transactions with foreign accounts were directed toward stabilizing rate movements, insofar as possible without conflicting with other Federal Reserve objectives. Stabilization of short-term rates was also enhanced by additional offerings of bills by the Treasury when required to offset downward movements in rates.

The success of the Federal Reserve and the Treasury in stabilizing longer-term rates by open market activities was not merely the result of their gross absorption of a not insignificant amount of coupon issues, but rather was related to the timing and psychological consequences of actions. Two or three examples are worth mentioning:

In 1963 the Treasury engaged in two advance refundings—in March and September. In the one in March there were very sharp increases in dealers' inventories of 5- to 10- and of 10- to 20-year bonds—much larger increases than had occurred in similar financings in 1961 and 1962. To restrain the potential upward rate movements, the Treasury stepped up its purchases. In September, when dealers' holdings of bonds with after-20-year maturities rose sharply, Treasury activity was even more pronounced. In September and October combined, the Treasury purchased $350 million of after-20-year bonds, $100 million of 10- to 20-year bonds, and $150 million of 5- to 10-year bonds. These purchases helped the dealers to reduce their inventory holdings sharply and thus avoided a possibly sharp increase in long-term interest rates.

The year 1965 offers another example. In January, an advance refunding had increased dealers' inventories of securities with 5- to 10-year and after-20-year maturities quite sharply. There was little official-account purchasing in the 5- to 10-year area, but even so, inventories

moved down quickly. One large Treasury purchase ($325 million) of after-20-year bonds helped to reduce dealer positions in that area. Then in a refinancing in May, dealers increased sharply their holdings of 5- to 10-year bonds and also began to absorb market sales of after-20-year bonds, so their holdings of coupon issues became quite large over the spring and summer at the same time that market rates began to rise as a result of an increasing volume of private issues and of expectations associated with the escalation of the war in Vietnam. In May and June the Federal Reserve purchased $200 million of 5- to 10-year issues and about $50 million of longer-term bonds, which helped dealer positions somewhat. But with dealer inventories still quite large in the long-term bond area, the Treasury came into the market in August and September. In those 2 months it acquired $230 million of after-20-year bonds and $150 million of 5- to 20-year bonds in order to absorb some of the excess supply in the market. It was exactly this kind of activity —timed, hopefully, to avoid sharp rate movements—that made official-account activities so important in the 1960's, and that—given the

over-all calm economic and financial environment—furthered market expectations that interest rates would remain relatively stable.

Official-account activities of this intermittent sort, however, can only offset temporary or short-run market pressures. They cannot contribute to rate stability over the long run if basic economic forces are moving strongly in an inflationary direction. The activities of the 1960's were not designed to counter continuously the factors of supply and demand in the market, but only to smooth the pressures stemming from these factors. Indeed, the Treasury activities of the late summer of 1965 were undertaken in the realization that while it was desirable to take some overhang of securities off the market, this would best be accomplished at a declining scale of prices, in view of the fundamental forces making for higher interest rates. The further relatively sharp price declines after official operations were a harbinger of the strong credit demand pressures to come later in 1965 and 1966, and they signified the impossibility of maintaining relatively stable interest rates while attempting to counteract an overly expansive domestic economy. □

IV. CHANGING ENVIRONMENT IN PRIVATE FINANCIAL MARKETS

Shifts in official operations and debt management techniques were not the only changes in the financial environment that affected the Government securities markets in the 1960's. Financial markets in general were strongly influenced by the growing sophistication of the banking system—especially by banks' more aggressive use of Federal funds and time deposits, the latter being fostered by more permissive regulation of rate ceilings by the Federal Reserve. The increased use of these sources of funds affected the portfolio policies of banks and the financing behavior of other borrowers and lenders.

Another major change in the financial environment of the 1960's was the much greater international mobility of funds, related in large part to the return to convertibility by the major European countries in the late 1950's. The return to currency convertibility, coupled with the wide and persistent U.S. balance of payments deficit, not only contributed to a larger outflow of gold from this country but also increased the mobility of international capital— and hence the impact of credit market conditions abroad on U.S. markets, and vice versa. These developments, of course, were the reason that public policies brought upward pressure on short-term U.S rates, but they also—along with the greater issuance of attractive bank time deposits—specifically affected foreign demand for Treasury issues. This matter is discussed in considerably more detail in the Appendix to this study.

FEDERAL FUNDS AND TIME DEPOSIT GROWTH

The increased use of Federal funds in the 1960's was a continuation of the trend of the previous decade. Over the first 6 years of the 1960's, however, the gross volume of transactions rose quite sharply; Table 8 shows the extent of the increase at 46 major banks. Not only did the volume rise, but also a greater

number of banks began to take part in the market; smaller banks, in particular, entered the market for the first time—usually as sellers. Contributing to wider and deeper participation in the Federal funds market were rising levels of yields, greater sophistication in portfolio management, and—as a result—the development of regional markets for the purchase and sale of Federal funds.

TABLE 8: FEDERAL FUNDS TRANSACTIONS OF 46 MAJOR BANKS, 1960–65

Year		Billions of dollars [1]
1960	....	98.3
1961	....	101.2
1962	....	127.6
1963	....	151.0
1964	....	160.2
1965	....	180.1

[1] Sum of weekly averages of daily figures of gross purchases and gross sales.

Some of the implications of these developments for financial markets will be considered below with the discussion of the effects of increased inflows of time deposits.

Probably the most dramatic shift in private financial markets in the 1960's was the sharply increased inflow of time and savings deposits to commercial banks. The average annual rate of such inflow accelerated from 6.5 per cent in 1954–60 to more than 15 per cent in the 1961–65 period. As a result, time deposits, which had been less than a third of total private bank deposits in 1954, had become the dominant private deposit liability of banks by the end of 1965.

Several factors accounted for this dramatic shift in bank liabilities. The most basic of these was the desire of banks to regain their competitive position relative not only to nonbank claims but also to financial assets traded in the market. In the 1950's corporations had increasingly sought to hold more of their liquid assets in earning form, such as Treasury bills; in so doing they reduced their holdings of such assets as demand deposits. Consumers had also shifted

an increasingly larger share of their financial asset holdings to claims on nonbank institutions, the yields on which exceeded the return on bank time and savings deposits by a wide margin. By offering more attractive rates on time deposits, banks hoped to regain some of the funds that both of those groups had shifted into competing financial assets.

Banks were better able in the 1960's to engage in this competition because the Board of Governors of the Federal Reserve System increased Regulation Q ceilings—the maximum rates that member banks may pay on time and savings deposits—four times in the 1961–65 period, after the one previous increase—in 1957 —since the Board was given authority in 1933 to establish such ceilings. The increases of 1957 and 1962 were motivated mainly by equity reasons, since banks had been placed at a competitive disadvantage by relatively low rate ceilings. Increasingly after 1962, however, changes in the ceiling rate were made largely so that banks could remain competitive. Prior to the 1960's, time and savings deposit inflows had decelerated rapidly in periods of economic expansion when banks were unable to continue to offer rates competitive with rates available in the market and at other institutions.[9] In the 1960's, the increases in Regulation Q ceilings permitted banks to continue to attract such deposits.

Another reason for the sharp increase in time deposit growth was that banks throughout the country aggressively used—and often were competitively forced to use—their new rate freedom to design and offer deposit forms such as the small-denomination certificates of deposit (CD's) that would appeal to certain investor groups. An even more important innovation—which took place in early 1961— was the decision of major New York City banks to offer large-denomination negotiable CD's to all investor groups; earlier these banks had refused to accept time deposits from corporate customers. Negotiability was assured by pre-

vious agreements with Government securities dealers to make a market in the paper. With New York City banks in this market, outstanding negotiable CD's increased from $400 million in early 1961 to more than $16 billion in 1965. By then, they were the second largest money market instrument—exceeded in aggregate volume only by Treasury bills.

With funds flowing into deposits at an increasing rate, bank credit expanded sharply. The average annual growth rate was about 9 per cent in the 1961–65 period, about twice as rapid as in 1954–60. In addition, banks increased their share of total credit flows from 21 per cent in the former period to 35 per cent in the 1960's.

Growth in bank deposits represented in large part a diversion of funds by the public from other financial assets—money, deposits at nonbank institutions, and securities. The nature and degree of substitution are unknown, but it appears that the public's increase in time deposit holdings came at the expense of nonbank claims, and mainly securities (Chart 3). Corporate businesses sharply reduced their purchases of Treasury issues as they acquired more time deposits, but on the whole public purchases of Treasury issues declined only modestly as a share of total financial asset acqui-

3 FINANCIAL ASSET ACQUISITIONS OF PRIVATE DOMESTIC NONFINANCIAL PUBLIC
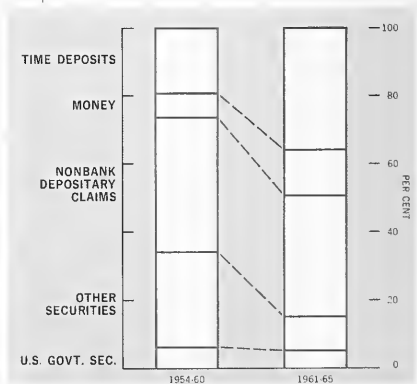
sitions. With public purchases of time deposits sharply increased, banks acquired some of the financial assets that would otherwise have been purchased by nonbank institutions and the public. In particular, banks acquired an enlarged share of the offerings in the municipal bond and mortgage markets.

Increased time deposit flows also had an effect on business borrowing patterns. Mortgage credit was readily available, and such credit increased sharply as a proportion of all business credit. Banks supplied a larger share of such loans as well as of the total volume of funds acquired by businesses in the 1961–65 period. Inasmuch as both loans and mortgages were available on easy terms, businesses relied considerably less on security issues.

EFFECTS OF BANKING INNOVATIONS ON FINANCIAL MARKETS

The increased use of Federal funds and the greater reliance on time deposits by commercial banks were symptomatic of a more aggressive banking system. In turn, these developments influenced private financial markets, with implications for the demand for Treasury issues and the behavior of the Government securities market.

Interest-rate structure. From 1961 until mid-1965, short-term interest rates generally rose, while long-term rates generally were unusually stable. As indicated earlier, this was one of the goals—and results—of monetary and debt management policies. The increased inflows of time deposits to commercial banks, however, contributed to this so-called "operation twist," and many observers have even gone so far as to suggest that the changes made in Regulation Q—which permitted banks to raise their rates and increase their time deposits —were more important to this development than open market operations and debt management.

Commercial banks, by increasing the supply of short-term financial assets—particularly negotiable CD's, added to the upward pressure on short-term yields. At the same time, however, business loan demand failed to pick up until late 1964, short-term yields were below long-term yields, and pressures on banks to offset the higher costs of deposits increased, so banks added to long-term assets—particularly real estate loans, State and local government bonds, and term loans to businesses. Moreover, with banks meeting a greater share of the total credit demand—especially of businesses and State and local governments—the volume of long-term securities issued in capital markets was reduced. As a result of these developments, upward pressures on long-term yields, especially yields on State and local government issues and corporate bonds, were lessened considerably relative to previous postwar expansions.

Interest-rate stability. The increased use of Federal funds and time deposits by banks was also an important factor—along with the stability of the economy and public policies—tending to increase the stability of market yields, particularly in short-term markets where week-to-week fluctuations in yields during the 1960's were considerably less than during the 1950's. During the 1960's the number of banks active in both these markets rose. In addition, the public increased its demand for money market instruments—accelerating the trend of the late 1950's. With the increased number of participants and the greater supply and variety of money market instruments, the ability of both buyers and issuers to arbitrage between markets increased sharply.[10] Such arbitraging among an increased number of instruments that may be substituted for one another—in an environment in which interest rate expectations were stable—contributed importantly to reduced fluctuations in market yields. Moreover, the new ability of banks to increase or decrease their time deposits—especially CD's —with small shadings in rates significantly increased the flexibility with which the aggregate stock of money market instruments could expand and contract.

In addition to reduced fluctuations in short-term market yields, developments in private

[10] See Robert W. Stone, "The Changing Structure of the Money Market," Federal Reserve Bank of New York *Monthly Review,* February 1965, pp. 32–38.

financial markets growing out of bank portfolio policies—as well as of public policies and the stable growth of the 1960's—tended to reduce fluctuations in, and to compress the spreads between, yields on both short- and long-term market instruments. In particular, the broadening of the range of assets acquired by commercial banks and the heightened sensitivity of all investors to rate relationships tended to draw yields closer together. The only exception to this development was in the municipal bond market. The very large purchases of such securities by banks tended to reduce tax-exempt yields considerably below other market yields. Thus, the yield spread between Treasury issues and municipal bonds tended to widen in the 1960's.

Dealer loan rates. Inasmuch as banks were more sensitive to alternative yields, were participating more in the Federal funds market, and were more active bidders for negotiable CD's, dealer loan rates at banks during the 1960's tended to move more closely with other yields. In turn, this closer matching by banks of opportunity costs tended to increase the sensitivity of dealer positions to market yields.

As a result, dealer loan rates at both New York City banks and at large commercial banks outside New York moved closer to the rates on Treasury bills and Federal funds, with the yields on these alternative bank assets tending to act as a floor to dealer loan rates. In addition, dealer loan rates at New York City banks and banks outside moved closer together in the 1960's, and at both groups of banks tended to move closer to the discount rate. It may be noted that in 1966, when the discount rate became out of touch with market rates, dealer loan rates were rather closely tied to the Federal funds rate, with the latter rate acting as the "floor" rate for much of the time.

Corporate demand for Treasury securities. The major buyers of the increased volume of negotiable CD's were nonfinancial corporations. The premium of 20 to 40 basis points that CD yields command over Treasury bills acted as a powerful magnet drawing corporate funds into such assets, despite the fact that CD's are less liquid than Treasury bills. The higher CD yields, the development of a secondary market for CD's, and the availability of specific maturities tended to increase sharply corporate purchases of time deposits in the 1960's. As corporations stepped up purchases of both time deposits and other private open market paper to obtain better earnings, they reduced their acquisitions of Treasury issues. Indeed, in 1964 and 1965, prior to the general shortfall of internal fund generation relative to capital outlays, corporations reduced their Government security holdings while continuing to acquire large volumes of time deposits.

Bank demands for Treasury securities. It would be expected that if banks expanded their participation in the Federal funds market and increased their use of time deposits—especially negotiable CD's—they would reduce their demand for liquid assets, particularly Government securities. This expectation is based on the increased ability and willingness of banks to finance reserve adjustments, deposit withdrawals, and sharp changes in loan demand by borrowing in both the CD and Federal funds markets, which would mean that they

TABLE 9: SHARE OF OUTSTANDING U.S. MARKETABLE GOVERNMENT SECURITIES HELD BY COMMERCIAL BANKS, DECEMBER 31, SELECTED YEARS

In per cent

Maturity of issue	1953	1960	1961	1962	1963	1964	1965
Total	39.6	32.6	24.4	32.6	30.5	30.0	28.3
Bills	25.6	20.8	26.7	24.6	21.9	24.4	22.1
Coupon issues maturing (in years):							
Within 1	43.2	25.6	34.1	29.0	22.7	27.8	27.7
1 to 5	60.2	49.5	50.5	49.0	52.1	42.7	38.9
5 to 10	51.2	34.2	30.3	35.6	32.5	35.2	38.3
10 to 20	15.6	14.4	15.8	4.3	8.3	3.3	4.8
After 20	12.5	5.5	3.7	3.2	3.8	3.4	4.7

would not need liquid assets that they could sell to accomplish these purposes.

But such was not the case. Even though banks of all classes did reduce their holdings of Treasury securities in dollar volume and relative to other assets in the 1960's, the reductions were no sharper than those in the 1950's. Moreover, all classes of banks increased markedly the proportion of their Government securities portfolio in short-term form, when bank demand for the most liquid Government securities would have been expected to decline. In addition there was some increase in the share of banks' holdings of after-5-year bonds—mainly in the 5- to 10-year area. It was only in holdings of 1- to 5-year issues that there was a marked decline. The shift in maturity composition in the after-1-year area reflected in part bank participation in advance refundings during the period.

The failure of bill holdings of banks to show a large decline in the 1960's is perplexing. However, there are two possible explanations. First, Treasury bills became relatively more attractive as yield spreads compressed. For example, throughout most of the period, finance company paper and commercial paper paid considerably smaller premiums over bills than they had during periods of rising market rates in the 1950's. Second, it is clear that while banks increased their use of both the CD and the Federal funds markets in the 1960's for reserve adjustments, these same factors may at the same time have increased banks' demand for portfolio liquidity. For example, the extensive purchases by banks of longer-term assets, such as municipal bonds, and the increasing amount of bank liabilities sensitive to yield differentials may have caused banks to increase their holdings of such assets as Treasury bills, which can be liquidated quickly at little cost.

As banks' demands for various maturities changed in the 1960's, so did their share of all outstanding Treasury issues. Thus, in 1965, banks as a group held a moderately higher share of issues in the within-1-year and the 5- to 10-year maturity ranges, but in all other maturity categories their shares were less than

in 1960. In aggregate dollar volume their holdings had declined somewhat.

EVALUATION OF INNOVATIONS

Perhaps the most important effect of changes in private markets during the 1960's was the contribution of commercial bank behavior to the public policy goal of keeping upward pressure on short-term rates while moderating the rise in long-term rates. It is possible that the debt management and monetary policies of this period would not have succeeded without the "borrowing short and lending long" activities of banks. Not only did these actions add to the supply of short-term financial assets and increase the demand by financial institutions for long-term financial assets, but also the supply of long-term market securities issued directly in capital markets was reduced by the enlarged flow of credit granted by financial institutions.

At the same time, the behavior of commercial banks contributed to the increasing sensitivity of financial markets to interest-rate differentials. As a result, bank behavior was an important factor in maintaining the stability of rates and in compressing the yields on financial assets. Expanded arbitraging between markets and an increased elasticity to the supply of financial assets were important in this regard.

Despite some relative increase in bank demand for bills, these innovations in private financial markets tended on balance, however, to reduce the demand for short-term Treasury securities by expanding the supply of attractive substitutes. On the other hand, demand for longer-term Treasury issues may have been increased somewhat by these developments. Holdings by banks of 5- to 10-year issues did rise in the 1960's, along with their holdings of other longer-term assets. In addition, the reduced yields on municipal bonds—brought about in large part by increased bank purchases—tended to make long-term Treasury issues relatively more attractive.

Finally, the innovations in financial markets tended to link rates on loans to Government securities dealers to the opportunity costs of bank funds. Thus, dealer financing costs were

kept more in tune with money market pressures. With dealer costs tending neither to rise nor to decline more rapidly than other rates—as they had in the 1950's—pressure on U.S. Government securities dealers to unload or to build up inventories because of financing costs was reduced during the bulk of the 1960–65 period, and the reduced pressure contributed to the relative stability of interest rates on Government securities. After mid-1965, however, dealer loan rates fluctuated more widely than other money market rates, and at times the increases were sharp enough to generate substantial upward yield pressures.   □

V. GENERAL CONCLUSIONS

In assessing the effects of the economic environment of the 1960's on the Government securities market, it is difficult to separate the broad economic and financial developments that were peculiar to the period—but might recur again—from the long-lasting financial innovations in both the private and public sectors. The stability of economic growth and prices and the relatively limited demand for funds in the private sector throughout a good part of the first half of the decade contributed importantly to the stability of long-term yields, while the rapid acceleration of demands and the resultant inflationary pressures from mid-1965 to late 1966 created the basis for much of the sharp upward movement in all interest rates. Although there are unique historical circumstances that establish the macroeconomic and broad expectational characteristics of any specific period of time, it is quite possible that a period of stable growth such as occurred between 1961 and mid-1965 could occur again—contributing to similar developments in financial markets and interest rates.

In this concluding section, however, it is more fruitful to summarize the implications that center around innovations in public policy and private financial markets. Many of these developments—while certainly not unrelated to the general economic environment—for the most part did represent conscious changes from the past, rather than merely a "concatenation of circumstances."

Thus, after 1960, public policies directly influenced the behavior of the Government securities market to a degree not known since the Treasury–Federal Reserve accord of 1951.

Attempts to influence the structure of interest rates included: (1) more careful designing of the maturity composition of new offerings—one that would provide a flexible response of new issues to current market conditions; (2) the advance refunding technique; (3) aggressive Treasury trust-account purchases and sales; and (4) a more flexible and dynamic open market policy at the Federal Reserve. The net result of these official operations was to increase sharply the quantity of short-term obligations held by the public and to shift outward the maturity of the public's holdings of long-term securities without a large increase in the public's total holdings of coupon issues. These operations helped to increase short-term yields without bringing upward pressure on long-term yields. Moreover, more aggressive and flexible response to short-run rate movements by the Treasury and Federal Reserve contributed to a greater stability of yields.

The "twist" of the term structure of rates, as well as the greater short-run stability of yields, however, was probably influenced more by innovations in private financial markets than by changes in official policy. The aggressive issuance of time deposits by commercial banks added more to the public's holdings of short-term assets than did debt management techniques, broadly defined. Moreover, the increased demand by banks and other financial institutions for long-term financial assets—and a parallel reduction in the pace of private direct capital market financing during most of this period—added greatly to stability in long-term interest rates. In addition, the expanded elasticity of the supply of money market assets

engendered by the growth of the negotiable CD, the increased use of Federal funds for reserve adjustment, the broadening of commercial bank investments, and the acceleration of the trend of interest-rate sensitivity among most all money market participants contributed importantly not only to the stability of yields on money market instruments, but also to the reduced spread between yields on most financial assets.

In the process, however, the quantity of substitutes for short-term Government securities increased. This increased supply of substitutes not only added stability to money market yields but also tended to reduce the demand for short-term Treasury issues in both U.S. and foreign markets.[11] Although part of the public's reduced demand for such issues was offset by some increase in bank demand, it is likely that innovations in private financial markets—including the general increase in rate sensitivity—reduced the total demand for short-term Government securities. While this helped to bring upward pressures on short-term yields in the 1960's, changes resulting from these shifts in the demand schedule are likely to remain rather permanent—particularly if banks continue to be aggressive issuers of CD's.

On the other hand, developments in the 1960's tended to increase the demand for long-term Government issues. No new substitutes for coupon issues developed in that period, but increased demand by financial institutions for long-term instruments in general reduced the spread between yields on long-term Governments and those on similar financial assets— making long-term Government issues relatively more attractive. Although demand for long-term Government securities by financial institutions was not so large during the period of heavy credit demand and reduced deposit inflows of 1966, it is likely that in future periods of rapid expansion in deposit inflows long-term Governments will again be in demand.

Another factor that tended to add to the strength of long-term Government securities

was some reduction in the market supply. Advance refunding techniques and increased official-account purchases of coupon issues reduced the quantity of such issues available in the market. Moreover, such operations tended to add stability to the prices of such issues, despite the thinness of market supply, and as a result may have increased the demand for the then more attractive Government bonds.[12]

While developments in the 1960's changed the environment in which the Government securities market operated, the importance of Federal debt among all debt instruments held by the public continued to decline. Increased issues of private financial assets, lack of proportional growth in new Treasury issues, and the large official-account purchases—especially by the Federal Reserve—even helped to accelerate this trend in many ways. As a result, an increasing proportion of the liquidity of both financial institutions and the nonfinancial public by mid-1965 was accounted for by private securities — especially financial intermediary debt. These developments present some difficult questions about the ultimate liquidity of U.S. financial institutions, as well as about the continued use of the Government securities market as the major vehicle for implementing monetary policy.

Throughout the U.S. economy—but particularly at financial institutions—there is a continuing demand for riskless financial assets to meet needs for liquidity. Indeed, laws, regulations, and examination procedures place considerable pressure on institutions to hold some assets that are considered riskless, generally Treasury issues. However, in order to do no more than hold the structure of financial assets unchanged from the structure in 1965 would require Federal borrowing at a rate of from $13 billion to $17 billion a year and private domestic borrowing at a rate of $35 billion to $40 billion per year, or about two-thirds of

[11] See Appendix.

[12] The impact of official operations in U.S. Government securities on dealer positions and activity is discussed in the paper, "Market Performance as Reflected in Aggregative Indicators," by Louise Ahearn and Janice Peskin (pp. 93–153).

the 1965 pace. Such a development would imply a permanent depression in private demand and a powerful offset in the form of a big Federal deficit.

Since a reversal of present trends appears unlikely, it seems clear that the financial structure of the U.S. economy will continue to shift toward private claims, the conventional liquidity base of financial institutions will continue to erode, and vocal concern about the extended position of the financial system will increase. Indeed, if the 1960's are indicative of the amount of marketable Treasury securities that would be available to the public after official purchases, these trends will accelerate.

If the present trend continues, developments in the Government securities market over the long run are likely to be advantageous to the Treasury while complicating Federal Reserve operations. The Treasury should find it increasingly easier to sell its obligations as a relative shortage of riskless financial assets develops. The Federal Reserve, on the other hand, is likely to find it increasingly difficult to carry out open market operations. For while it should be easier for the Federal Reserve to sell securities, it is likely to become quite difficult for the Federal Reserve to buy Treasury issues in quantity without causing sharp price movements, because holders of these instruments may be loathe to give up their riskless liquid assets. □

VI. APPENDIX:

FOREIGN DEMAND FOR U.S. GOVERNMENT SECURITIES IN A CHANGING INTERNATIONAL FINANCIAL ENVIRONMENT*

The postwar rehabilitation of European economic and financial systems, to which most of the 1950's were devoted, produced significant changes in the international financial environment. The new pattern of international payments and the rebuilding of European monetary reserves made possible the reconstitution of an international financial system in which major currencies are freely convertible and internationally held balances[13] are moved among major financial centers in response to changing market conditions. This new era was formally marked by the return to external convertibility of most major European currencies at the end of 1958. And since 1960 foreign acquisition of financial assets in the United States, particularly of U.S. Government securities, has grown more slowly than in the earlier postwar years.

The total volume of internationally held financial assets has increased rapidly since the late 1950's, prompted by expansion in both international trade and investment. The high level of economic activity in the industrial countries of the world has generated a large volume of savings, and relatively stable monetary conditions and less restrictive financial arrangements have encouraged investment in both real and financial assets across national borders. The development of the European Economic Community in particular has given special impetus to international investment.

U.S. dollar balances make up by far the largest volume of internationally held financial assets. Foreign central banks are the largest nonresident holders of liquid dollar assets. At the end of 1967, $18.3 billion[14] (or about 65 per cent) of the world's total official foreign exchange reserves of $28.3 billion were U.S. dollar assets. (This proportion compares with 60 per cent in 1960 and 45 per cent in 1954.) In addition, U.S. financial markets, along with those in the United Kingdom, still provide the private nonresident investor with his major investment outlet, particularly in marketable assets.

As a result of modifications in institutional and operational arrangements since the late 1950's, the variety of international investment opportunities has increased and the financial system has been much more sensitive than it was earlier to changing financial conditions in individual countries. Modified payments regulations now permit a freer flow of investment funds than in the earlier 1950's. New financial assets have been introduced, and new institutions—such as the Euro-dollar market and international long-term capital markets—have developed. Today's international investor, whether official or private, is less dependent on financial assets in the United States. For example, roughly $16 billion in dollar-denominated assets were held in the form of deposits in the Euro-dollar market at the end of 1967, outside the United States, and about $4 billion in dollar-denominated long-term bonds were bought by investors in markets outside the United States between 1962 and 1967.

This Appendix attempts to analyze very briefly how the changing international financial environment has affected the foreign demand for securities in the United States, especially

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[13] The term "internationally held" balances or assets refers to short-term or liquid financial assets held in a country by nonresidents.

[14] The $18.3 billion figure does not include an unknown volume of U.S. dollar assets held by foreign monetary authorities in Euro-dollar deposits. These statistics were taken from the International Monetary Fund, *International Financial Statistics*.

U.S. Government issues. It reviews foreign financial investment in the United States and then broadly traces the developments that have contributed to greater internationalization of major financial markets.

FOREIGN DEMAND FOR FINANCIAL ASSETS IN THE UNITED STATES

Even though the scope for international trading in securities has expanded since 1957, the growing volume of internationally held financial assets continues to take the form primarily of assets in the United States. In the 8 years 1958–65, according to the U.S. balance of payments accounts,[15] foreign-owned liquid assets in the United States showed an average increase of $1.6 billion per year.[16] In comparison, foreign holdings of liquid sterling assets increased very little during the period.

Foreign acquisitions of liquid U.S. financial assets, however, varied widely during those 8 years. In 1959, the first full year after the return to current-account convertibility in Europe, $2.8 billion, or 72 per cent of the total U.S. payments deficit of $3.9 billion,[17] took the form of increased foreign holdings of liquid assets in the United States (Appendix Chart 1). Again in 1964, $2.6 billion, or 93 per cent of the total U.S. deficit of $2.8 billion, reflected

increased foreign holdings of dollar assets in the United States. But in 1965, when a special effort was made to reduce the U.S. foreign payments deficit and when the Bank of France undertook redemption of a large share of its dollar assets for gold, foreign holdings of financial assets in the United States registered virtually no increase.

1 | **U.S. BALANCE OF PAYMENTS**

* Includes the following types of U.S. Government obligations: foreign series and foreign currency series.

During the 6 years after 1959, the average annual rate of increase in foreign dollar balances in the United States slowed to only 7.3 per cent. By comparison, in the 8-year period 1958–65 (which includes those 6 years) the total volume of foreign assets in the United States had expanded from $15.8 billion to $27.9 billion, or at an average increase of 9.7 per cent per year.[18] And during the preconvertibility period—1950 through 1957—the

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[15] In the U.S. balance of payments accounts changes in foreign liquid assets in the United States reflect net changes in foreign holdings of marketable long-term U.S. Government bonds and notes as well as changes in all types of short-term securities and assets.

[16] The year 1958 represented a turning point in the U.S. balance of payments. Prior to 1958 the U.S. foreign payments deficit consisted primarily of increases in U.S. liquid liabilities to foreigners. In the 2 years 1956–57, for example, foreigners in the aggregate actually gave up gold to acquire dollar assets in this country; foreign liquid assets increased, on the average, by $1.2 billion annually during the period, while the U.S. gold stock increased by an average of $552 million per year. Beginning in 1958, however, the United States began to suffer large annual losses of gold, although foreigners generally continued to make slightly larger annual additions to their liquid financial assets in the United States than earlier.

[17] This figure refers to the U.S. deficit as measured on a "liquidity basis." Other measures of the balance of payments would produce different deficits.

[18] These figures include foreign holdings of U.S. Treasury bills, certificates, notes, and long-term bonds; deposits with commercial banks; and bankers' acceptances, commercial paper, and certificates of deposit.

growth in such balances had averaged about 10.8 per cent per year.

Between 1959 and 1965 the fastest growth in foreign financial assets in the United States was registered by foreign commercial banks.[19] U.S. dollar assets of these banks—which do not include any long-term Treasury issues—increased from $4.6 billion to $7.4 billion, or an average of more than 10 per cent per year. By way of comparison, foreign official (and international organization) holdings of such assets grew from $11.8 billion to $16.5 billion, or an average of 6.6 per cent per year. Those of private nonbank foreigners rose by an average of only 6.1 per cent per year—from $3.0 billion in 1959 to $4.1 billion in 1965.

FOREIGN DEMAND FOR U.S. TREASURY ISSUES

During the period 1952–59 foreign demand for short-term U.S. Government securities and for bankers' acceptances and commercial paper grew faster than the demand for deposits in

commercial banks.[20] Although this was a period in which interest rates were generally rising in the United States, rate ceilings imposed on interest-bearing deposits by the Federal Reserve System caused the increases in interest rates on deposits to lag behind those on market instruments. As a result, foreigners turned increasingly to short-term Treasury issues, and their total holdings of such issues rose from $2.1 billion at the end of 1951 to $7.7 billion in 1959 (Appendix Table 1). There was a sharp increase in the foreign demand for short-term U.S. Treasury issues in 1959 when yields on these securities climbed to a peak of 4.5 per cent, compared with the 2.5 per cent that banks were allowed to pay on 3- to 6-month time deposits. As a result, over the 1952–59 period the Treasury bill share of aggregate foreign short-term dollar holdings rose from 27 to 43 per cent, while the share of commercial bank deposits fell from 68 to 47 per cent. Over the

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[19] Foreign commercial banks' dollar balances in the United States include balances of foreign branches of U.S. banks with their parents—which have grown rapidly in line with expanding U.S. overseas banking —and the balances of foreign banks with their U.S.-based branches and agencies.

[20] Available U.S. Treasury Department data provide a breakdown of the published figures on foreign short-term financial holdings in the United States into three classes of owners—foreign official, foreign commercial bank, and all other—and three categories of investments assets—deposits (both time and demand deposits) in commercial banks, U.S. Treasury bills and certificates, and other assets (which include bankers' acceptances, commercial paper, and CD's).

APPENDIX TABLE 1
SHORT-TERM U.S. DOLLAR LIABILITIES TO FOREIGNERS REPORTED BY BANKS IN THE UNITED STATES[1]

End of year	Outstanding liabilities (in millions of dollars)							Percentage distribution by type of investment		
	Total [2]	Type of holder			Type of investment			Deposits	U.S. Treasury issues	Other
		Official	Private		Deposits [3]	U.S. Treasury issues	Other [4]			
			Bank	Nonbank						
1950	7,335	3,874	2,068	1,393	5,504	1,504	322	75	21	4
1951	7,935	3,893	2,529	1,513	5,383	2,118	434	68	27	5
1952	9,228	4,982	2,570	1,676	5,833	2,876	519	63	31	6
1953	10,263	5,956	2,529	1,778	6,138	3,445	681	60	34	6
1954	11,345	7,010	2,530	1,805	6,998	3,677	671	62	32	6
1955	11,919	7,193	2,943	1,783	6,994	4,208	712	59	35	6
1956	13,806	8,414	3,362	2,030	7,632	5,150	1,024	55	37	8
1957	14,353	8,688	3,413	2,252	7,640	5,372	1,341	53	37	10
1958	15,338	9,449	3,460	2,429	8,721	5,372	1,247	57	35	8
1959	17,245	10,247	4,601	2,397	8,172	7,747	1,599	47	43	10
1960	18,689	11,755	4,705	2,229	9,417	7,639	1,633	50	41	9
1961	19,994	12,257	5,380	2,357	10,685	7,511	1,798	53	38	9
1962	21,863	14,048	5,251	2,564	10,624	9,330	1,909	49	43	8
1963	22,795	14,038	5,712	3,045	11,760	8,690	2,345	52	38	10
1964	25,475	14,885	7,213	3,377	13,523	8,799	3,153	53	35	12
1965	25,560	14,619	7,354	3,587	13,700	8,356	3,504	54	33	13

[1] Includes liabilities to international (including IMF) and regional organizations under "official" except for non-interest-bearing U.S. Treasury notes held by the IMF.

[2] Totals may not add because of rounding.
[3] Excludes CD's.   [4] Includes CD's.
Source.—Board of Governors of the Federal Reserve System.

APPENDIX TABLE 2
MAJOR TYPES OF SHORT-TERM U.S. DOLLAR ASSETS HELD BY FOREIGNERS IN THE UNITED STATES, DECEMBER 31, 1954–65

Percentage of total assets within holder groups

| End of year | Foreign official[1] | | | Foreign private | | | | | |
| | | | | Commercial bank | | | Nonbank | | |
	U.S. Treasury issues	Deposits[2]	Other[3]	U.S. Treasury issues	Deposits[2]	Other[3]	U.S. Treasury issues	Deposits[2]	Other[3]
1954	48	46	6	3	90	7	14	84	2
1955	55	40	5	3	87	10	10	87	3
1956	56	38	6	5	83	12	12	81	7
1957	57	36	7	5	80	15	13	78	9
1958	52	40	8	4	87	9	13	80	7
1959	65	29	6	11	73	16	13	76	11
1960	63	29	8	2	89	9	7	83	10
1961	60	31	9	1	91	8	6	84	10
1962	65	27	8	2	89	9	4	82	14
1963	61	31	8	2	86	12	4	81	15
1964	58	32	10	2	83	15	2	83	15
1965	56	32	12	2	79	19	3	88	9

[1] Includes short-term dollar assets of international (including IMF) and regional organizations except for non-interest-bearing U.S. Treasury notes held by the IMF.
[2] Excludes CD's.
[3] Includes CD's.
SOURCE.—Board of Governors of the Federal Reserve System.

same period the share of commercial paper and bankers' acceptances rose from 5 per cent to 10 per cent.

In 1960, however, this trend was reversed as higher rates on deposits at commercial banks, and later (in 1963) the increasing use of negotiable certificates of deposit (CD's), began to attract a larger share of total short-term foreign investment in the United States. Although foreign holdings of Treasury bills and certificates rose from $7.7 billion at the end of 1959 to $8.4 billion in 1965, such securities declined from 43 per cent to 33 per cent of total short-term foreign assets in this country. Meanwhile, the share of bank deposits rose from 47 to 54 per cent.

The greatest demand for short-term U.S. Treasury securities comes from foreign monetary authorities, which hold dollar assets in the United States as a part of their international reserves (Appendix Table 2). Foreign official holdings of such securities rose from $3.3 billion (48 per cent of total foreign official holdings) in 1954 to $8.2 billion (56 per cent) in 1965. In 1959, when short-term Treasury yields rose sharply relative to other assets in the United States, foreign official holders actually reduced their holdings of other types of assets in order to acquire Treasury issues. Since then, however, their demand for U.S. Government

issues has been relatively less than that for other types of marketable assets, principally CD's which have shown more favorable rate trends.

Foreign commercial banks are not large buyers of Treasury issues; instead they hold most of their assets in the United States in the form of bank deposits, including CD's. In 1959, however, because the yields on Treasury issues were so attractive, they did make large net purchases and raised their holdings of these issues to roughly 11 per cent of their total assets in the United States. In 1960 holdings of such Treasury issues by foreign commercial banks fell sharply and since then have averaged between 1 and 2 per cent of total holdings—reflecting the preference of these banks for higher-yielding assets, both in the United States and abroad.

Foreign private investors other than banks have never held a large volume of short-term U.S. Treasury issues. At their highest point in 1958 these assets totaled only $306 million, or roughly 13 per cent of the total dollar assets of foreign private nonbank holders. By the end of 1965 they had fallen to only $87 million, as the need for larger working balances and the development of tighter credit conditions and higher interest rates abroad had caused holders to sell Treasury issues.

In summary, since 1960 foreign demand for short-term U.S. Treasury issues has not been so strong as it was previously because more attractive yields have been available on an increasing number of other investment instruments both in the United States and abroad. All classes of foreign investors—central banks, commercial banks, and private nonbank investors—have shown a decreasing demand for short-term U.S. Treasury issues in this period relative to their total holdings of international liquid assets.

And since 1963 there has also been a decline in foreign demand for long-term U.S. Treasury issues, largely because of reductions in holdings of foreign monetary authorities and international organizations. Foreign holdings of marketable U.S. Government notes and long-term bonds rose sharply from $875 million in 1951 to $2.6 billion in 1961. However, in 1962 the total was reduced by roughly $550 million, in large part as a result of heavy sales by the International Monetary Fund and International Bank for Reconstruction and Development. Foreign monetary authorities increased their holdings of long-term U.S. Treasury issues in 1963, but from then through 1965 all classes of owners have reduced holdings.

DEVELOPMENTS IN THE INTERNATIONAL FINANCIAL ENVIRONMENT

Since the late 1950's the international financial scene has been marked generally by an increasing degree of financial market integration and by growing payments freedom, although since 1963 the balance of payments problems of the United States and the United Kingdom have resulted in increased restrictions on capital flows of these countries. Favorable economic conditions in all industrial countries have contributed to greater financial integration.

The declaration of nonresident external convertibility in Europe in 1958 is often cited as an event that suddenly started international financial flows that had long been dammed up,

and some believe it had particular significance for foreign-owned liquid balances in the United States. Actually, however, some of the liberalization of exchange controls that permitted foreign nonofficial parties to build up their dollar investments in the United States had been under way before 1958. Furthermore, the declaration of convertibility was not important to the investment actions of foreign monetary authorities, which constitute the largest foreign investors in U.S. financial assets. As for foreign commercial banks, they did increase their dollar holdings by roughly one-third in 1959, no doubt encouraged by the unusually high interest rates in the United States at that time (their holdings of short-term Government securities increased by $361 million). But foreign nonbank investors were not influenced by either their new-found liberties or high U.S. interest rates, and they actually decreased their short-term dollar assets slightly in 1959 (their holdings of short-term Government securities decreased by $11 million).

The less restrictive and more integrated nature of international finance today has implications mainly for nonofficial foreign investors, but there are also implications for official investors. Because of the key role of the dollar as an international reserve asset, foreign monetary authorities normally turn to U.S. dollar-denominated assets for their foreign exchange investments, and in the past a large part of such investments had been in U.S. Government securities. However, since 1958, when the Euro-dollar deposit market began to develop, that market has attracted an increasingly large volume of foreign central bank funds, and currently (1966) Euro-dollar deposits are the most attractive alternative to assets in the United States for foreign monetary authorities. In the United States the CD has proved to be an attractive alternative to U.S. Government securities for investment by foreign official accounts.

Nonofficial foreign investors too have been increasingly attracted to the Euro-dollar market in their search for U.S. dollar assets. Major commercial banks in important financial cen-

ters around the world accept not only interbank deposits but also U.S. dollar-denominated deposits from nonbank customers. Rates paid on these deposits are higher than those on comparable investments in the United States, and at times the differential between Euro-dollar and U.S. rates has been very attractive. In 1966 foreign branches of U.S. banks in London began to issue dollar-denominated CD's in the London market. Such CD's carry higher yields than their counterparts in the United States. In view of the secondary market that is now being developed for these assets, they should become even more attractive to both U.S. and foreign investors.

The Euro-dollar market currently is the most important factor making for greater integration of the international financial system. It is the vehicle through which the money market of the United States is linked with money markets in other currencies. Through the Euro-dollar market, changes in conditions in one financial center may be reflected in markets throughout the world.

Greater freedom in international finance has also encouraged international investment in financial centers other than New York. For a long time local currency money market investments in Canadian currency have attracted U.S. investors, and more recently they have been attracting Europeans. Foreigners also own considerable amounts of local currency deposits in several European countries and in Japan.

Also, several factors of a nonfinancial nature have encouraged greater linkage of major financial markets and less dependence on financial assets in the United States; this has been true especially for the nonofficial investor. The growth of international operations has encouraged many businesses to maintain foreign balances in a great number of centers, including the United States. Improved communications have linked important financial centers into a market that is practically worldwide and have played an important role in creating greater interest in foreign investment opportunities. In addition, the rapid expansion of the overseas branch network of U.S. commercial banks has contributed to a closer linking of international financial operations.

SUMMARY AND CONCLUSIONS

The economic and financial rehabilitation of Europe and booming economic activity throughout the industrialized world in the 1960's have fostered the development of a less restrictive international currency system than had existed throughout most of the 1950's. At the same time the volume of internationally held financial assets has grown at a rapid rate.

Because of the prominent role that the U.S. dollar plays as an international reserve asset, foreign monetary authorities (and international and regional organizations) have continued to demand financial assets in the United States—increasing their total holdings from $11.9 billion in 1959 to $16.5 billion in 1965. Foreign official holdings of short-term U.S. Treasury issues have not grown so strongly, however, as they had before 1959, in part because of the relatively more attractive yields on other assets in the U.S. market and the development of the Euro-dollar deposit as an investment alternative outside the United States. Foreign official holdings of long-term U.S. Treasury issues on balance increased during the first half of the 1960's.

Foreign commercial banks have increased their financial assets in the United States by roughly 60 per cent since 1959 but have reduced their holdings of Treasury securities to a negligible amount. The decline in their demand for Treasury issues reflects the increased attractiveness of investing in the Euro-dollar market and in U.S. CD's and the greater need for deposit balances in New York banks to support their foreign operations.

Foreign nonbank institutions have also decreased their holdings of short-term Treasury issues to a negligible amount since 1959. Tight monetary conditions abroad and higher yields in foreign financial centers have caused some foreign funds to move out of the United States, and more attractive yields on other types of

U.S. securities have drawn foreign nonbank funds out of short-term Treasury issues. And since 1961 foreign private and international holdings of long-term Treasury issues have been declining, too.

Generally speaking, the high level of economic activity in the industrial world since 1959 has increased both the demand for financial assets and the volume of internationally held assets. Except for foreign monetary authorities, however, foreigners have been reducing their holdings of short-term U.S. Treasury issues. In the long-term market foreigners made net purchases of Treasury issues in 1961 and 1963, but in all other years they made net sales. For the whole period 1960–65, foreigners increased their total holdings of short- and long-term marketable U.S. Treasury issues by only about $800 million.

In addition to their purchases of marketable U.S. Treasury issues, foreign central banks and governments have bought special nonmarketable bonds and notes (denominated in both foreign currencies and U.S. dollars) issued by the U.S. Treasury to relieve pressures on the U.S. gold stock. These holdings rose from $251 million equivalent at the end of 1962—the first year they were issued—to a peak of $1,692 million equivalent at the close of 1965. During the first half of 1966, however, the volume of such securities held by official foreign agencies was reduced to $1,101 million equivalent. □

FEDERAL AGENCY DEBT AND ITS SECONDARY MARKET

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CONTENTS

I. INTRODUCTION

Federal agency debt is not a new market instrument. Federal agencies have been selling their securities to the public since before World War II. But as late as 1950, agency debt totaled only $1.5 billion, and the secondary market for such debt was virtually nonexistent. The growth in agency debt during the 1950's, and particularly in the 1960's, has been enormous. By mid-1967, such debt totaled just under $24 billion, which was more than the combined total of commercial paper, finance company paper, and bankers' acceptances. Accompanying the growth in agency securities has been the development of an active secondary market. Trading in agency issues during 1966 and 1967 averaged $200 million or more each day. Compared with the volume of trading in U.S. Government securities, which averaged more than $2 billion a day, the agency market is small. Nevertheless, the secondary market for agency issues is more developed than that for any private asset.

With the growing activity and breadth of its secondary market, and thus the enhanced marketability of the securities, agency debt is becoming an increasingly important substitute for U.S. Government securities in investor portfolios. Hence, developments in the agency market should be felt more and more in the Government securities market. This has already been borne out by the 1966 experience. The sharp increase in agency debt during the early part of 1966 and around midyear, absorbed by investors only at successive new highs in interest rates, was an important element in the ensuing near-crisis in financial markets: The rising yields on agency issues were translated directly into higher yields on Treasury and private securities. And at the same time the supply situation for agency securities contributed to the feeling of potential crisis that pervaded the markets.

This paper describes and analyzes the secondary market in agency securities. It is divided into three parts: (1) the characteristics of Federal agency debt (including size, risk, maturity, yields, and ownership); (2) the homogeneity of agency securities; and (3) indicators of market performance. For purposes of analysis, considerable data were drawn together from a wide variety of sources—some less reliable than others. Where possible, the analyses included the 1950's to permit temporal comparisons; however, data were often available only for the 1960's.

A few words on the nature of agency debt will help to define and limit the focus of this study. Debt of all Federal agencies can be subdivided into three types: (1) direct guaranteed, (2) direct nonguaranteed, and (3) guaranteed participation certificates. Issues of the first type—those guaranteed as to principal and interest by the U.S. Government—are not considered in this study. While this type of debt has grown gradually in size, it still totals only around $500 million; and because single issues are so small, it is by and large not readily tradable.[1]

Of the two remaining types, direct nonguaranteed issues represent the bulk of agency debt outstanding—some $18 billion in mid-1967. Nonguaranteed securities[2] are the liabilities of six Federal agencies; some of these agencies are supervised by the U.S. Government whereas others are Government-owned either in part or in their entirety.[3] These six agencies include the Federal land banks (FLB), the Federal intermediate credit banks (FICB), the banks for cooperatives (BC), the Federal home loan banks (FHLB), the Federal National Mortgage Association (FNMA, secondary-market-operations function only), and the Tennessee Valley Authority (TVA).

The expenditures of these agencies, with the

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[1] As of June 30, 1967, only three individual, guaranteed issues exceeded $25 million in size.

[2] While not guaranteed by the U.S. Government, they are of course guaranteed by the agencies themselves.

[3] The *net* expenditures of these agencies are included as part of U.S. Government expenditures on a cash-budget basis.

exception of TVA, are intimately related to the extension of credit directly or indirectly to the selected sectors of housing and farming. BC, FICB, and FLB provide loans of varying maturities to private farm groups. FHLB lend to savings and loan associations and to miscellaneous savings institutions. Finally, FNMA provides supplementary assistance to the mortgage market through secondary market purchases and sales.

Net issuance (or repayment) of debt by these agencies, in turn, is directly related over the long run to their net expenditures (or receipts). By and large, net expansion of loans by the agencies will result in a growth in agency debt outstanding of roughly the same amount. Over the short run—say several months— the agencies have some alternative sources of lendable funds. At times, for instance, BC and FICB borrow relatively small amounts from commercial banks. The FHLB have a sizable portfolio of U.S. Government securities on which they often draw to supplement financings or to tide them over periods between financings. FNMA may borrow directly from the Treasury, and it often does this on an interim basis prior to a debt sale.[4]

[4] This is meant to be only a cursory look at the functions, expenditures, and financing of these agencies. A detailed examination would show considerably more complicated balance sheets than indicated here. Such detail is presented in an unpublished memorandum, "U.S. Government Agency Financing," by D. Hunter, Federal Reserve Bank of New York. Also see "Federal Agency Securities," in *Monthly Review,* Federal Reserve Bank of San Francisco (Sept., Oct., and Nov. 1963).

The second type of agency debt instrument considered in this study is the participation certificate (PC). This is quite a new instrument; it was first offered in late 1964. Growth of PC's has been rapid, however, and in mid-1967 some $5.7 billion of fully marketable PC's were outstanding. These instruments are participations in pools of assets, such as mortgages guaranteed by the Veterans Administration (VA) or insured by the Federal Housing Administration (FHA) and loans of the Export-Import Bank, the Commodity Credit Corporation (CCC), or the Small Business Administration (SBA). Except for offerings of the Export-Import Bank and CCC, PC's are generally called FNMA PC's because FNMA acts as the trustee for the sales. PC's are now considered to be fully guaranteed by the U.S. Government.

Inasmuch as PC's are in effect a substitute means of financing the Government's deficit, the Federal authorities establish the timing and volume of PC's to be sold; the amount offered is not determined by the operating expenditures of the agencies involved. Although their interest cost is higher than that of direct Federal debt, PC's have been attractive to the authorities at least in part because they enter the Federal budget accounts as negative expenditures, thus reducing the size of the budget deficit (or increasing the budget surplus).[5]   □

[5] For greater detail on PC's, see Lawrence Banyas, "New Techniques in Debt Management Since the Late 1950's," Part 3 of this series.

II. SUMMARY OF FINDINGS

The major findings of this study of agency debt and its secondary market follow.

1. The steady growth in agency debt already noted has been accompanied, over the long run, by declining spreads between yields on agency and Treasury securities. This development would indicate an improvement in the agency market.

2. The demand for agency debt has risen with, if not ahead of, the supply. Since the 1950's, there has been a dramatic improvement in the breadth of the market, as evidenced by the wide variety of investors who have quite recently acquired agency issues, often while simultaneously selling U.S. Government securities. The larger nonfinancial corporations and State and local governments appear to participate in the market for agency issues in the same degree that they do in the U.S. Government securities market. Commercial banks (particularly reserve city banks) and the larger nonbank financial institutions (particularly life insurance companies), however, account for smaller shares of nonguaranteed agency debt than of U.S. Government issues, and for still lesser shares of PC's. The difference is especially evident in the longer-term maturities. These two investor groups apparently view at least the long-term securities of Federal agencies as being less marketable than Treasury issues. But again, the difference has diminished during the 1960's, indicating relative improvement in the agency market.

3. It is clear that the supply of agency debt rose too rapidly during 1966 to enable absorption by investors without considerable congestion in the market for such debt, and indeed in other markets as well. The $5 billion rise in agency debt over the first two quarters of the year was accompanied by drastic rises in yield spreads between agency and Treasury securities, and even by mid-1967 the spreads had not returned to normal levels. Thus, while a steady rise in the supply

of agency debt is a prerequisite for improvement in the agency market over the long run, an excessive rise in debt can lead to short-run market deterioration.

4. There appears to be a single market for all of the diverse nonguaranteed agency securities and PC's. That is, investors apparently view the securities as homogeneous. This study found that there were no consistent or significant differences in market yields or in ownership of the various agency securities, including PC's.

5. However, there was some evidence that the size of individual agency issues is an important factor in their marketability. Agency issues in 1967 ranged widely in size, from $20 million to $535 million (publicly held amounts). The evidence gathered in this study, albeit limited, showed that quoted yields on the smaller issues varied quite widely from the yield curve and that such issues are lodged, to a greater degree than the large issues, in the portfolios of comparatively inactive investors.

The small size of many issues, particularly of those with long-term maturities, is probably a major reason why larger commercial banks and nonbank financial institutions participate less actively in the agency market than in the U.S. Government securities market. A further indication of the importance of issue size is the sharply increased participation of financial institutions in the new, larger PC's as compared with their meager participation in the small, serial PC's.

6. The volume of trading in the secondary market for agency securities has risen sharply since the early 1960's in both short- and long-term maturities—indicating that it is now easier for investors to effect buy and sell orders with speed and at market prices. The increase in activity has resulted from the increase in agency debt and the rising volume of gross new issues. Although activity in the agency market is still only 10 per cent

of total trading in the U.S. Government securities market, activity in agency issues has been growing faster than that in Government issues during the 1960's. In the short-term sectors of the markets, agency trading and turnover (that is, transactions/debt) as of mid-1967 were at least the equivalent of trading and turnover in Treasury coupon issues due within 1 year.

7. It has sometimes been asserted that trades, and particularly purchases, of agency securities are effected primarily during agency financings, and that the supply of agency debt available for trading apart from financings is limited. This study found that while activity of course was higher during financing periods, market activity remained relatively high at other times as well. In particular, the exclusion of trading during financing periods does not alter the conclusion that the short-term agency market is at least the equivalent of the short-term Treasury coupon market. In the longer-term sectors of the agency market, however, there did seem to be a greater spread between all trading and that outside financing periods.

8. Dealers have become more willing since the early 1960's to hold agency securities. There has, in fact, been a three-fold rise in dealers' positions. The higher positions have resulted from the larger supply of debt outstanding, from the increase in market activity, and from the rise in gross new issues.

9. Spreads between dealers' bid and asked prices in the short-term agency market are as low as in the U.S. Government securities market. Quoted spreads on intermediate- and long-term agency securities, however, have been around 1 point. While such issues certainly trade at smaller spreads than the often nominal quotes, it is clear that the spreads are larger than in the Treasury bond market. □

III. CHARACTERISTICS OF FEDERAL AGENCY DEBT

As a preface to an analysis of the secondary market in Federal agency securities, this chapter describes the characteristics of agency debt. Such characteristics include supply, maturity structure, risk, market yields, and ownership. These supply and demand factors are integrally related to performance of the agency market; in part they influence, and in part they reflect, the condition of that market.

SUPPLY

In mid-1967 agency debt outstanding totaled $24 billion.[6] In comparison with U.S. Government marketable debt, which totaled $211 billion, agency debt was small. But the growth in agency debt during the 1950's and 1960's has been extremely rapid. At the beginning of the 1950's there was only $1.5 billion of agency debt outstanding. Starting from such a low level, the rise in agency debt takes on added

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[6] Unless otherwise noted, agency debt is defined to include nonguaranteed agency issues, FNMA PC's, and fully marketable Export-Import Bank PC's. The $500 million of PC's issued by the CCC in April 1966 and retired in August 1966 is also included.

significance. It has, in fact, signaled the establishment and development of a new securities market.

TABLE 1: FEDERAL AGENCY DEBT OUTSTANDING, SELECTED DATES

Date	In billions of dollars
Dec. 31, 1950	1.8
1955	3.6
1960	7.9
1965	15.3
1966	21.3
June 30, 1967	23.8

NOTE.—Represents nonguaranteed agency debt and fully marketable participation certificates.

The growth in agency debt has been virtually continuous, as Table 1 illustrates. Such debt has about doubled every 5 years since 1950. The increase has been especially rapid since the end of 1965; over the 18-month period ending in mid-1967 the supply rose by $8.5 billion. Chart 1 shows nonguaranteed agency debt outstanding and PC's for the 1954–67 period. These data are presented in Appendix Table 1.

The rise in agency debt during this period has reflected in part the introduction of debt offerings by several agencies. For example,

1 | TOTAL FEDERAL AGENCY DEBT OUTSTANDING
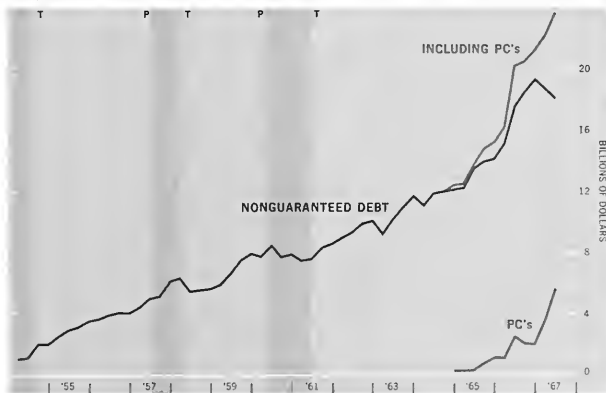
P=peak; T=trough.

FNMA and TVA did not issue securities until 1955 and 1960, respectively. Also, the introduction of marketable PC's during 1964 and the growth of such issues since then have accounted for roughly one-half of the rise in agency debt in recent years. In addition there has been a continued upward trend in issues of the farm credit agencies and of FHLB as the demand for credit at these agencies has grown along with the Nation's gross national product.

Chart 2 and Appendix Table 2 indicate that there has been an upward trend in all types of nonguaranteed agency debt. Growth has been most rapid in the debt of FNMA and FHLB.

Changes in the supply of agency debt show cyclical and seasonal variations that are obscured to some degree by the pronounced trend. These variations are evident when the types of agency issues are considered separately. All five types of nonguaranteed agency debt can be seen to have some cyclical component, though it is most evident for FNMA and FHLB debt. In general, the rise in agency issues is correlated with the degree of monetary ease or tightness. When money is tight, agency debt rises rapidly. Or to put it another way, demands for credit at the five agencies increase when alternative credit availability is diminished and when market interest rates are high.

But when money is easy, agency debt rises more slowly or, in some cases, declines.

The direct interest-rate pressures caused by an increase or a decrease in the supply of agency debt thus generally reinforce rate pressures over the cycle that result from shifts in monetary policy and in private credit demands. It is true, of course, that the concurrent provision of credit by these agencies to the selected sectors of housing and farming to some extent offsets these pressures. But even with no net change in credit flows, a rapid shift in the supply of agency debt can have a marked impact on securities markets, as borne out by developments in 1966. Severe credit restraint did— and may again in the future, given the present institutional framework—cause a sharp rise in demands on all of the agencies simultaneously and brought about a large enough increase in agency debt to have far-reaching effects on public and private securities markets generally. In fact, continuing growth of all types of agency debt increases the potential for even greater swings in agency debt in the future.

Nonguaranteed agency debt also fluctuates seasonally, reflecting the seasonal nature of credit demands on the agencies. The seasonal variation in the issuance (or repayment) of debt by the agencies can be seen in Chart 2; in addition, Appendix Table 3 shows the quarterly net expenditures or receipts of these agen-

2 | TYPES OF NONGUARANTEED AGENCY DEBT
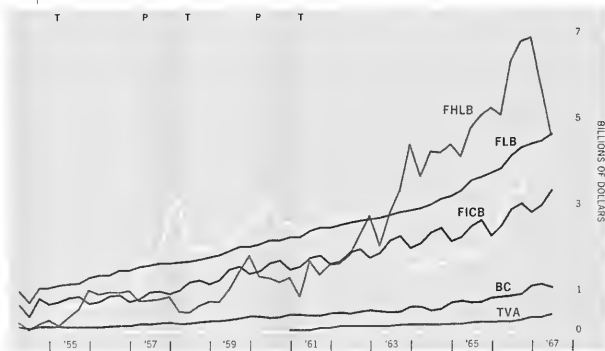
P=peak; T=trough.

cies. During the 1960's at least, the FHLB have repaid debt during the first quarter of each year as savings and loan associations paid off their borrowings; FHLB borrowing has tended to be heaviest during the second quarter of the year. Debt issuance by FNMA does not appear to have any seasonal pattern.

Borrowing by the farm credit agencies taken together is seasonally high during the first half of the year, though the separate agencies have borrowing patterns that are offsetting to some extent. FICB, founded in order to help farm organizations meet seasonal production and marketing costs, repay their debt during the fourth quarter and borrow during the remainder of the year, particularly in the second quarter. FLB, which provide long-term funds, show little seasonal variation in their borrowing, although their borrowing does appear to be largest during the second quarter. BC, on the other hand, repay debt during the first half of the year and borrow in the market during the second half, mainly in the fourth quarter.

When aggregated, the expenditures of these agencies show quite a sharp seasonal variation, as is indicated in Table 2, and so does their borrowing. Agency borrowing is concentrated

TABLE 2: NET EXPENDITURES, OR RECEIPTS (−), OF FEDERAL AGENCIES, QUARTERLY, 1961–67

In millions of dollars

Year	I	II	III	IV
1961	−645	604	496	309
1962	−401	844	599	130
1963	−1,013	1,131	1,168	512
1964	−376	738	459	168
1965	−259	1,191	645	23
1966	111	1,633	955	−547
1967	−1,878	−885	...	...

NOTE.—Agencies included are FHLB, FICB, BC, and FLB. (Abbreviations for agencies referred to in this and following tables are shown in the text on p. 37.)
SOURCE.—Appendix Table 3.

during the second and third quarters of the year and is highest during the second quarter. It was no accident, then, that congestion developed in the agency market during the summer of 1966, when the cyclically heavy borrowing needs of the agencies were superimposed on needs that were already at their seasonal peak.

The Export-Import Bank has usually issued PC's during the first half of the year, specifi-

cally in February and May. PC issues by FNMA have not followed a set pattern, and indeed need not. Once they are authorized by Congress, sales of PC's may be timed to satisfy any number of goals, such as to aid in meeting Treasury financing requirements, to mesh smoothly with other agency financings, or to take advantage of a receptive market.

MATURITY STRUCTURE AND OTHER CHARACTERISTICS

The comparative marketability, liquidity, and yields of securities reflect a variety of factors that differ from one market to another and that differ even within given markets. Of major importance is the breadth and depth of the secondary market. But of some significance as well are such factors as length to maturity and risk of default, which are considered briefly in this section.

Maturity structure. The bulk of nonguaranteed agency debt is short term. In mid-1967, about two-thirds of such debt matured within 1 year. Of the remainder, 22 per cent matured in 1 to 5 years and 10 per cent after 5 years. There is a greater concentration of agency debt in the short maturities than is the case in the U.S. Government securities market. In mid-1967 less than half of all Treasury debt outstanding was due within 1 year while almost 25 per cent was due after 5 years.[7]

In the recent past, the growth in agency debt has embraced all maturities. Nonguaranteed agency debt due within 1 year totaled $12.2 billion in mid-1967 as compared with $5.3 billion in mid-1960. Over the same period, debt due in 1 to 5 years rose from $1.7 billion to $3.9 billion, and debt due after 5 years from $1.4 billion to $1.9 billion. The longer-term issues, however, grew at a slower pace than other maturities, and the proportion of nonguaranteed agency debt in long maturities declined to its mid-1967 level of 10 per cent from 16 per cent in mid-1960 and from 25 per cent

[7] The proportion due after 5 years was even larger (31 per cent) in mid-1965, about the time the Treasury had to stop issuing bonds because yields had risen above the 4¼ per cent interest-rate ceiling.

in early 1962. Data on agency debt by maturity are shown in Chart 3 and also in Appendix Table 4.

The maturity composition of agency debt differs widely among the issuing agencies. In general these differences reflect the structure of the agency's assets. The loans and discounts of FICB are, as a rule, short term and are restricted to maturities of 7 years or less. Debt issues of these banks may not exceed 5 years, and in practice all debentures issued by the banks in recent years have had a final maturity of 9 months. BC also generally make short-term loans, and in recent years all of their debt has had a 6-month maturity. Loans of FHLB on the other hand may be relatively long term or short term, and FHLB debt has sometimes been issued in the 1- to 5-year maturity area. Over the last few years the longest maturity on a new issue by FHLB was 2 years and 10 months. However, most of the new issues sold by FHLB had original maturities of about 1 year.

3 NONGUARANTEED AGENCY DEBT
Maturity Structure
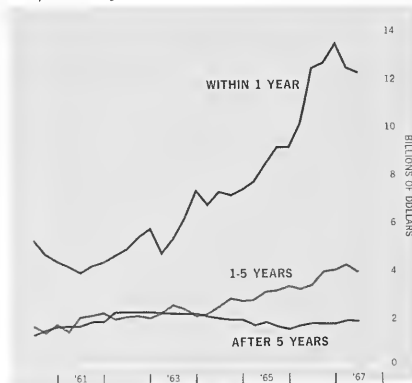
Nonguaranteed agency debt due in more than 5 years is issued exclusively by FLB, FNMA, and TVA. FLB make loans of from 5 to 40 years. In mid-1967, FLB bonds were about evenly divided among three maturity groups: within 1 year, 1 to 5 years, and after

5 years. On the same date, the longest-term bonds of the FLB carried an 11½-year final maturity.

Most of the assets held by FNMA in its secondary-market-operations function are mortgages guaranteed by the VA or insured by the FHA. Hence market obligations of FNMA encompass long-term as well as short-term maturities. As of mid-1967, most of the FNMA debentures outstanding were to mature in 1 to 5 years, with relatively few of the issues due in less than 1 or in more than 5 years. In addition to the debentures, FNMA issues short-term discount notes, due in 30 to 70 days.

TVA is the sole agency that issues nonguaranteed debt and that has no function intimately related to the extension of credit. In contrast to other agencies, the bulk of the assets of TVA are real, not financial. TVA debt presently includes several bonds due after 10 years and short-term discount notes sold at auction.

PC's have a considerably longer average maturity than do nonguaranteed agency issues. The maturity of PC's derives from the characteristically long-term nature of the pooled assets that are collateral for the certificates. Of the $5.7 billion of marketable PC's outstanding in mid-1967, all but $0.2 billion were due in more than 1 year and some $2.5 billion were due after 5 years. The longest-term PC outstanding carried a maturity of just under 20 years.

Virtually all of the dollar volume of PC's outstanding in mid-1967 represented certificates that had been issued after early 1965—and at a time when the Treasury was unable to issue any debt due in more than 5 years because market yields had risen above the 4¼ per cent interest-rate ceiling set by Congress on Treasury bonds.[8] The exclusion of agency debt from the rate ceiling permits the issuance of some long-term debt by the Federal authorities during inflationary periods in support of a countercyclical debt management policy.

[8] At the end of fiscal year 1967, Congress authorized a redefinition of Treasury notes that extends the maximum possible maturities of these securities to 7 years from the previous limit of 5 years. Treasury notes are not subject to the interest-rate ceiling.

Risk of default. Debt of the U.S. Government is as free from risk of default, as to either principal or interest, as any debt obligation. In fact, it is probably viewed by most investors as being a completely riskless investment. Agency debt—whether it be obligations of wholly or partially owned Government agencies or of agencies that are simply supervised by the Government—shares in the risk-free nature of direct U.S. Government debt in varying degrees.

PC's are fully guaranteed by the U.S. Government. In a September 1966 ruling of the Attorney General it was stated that PC's, which are issued by various branches and agencies of the Federal Government, "constitute general obligations of the United States backed by its full faith and credit." In addition, of course, PC's are backed by pools of financial assets.

Other agency debt, which by and large is issued by agencies with only partial Government ownership, is not guaranteed by the U.S. Government, but of course it is guaranteed by the issuing agency. However, the fact that the agencies were created by Congress, that they are supervised and in some cases partially owned by the U.S. Government, and that in some cases they may borrow directly from the Treasury makes their debt, to all intents and purposes, Government-guaranteed. Of the six agencies that issue nonguaranteed debt, only two—FHLB and FLB—have completely retired stock that had been held by the U.S. Government. The remaining ones are partially Government-owned. Three of the six—FNMA, FHLB, and TVA—have the authority to borrow directly from the Treasury; FNMA may borrow up to $2.25 billion and FHLB $1 billion.

Furthermore, the debt of these agencies, with the exception of TVA, is backed by the financial assets they hold in at least a comparable amount. Although these assets vary greatly in liquidity—ranging from cash reserves and U.S. Government security holdings to long-term loans and mortgages (VA-guaranteed and FHA-insured)—the total volume is at least equal in each instance to the total debt of the agency.

Other characteristics. Securities may be issued in either "bearer" or "registered" form. Bearer-form securities have greater marketability because they may be traded more quickly and more easily. Registered securities require signatures by owners and other registration procedures that are time-consuming; in addition, they cannot be transferred over the Federal Reserve wires. All nonguaranteed agency issues may be obtained in bearer form.[9] So too may FNMA PC's, though this has been true only since January 1967. For PC's this change represents a significant improvement in marketability, and thus in the attractiveness of these instruments to investors.

Also in January 1967, the first term issues of FNMA PC's were marketed, with relatively sizable amounts in each maturity.[10] Until then such certificates had been marketed as serial issues, with small amounts being offered in a number of issues ranging over a variety of maturities. The serial issues ranged in size from only $20 million to $70 million and were thus not readily tradable in the secondary market.

Also beginning in January 1967 Export-Import Bank PC's were made fully marketable. In prior offerings, such certificates had been sold only to restricted groups of investors, primarily commercial banks. The new PC's are available in either bearer or registered form.

Another recent development enhancing the attractiveness of agency debt has been the institution of repurchase agreements (RP's) against agency issues by the Federal Reserve. The first such agreements were made in December 1966. Since that time these agreements have formed a regular part of the System's RP operations. The immediate impact of the RP's was to make agency securities more attractive to dealers. But as dealers become more willing to hold agency debt, the entire market benefits through greater marketability, resulting in

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[9] In some cases, especially for the shorter-term issues, they are available only in bearer form.

[10] In the period since then there have been eight separate FNMA PC issues marketed, ranging in size from $200 million to $550 million ($150 million to $400 million offered to public investors).

smaller spreads between agency yields and yields on other securities.

YIELDS AND YIELD SPREADS

Agency yields are subject to the same general forces that determine other market rates. As Chart 4 shows, agency yields move over the cycle in line with yields in other markets. In 1966 yields in all of these markets reached postwar record highs, rising to—and in some cases above—6 per cent. By mid-1967, yields had declined, though a glance at the chart shows that they still remained at high levels.

A comparison of yields in the various markets shows that agency yields are generally higher than yields on Treasury issues but lower than those on private investments, such as corporate securities or certificates of deposit (CD's). Moreover, the spread between yields on two given securities varies over a fairly wide range since yields at any point in time may reflect supply and demand factors that are peculiar to a specific market as well as factors that are general to all markets. That yield

spreads may change radically is clear from the 1966 experience. As shown in Chart 5,[11] in that year there was a sharp increase in the spread between agency and Treasury yields and between private and agency yields (and thus between private and Treasury yields).

During 1966 the supply of agency securities rose rapidly, as did supplies of private issues, particularly corporates. On the other hand, the supply of long-term Treasury issues was declining[12] and the supply of Treasury bills also declined seasonally over the first three quarters of 1966, when the yield spread between agency issues and bills was increasing. By mid-1967, some yield spreads had returned to more normal levels, although there was no decline in the yield spread between agency and Treasury long-term issues, where comparative supply shifts remained unchanged.

Looking back over a longer period one can

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[11] These spread data are in Appendix Table 6.

[12] No Treasury debt due in more than 5 years has been issued since early 1965, and the supply has declined with the passage of time. In 1966 alone, it declined by $7.2 billion.

4 | YIELDS ON SELECTED TYPES OF MARKET ISSUES
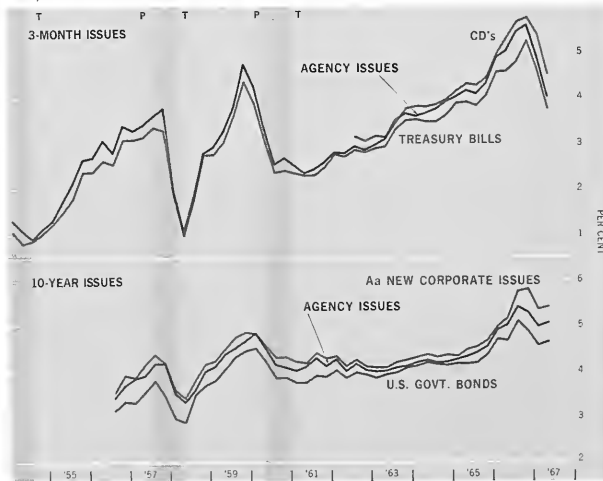
Quarterly averages computed from monthly data, from Salomon Brothers and Hutzler, "An Analytical Record of Yields and Yield Spreads." P=peak; T=trough.

see a marked secular decline in spreads between yields on long-term agency and Treasury issues. Panel III of Chart 5 shows yield spreads of around 50 basis points during 1956 and 1957 and spreads of around 25 basis points throughout the 1958–61 period. Beginning in 1962 there was a steady decline in the spread, and during 1964 the spread was no more than 5 basis points. Thereafter, the spread increased. The decline in the spread in the 1962–64 period was related in part to an improvement in the breadth of the agency market; larger investors were increasing their share of the market considerably, even at the declining spreads. However, the spread decline may also be attributed partly to differing supply shifts. During the early 1960's, advance refundings were adding to the supply of long-term Treasury debt, whereas long-term agency debt outstanding was declining slightly. When the supply situation was reversed in 1965, with the introduction of PC's and the cessation of long-term Treasury issues, the spread began to increase.

In Panel IV, the negative spread between agency and corporate yields shows virtually no

change, apart from a marked rise in 1966. It fluctuated widely within a range of about 25 basis points in the 1950's, and on several occasions in fact it decreased to zero. In the early to mid-1960's it moved over a still narrower range—of roughly 10 to 15 basis points.

In long-term markets in general, the quarter-to-quarter fluctuation in yield spreads diminished considerably during the early 1960's, as Chart 5 shows. While it is possible that the diminished fluctuations in spread represented a growing degree of investor arbitrage among various investments, it is also possible that they simply reflected the greater day-to-day stability in yields in all markets during the period.

Yield spreads between short-term agency issues and Treasury bills (Panel II of Chart 5)[13] fluctuate widely over the cycle and to a lesser

[13] The reader will note that Panel II contains two curves, one for market yields on bills and the other for investment yields. Investment yields reflect the true return on the invested funds. They indicate the return on the amount invested whereas market yields indicate the return on the face amount of the bill at maturity for a 365-day rather than a 360-day year. Agency, and other, yields are always on an investment-yield basis.

5 PROFILE OF YIELD SPREADS
Agency Yields less Yields on:
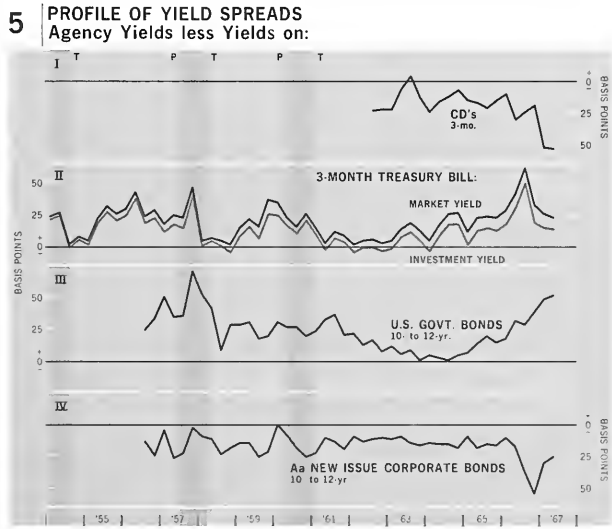
P = peak; T = trough.

degree seasonally. Throughout the period under consideration, such spreads declined to very low levels during periods of easy money and rose during periods of cyclical expansion. Thus, the spread was around zero near the troughs of the 1954, 1957–58, and 1960–61 recessions, but during the subsequent expansions it ranged up to around 50 basis points. This would appear to indicate that the superior liquidity and marketability of Treasury bills command a greater premium during periods of high and rising rates and lessened credit availability than during periods of easy money.[14]

Following the 1960–61 recession, the spread remained at very low levels for several years. In fact, if investment yields on Treasury bills are used, the spread was often slightly negative; that is, agency yields were less than Treasury bill yields. This sustained period of low spreads probably reflected in part the fact that upward pressures on bill yields were being maintained by official operations of the debt management and monetary authorities.

With such wide cyclical fluctuations in spreads between short-term yields, it is virtually impossible to isolate any secular trends. But it is clear that improvement in the market for short-term agency debt would by itself have been expected to reduce the yield spread.

During the 1960's, the spread between agency and Treasury bill yields shows a consistent seasonal pattern too. The spread rises in the second and third quarters and generally drops back in the fourth and first quarters. It will be recalled that new agency debt issues are concentrated in the second and third quarters. And these quarters have often involved a redemption of Treasury bills. The sharp increase in the spread during the second and third quarters of 1966, to a level of 42–62 basis points,

thus reflected to some extent a normal seasonal rise.

As Panel I of Chart 5 shows, the yield on 3-month CD's has, except for one instance, been above the yield on short-term agency issues. Generally, the spread has fluctuated in a range of 5–25 basis points, although it was much larger in the first half of 1967. When monetary policy was eased in late 1966, yields on most short-term market securities declined much more sharply than CD yields, and as a result the yield differential rose to 50 basis points.

Available data on agency yields are not always so comprehensive and accurate as would be desirable. Hence it has seemed desirable to include here an alternative set of data on agency and Treasury yields. These are data that the Treasury Department collects for its own use. They represent yields on specified dates at constant maturities, that is, yields derived from points on the yield curve. These data are shown in Chart 6 and Appendix Table 5 for 1-year, 3-year, 5-year, and 10-year maturities, for the period 1963 to the middle of 1967.

6 | SPREADS BETWEEN FEDERAL AGENCY AND U.S. GOVERNMENT SECURITIES – Various Maturities
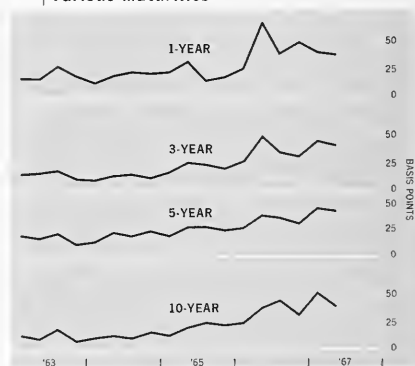
According to these data the spreads showed essentially the same movements as those in the series previously discussed—including a sharp

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[14] To a minor degree, the cyclical movement of spreads, at least early in the 1950's, might be related to varying supplies of Treasury bills versus supplies of agency issues over the cycle. Agency debt, as mentioned in an earlier section, rises more quickly when money is tight—that is, during expansions. On the other hand, during the 1950's Treasury debt often rose more quickly during and just after recessions when the Federal deficit was being enlarged by a drop in tax receipts as GNP declined.

rise during 1966 to around 50 basis points on most maturities. Prior to 1966, the spread on every maturity fluctuated in a range of roughly 10–25 basis points. The spread was generally lowest for long-term issues and highest for 1-year maturities. However, the levels of spreads shown in these data do not always coincide with the data from Salomon Brothers and Hutzler, shown in Chart 4. For instance, the Treasury data do not show a virtual elimination of the yield differential on 10-year maturities during the 1963–64 period, as do the Salomon Brothers' data.[15]

Special market developments might virtually eliminate the differential between agency and Treasury yields for a time, but it is unlikely that this condition would be sustained over a long period. Even though agency issues may be considered in practice to be just as risk free as Treasury debt, the more developed market for and greater tradability of Treasury debt relative to agency debt in most sectors would ordinarily cause some spread in yields on the two types of debt. However, a return to a slower but steady growth in agency debt, accompanied by continued development of the secondary market, should result in a downward drift in the spread.

DEMAND

The growth in Federal agency debt outstanding since the early 1950's has been accompanied by a considerable broadening in the ownership of such debt. At the end of 1950, commercial banks held more than 80 per cent of the $1.8 billion of agency debt outstanding. By 1955 the bank share had dropped to 50 per cent, and by 1960 to 20 per cent.

Meanwhile, a host of investor groups were adding agency debt to their portfolios. At the end of 1955, holdings of agency issues by most large nonbank investor groups were only nominal. In the 5 years after 1955 there was a sharp growth in holdings of such issues by non-

financial corporations and by nonbank financial institutions. Then, after 1960, State and local governments and individual investors acquired agency issues at a rapid pace, as did the smaller commercial banks. During the 1960's, in fact, many large investor groups increased their holdings of agency debt and sold U.S. Government securities.

The entrance of new investors into the · agency market has not been related solely to the increased supply of debt, which led to greater availability of issues as well as widened knowledge of the market. It has surely been dependent as well on the development of the secondary market—and thus the improved marketability of agency debt—and on the attractiveness of yields on agency issues relative to those on other securities.

But despite the sharp increase in holdings of most of the larger and more active investors, the supply of agency debt has been increasing so rapidly in the last few years that the share of such debt held by these investors has declined from 1962–63 levels. Moreover, two investor groups—commercial banks and nonbank financial institutions—account for a smaller share of the agency market, particularly in the longer-term maturities. In late 1966 commercial banks accounted for roughly 10 per cent less of all nonguaranteed agency securities publicly held than they did of Government securities, and this disparity was even more important for reserve city banks as a group. Larger nonbank financial institutions accounted for 10 per cent less of agency securities than of Government issues with after-5-year maturities. This same disparity was even more evident in the ownership of FNMA PC's relative to Government securities. It would appear that these two investor groups consider long-term agency securities at least to be considerably less marketable, in part because of the small size of individual issues.

It seems clear that larger (and probably more active) investors, in general, account for a smaller share of agency than of U.S. Government debt. Their smaller participation in the agency market not only reflects but also causes

[15] Yields used in the two sets of data differ, at least in part, because Salomon Brothers' data are based on offered quotations (except for bills) and Treasury data on bid quotations.

TABLE 3: HOLDINGS OF FEDERAL AGENCY AND U.S. GOVERNMENT DEBT, BY TYPE OF HOLDER, 1961–67

Date	Nonguaranteed agency debt maturing (in years)—				U.S. Govt. marketable debt maturing (in years)—				
	Within 1	1–5	After 5	Total	Within 1		1–5	After 5	Total
					Bills	Other			
Commercial banks [1] — In millions of dollars									
Dec. 31, 1961	995	592	84	1,671	9,962	11,187	30,751	7,174	59,074
1962	1,769	518	122	2,409	9,838	10,047	26,348	11,772	58,005
1963	2,221	525	119	2,865	9,290	7,413	26,107	12,070	54,880
1964	1,990	557	97	2,644	10,969	7,540	23,507	11,737	53,753
1965	2,231	652	91	2,974	10,156	7,847	19,676	12,645	50,324
1966	2,282	597	118	2,997	8,771	7,067	21,113	10,232	47,183
June 30, 1967	2,299	570	198	3,068	5,844	5,403	24,919	9,359	45,525
Percentage of publicly held debt									
Dec. 31, 1961	23	26	4	20	25	41	57	19	37
1962	31	25	5	24	22	43	53	26	36
1963	30	25	5	25	20	39	55	25	34
1964	27	20	5	22	23	45	49	24	33
1965	25	20	6	21	20	45	45	25	31
1966	18	16	7	17	17	44	44	23	30
June 30, 1967	21	17	11	19	14	43	47	23	31
Nonbank financial institutions [2] — In millions of dollars									
Dec. 31, 1961	394	414	323	1,131	778	1,582	4,631	10,656	17,647
1962	571	341	345	1,257	1,058	1,273	4,329	11,262	17,922
1963	719	364	283	1,366	1,053	1,196	4,174	11,586	18,009
1964	756	491	257	1,504	1,167	933	4,636	11,277	18,013
1965	920	534	203	1,657	1,387	970	4,273	11,081	17,711
1966	1,175	527	190	1,892	1,490	784	4,711	9,588	16,573
June 30, 1967	1,167	527	227	1,920	886	656	5,062	8,813	15,417
Percentage of publicly held debt									
Dec. 31, 1961	9	18	17	13	2	6	9	29	11
1962	10	17	15	12	2	6	9	25	11
1963	10	17	13	12	2	6	9	24	11
1964	10	18	13	12	2	6	10	23	11
1965	10	16	13	12	3	6	10	22	11
1966	10	14	11	11	3	5	10	22	10
June 30, 1967	11	16	12	12	2	5	10	22	11
Nonfinancial corporations [3] — In millions of dollars									
Dec. 31, 1961	904	54	11	969	5,466	3,232	1,747	102	10,547
1962	902	73	11	986	6,551	2,512	1,524	163	10,750
1963	1,155	49	4	1,208	6,178	1,493	2,397	359	10,427
1964	677	87	4	768	5,043	1,705	2,001	387	9,136
1965	825	117	11	953	4,657	1,254	1,754	349	8,014
1966	597	103	15	715	3,396	1,334	1,339	254	6,323
June 30, 1967	318	90	17	424	1,900	736	1,194	191	4,021
Percentage of publicly held debt									
Dec. 31, 1961	21	2	1	11	14	12	3	(4)	7
1962	16	4	1	10	15	11	3	(4)	7
1963	16	2	(4)	10	13	8	5	1	6
1964	9	3	(4)	6	10	10	4	1	6
1965	9	4	1	7	9	7	4	1	5
1966	5	3	1	4	7	8	3	1	4
June 30, 1967	3	3	1	3	5	6	2	1	3

TABLE 3 — Continued

Date	Nonguaranteed agency debt maturing (in years)—				U.S. Govt. marketable debt maturing (in years)—				
	Within 1	1–5	After 5	Total	Within 1		1–5	After 5	Total
					Bills	Other			
State and local governments [5]									
In millions of dollars									
Dec. 31, 1961.......	179	67	167	413	2,710	1,264	1,320	5,599	10,893
1962.......	243	48	259	550	3,282	1,165	1,059	6,210	11,716
1963.......	246	29	264	539	4,260	1,149	1,618	7,577	14,605
1964.......	385	104	328	817	3,961	902	2,014	8,144	15,021
1965.......	854	205	279	1,338	4,574	997	1,862	8,274	15,707
1966.......	887	223	269	1,379	4,512	1,032	2,166	7,674	15,384
June 30, 1967.......	985	200	273	1,459	4,700	923	2,262	6,949	14,834
Percentage of publicly held debt									
Dec. 31, 1961.......	4	3	9	5	7	5	2	15	7
1962.......	4	2	11	5	7	5	2	14	7
1963.......	3	1	12	5	9	6	3	15	9
1964.......	5	4	17	7	8	5	4	16	9
1965.......	9	6	18	10	9	6	4	17	10
1966.......	7	6	15	8	9	6	5	18	10
June 30, 1967.......	9	6	15	9	12	7	4	17	10
All other investors [6]									
In millions of dollars									
Dec. 31, 1961.......	1,890	1,147	1,315	4,353	20,596	10,234	15,827	13,780	60,438
1962.......	2,302	1,062	1,565	4,931	23,933	8,292	16,121	15,813	64,159
1963.......	2,990	1,146	1,561	5,698	25,246	7,700	13,623	17,599	64,167
1964.......	3,585	1,505	1,291	6,382	27,541	5,570	15,863	18,367	67,341
1965.......	4,286	1,827	1,007	7,121	29,088	6,268	15,784	17,534	68,674
1966.......	7,461	2,245	1,202	10,909	32,647	6,038	18,895	16,109	73,689
June 30, 1967.......	6,298	1,957	1,164	9,418	27,339	4,824	19,929	14,617	66,709
Percentage of publicly held debt									
Dec. 31, 1961.......	43	51	69	51	52	37	29	37	38
1962.......	40	52	68	49	54	36	33	35	40
1963.......	41	54	70	49	55	41	28	36	40
1964.......	49	55	65	53	57	34	33	37	41
1965.......	47	55	63	51	58	36	36	35	43
1966.......	60	61	67	61	64	37	39	37	46
June 30, 1967.......	57	59	62	58	67	39	37	37	46
Official accounts [7]									
In millions of dollars									
Dec. 31, 1961.......	35	...	...	35	3,932	14,970	10,597	7,866	37,365
1962.......	...	...	...	...	3,588	15,744	12,259	8,867	40,458
1963.......	29	...	...	29	5,512	18,912	10,568	10,490	45,482
1964.......	11	...	1	12	7,795	15,325	15,986	10,084	49,190
1965.......	45	...	...	45	10,314	15,884	17,253	10,723	54,174
1966.......	1,043	313	...	1,356	13,869	24,277	11,224	9,503	58,873
June 30, 1967.......	1,169	568	...	1,738	17,866	18,571	18,058	9,672	64,167

[1] Banks included in the Survey in 1966 accounted for about 64 per cent of all agency securities held by banks and about 83 per cent of all U.S. Government securities held by banks.

[2] Includes mutual savings banks, insurance companies, and savings and loan associations. Reporting mutual savings banks and insurance companies account for no more than 90 per cent of all such securities held by these institutions, while reporting savings and loan associations account for only 50 per cent.

[3] Includes only general funds. Reporting corpora-

tions account for about 50 per cent of all such securities held by nonfinancial corporations.

[4] Less than 0.5 per cent.

[5] Reporting governments account for about 70 per cent of such securities held by all State and local governments for the years 1964–67, and 60 per cent for the years 1961–63.

[6] Excluding official accounts, shown below.

[7] Includes Federal Reserve and Treasury trust fund and agency holdings.

SOURCE.—Treasury Survey of Ownership.

a poorer secondary market. The larger the share of such debt held in the portfolios of relatively small investors, the greater is the likelihood that agency issues will be locked into investor portfolios until maturity rather than traded actively in the secondary market.

7 PROFILE OF OWNERSHIP STRUCTURE OF NONGUARANTEED AGENCY DEBT
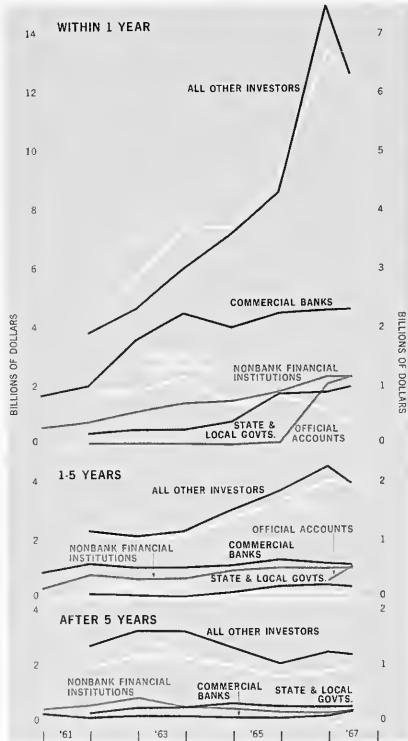
Data from the Treasury Survey of Ownership.

Since the end of 1966, however, larger investors have increased their share of the agency market. For PC's in particular, larger commercial banks and nonbank financial institutions together have increased their share of the total outstanding from 10 per cent to 37 per cent. It is likely that some part of the sharp

rise during 1967 in the share of the PC market held by these investors relates to the previously noted improvement in the marketability of PC's.

The remainder of this section will examine the ownership structure in more detail. The details of ownership are presented in Table 3 and are shown in Chart 7. These data are confined to the period beginning in 1961 as it is only for recent years that the Treasury Survey has included all of the major investor groups. Securities are classified by maturity date since assets held by many investor groups are highly concentrated in particular maturity areas. Table 3 also includes data on ownership of U.S. Government securities for purposes of comparison. Ownership of PC's is discussed separately because the data for these issues are not comparable.

It should be noted that the available data do not present a clear picture of ownership of agency issues. The Treasury Survey does not cover all holders, but only the larger holders in any one investor class. The coverage in the Survey for any particular class of investors ranges from an estimated 90 per cent of all agency securities held by the particular group to less than 50 per cent in some cases.[16] Therefore, the category "all other investors" includes —in addition to individuals and other nonreporting groups such as nonbank Government securities dealers and investment companies—nonreporting banks, corporations, and so forth. If allowance could be made for these nonreporting investors, holdings of individuals would probably appear relatively small. They certainly would not dominate the market as appears to be the case in Chart 7. This is indicated by adjustments that can be made for two recent years.

For example, for 1965 and 1966 some data

[16] The estimated coverage for each group is shown in footnotes to Table 3. It also appears that the coverage for any investor group can vary greatly as between agency and U.S. Government issues. In all cases, reporting investors appear to account for a lower percentage of holdings of agency issues—implying that small institutional investors hold a larger share of agency securities than of U.S. Government issues. This divergence makes comparisons of ownership in the two markets somewhat tenuous.

are available for adjusting the Survey information to give a clearer—though still far from perfect—picture of the ownership profile of nonguaranteed agency debt. If Survey figures for commercial banks as shown in Table 3 are raised to include agency issues held by non-reporting commercial banks,[17] and if holdings of corporate pension trust funds are removed from the "all other" category, relative ownership shares are altered dramatically. As Table 4 shows, at the end of 1965 bank holdings of short-term agency issues would be slightly larger than those of "all other investors" though this would not be the case in 1966. These in-

TABLE 4: AGENCY DEBT HELD BY SELECTED INVESTOR GROUPS, BY MATURITY OF DEBT

In billions of dollars

Date and group	Within 1 year	1-5 years	After 5 years
Dec. 31, 1965			
All commercial banks	3.2	.9	.1
"All other investors" category [1]	3.1	1.5	.8
Dec. 31, 1966			
All commercial banks	3.6	.8	.1
"All other investors" category [1]	6.0	1.9	1.1

[1] Adjusted to exclude holdings of corporate pension funds.

adequacies of the data should be borne in mind in the following discussion.

Nonguaranteed agency debt. As should be clear from the preceding paragraph, commercial banks play a more important role in the agency market than Chart 7 indicates. The share of agency debt held by all commercial banks is considerably less than it was in the early to mid-1950's, but it is not small. In the last few years banks have held roughly one-fourth to one-third of all short-term nonguaranteed agency issues in public hands. They are less important participants in the intermediate- and long-term sectors of the agency market, as is also true of their participation in the U.S. Government securities market.

In dollar terms, bank holdings of agency securities appear minute in comparison with their holdings of U.S. Government securities. At the end of 1966, nonguaranteed agency securities

at all commercial banks totaled just over $4.5 billion, whereas marketable U.S. Government securities totaled more than $57 billion. Moreover, when banks' relative shares of agency issues and of publicly held U.S. debt are compared, the share for U.S. debt is also larger. On the basis of call report data for the end of 1966,[18] all commercial banks held 22 per cent of publicly owned Treasury bills, just over one-half of the coupon issues due within 5 years, and 27 per cent of long-term Treasury bonds. In the agency market, on the other hand, banks held 30 per cent of short-term issues, only 22 per cent of issues due in 1 to 5 years, and not even 10 per cent of agency securities due after 5 years. In both markets, the bank share was reduced by several years of monetary restraint and would appear somewhat higher in another stage of the cycle.

There is also a difference between the agency and U.S. Government securities markets in the degree of participation of reserve city banks as compared with other classes of banks. As shown in Table 5, in 1966 reserve city banks accounted for a much larger proportion—about one-third—of all bank holdings of U.S. Government securities than they did of agency issues—about one-seventh. Holdings of country member and insured nonmember banks varied accordingly.

Thus far during the 1960's bank holdings of agency issues have increased at an even more rapid pace than during the 1950's.[19] At the same time, however, banks' share of agency debt outstanding has declined as a result of the rapid growth in agency debt.

Bank holdings of agency issues even showed a slight increase during 1966, despite the fact that credit restraint was extreme.[20] An absence of selling of agency issues during that period of tight money contrasts with sizable sales

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[17] Available for recent years from Federal Reserve Call Reports of Condition.

[18] Treasury Survey data, excluding some of the smaller banks, show the same comparative pattern (Table 3).

[19] For years before the mid-1960's, Treasury Survey data must be used, and they are shown in Table 3.

[20] Although, through November 1966, the commercial banks reporting in the Treasury Survey showed a small decline in nonguaranteed agency holdings.

TABLE 5: INSURED COMMERCIAL BANKS' HOLDINGS OF FEDERAL AGENCY AND U.S. GOVERNMENT DEBT

Class of bank	Nonguaranteed agency debt maturing (in years)—			U.S. Govt. marketable debt maturing (in years)—				Nonguaranteed agency debt maturing (in years)—			U.S. Govt. marketable debt maturing (in years)—			
	Within 1	1–5	After 5	Within 1 Bills	Within 1 Other	1–5	After 5	Within 1	1–5	After 5	Within 1 Bills	Within 1 Other	1–5	After 5
	In millions of dollars							Percentage distribution						
June 30, 1966:														
Reserve city:														
New York City	182	23	5	1,229	569	1,330	1,514	5	3	3	15	7	6	11
Chicago	58	17	5	411	188	595	473	2	2	3	5	2	3	3
Other	371	97	43	1,453	1,745	5,649	3,696	10	11	27	18	22	23	27
Country	1,673	401	68	2,431	3,372	10,606	5,515	46	46	43	30	43	44	40
Insured nonmember	1,341	338	37	2,588	2,062	5,937	2,721	37	39	23	32	26	25	20
Total 1	3,625	876	158	8,113	7,936	24,118	13,918	100	100	100	100	100	100	100
December 31, 1966:														
Reserve city:														
New York City	133	27	4	1,797	588	1,253	1,450	4	3	3	16	7	5	12
Chicago	33	12	3	350	181	663	420	1	2	2	3	2	3	4
Other	355	87	30	2,384	2,012	5,860	3,170	10	11	21	21	24	23	27
Country	1,630	384	68	3,544	3,538	11,181	4,430	45	46	47	31	42	44	38
Insured nonmember	1,447	318	40	3,299	2,082	6,466	2,193	40	39	28	29	25	25	19
Total 1	3,599	827	145	11,373	8,400	25,423	11,663	100	100	100	100	100	100	100

1 Does not include uninsured banks for which data are not comparable. Uninsured bank holdings of all agency securities total about $100 million whereas holdings of U.S. Government securities total $350 million to $400 million.

SOURCE.—Board of Governors of the Federal Reserve System, *Summary Report—Assets and Liabilities of Member Banks, December 31, 1966.*

of U.S. Government securities by banks (shown in Table 3). It also contrasts with bank sales of agency issues during earlier periods of cyclical expansion. The fact that such sales did not materialize during 1965–66 may have been the result of any number of factors—including the unprecedented rise in agency debt outstanding; the rapid decline in prices of agency securities, which made it unprofitable for investors to trade the issues; and a sharp increase in the spread between yields on agency and U.S. Government issues. Yet another factor was the continued acquisition of agency issues by the smaller commercial banks, since reserve city banks as a group did sell agency issues during 1966. On the one hand, these smaller banks tend to be less affected by monetary tightness than big banks, and on the other, they were probably responding to a new awareness of the agency market coupled with the extremely favorable spreads between yields on agency and other issues.[21] But whatever the cause, without the absence of sizable sales of agency issues by commercial banks during 1966, the rise in

agency yields would have been even more spectacular.

Next in importance to commercial banks as participants in the Federal agency market are the nonbank financial institutions. These include mutual savings banks, insurance companies (life, fire, casualty, and marine), and savings and loan associations. As of the end of 1966, holdings of nonguaranteed agency issues by such institutions reporting in the Treasury Survey totaled $1.9 billion, or just over 10 per cent of agency debt outstanding in public hands. Conversely to commercial banks, these institutions play a more important role in the intermediate- and long-term sectors of the market, for their liabilities are of longer maturity and greater predictability.

During the early to mid-1950's these institutions held virtually no agency securities. But in 1956, they began to add agency issues to their portfolios in some volume; in the 5 years ending with 1960 they added roughly $1 billion of such issues to their portfolios, and by mid-1967 they had added another $1 billion.

While holdings of agency issues of these financial institutions are considerably smaller in dollar amounts than those of U.S. Government securities, as shown in Table 3, each portfolio accounts for roughly the same proportion of

[21] Agency securities, except for FICB issues, may not be used as collateral for borrowing from the Federal Reserve. And many of the major banks were short of collateral during 1966.

debt outstanding in that particular market. Nevertheless, the maturity distribution varies considerably from one portfolio to the other. Holdings of agency issues are concentrated in the short-term maturities while holdings of Treasury issues are overwhelmingly intermediate and long term. To some degree this is a reflection of a variance in the type of financial institution most important in each market. Mutual savings banks account for one-half of nonbank financial institutions' holdings of agency issues outstanding and life insurance companies account for less than 1 per cent. In contrast, insurance companies account for roughly one-half of institutions' holdings of U.S. Government issues—and life insurance companies alone for one-fourth of the group's holdings. Among the types of nonbank financial institutions, life insurance companies of course hold the longest-term assets. For these institutions it seems apparent that yield spreads in favor of long-term agency issues have not been large enough to offset the lesser marketability of such issues.

Savings and loan associations account for roughly the same share of debt in both markets, though they too account for fewer of the long-term maturities in the agency market. Savings and loan associations hold agency securities despite the fact that these securities do not help to meet legal liquidity requirements.

During 1966, despite declines in savings inflows, nonbank financial institutions added agency securities to their portfolios. In fact, the $235 million rise in their holdings of nonguaranteed agency issues was larger than in any other year of the 1960's. Simultaneously, these institutions reduced their holdings of U.S. Government securities by more than $1 billion. The yield spread in favor of agency issues rose sharply at this time. During the first half of 1967, similar shifts in portfolios were in evidence: Treasury debt holdings were reduced, again by more than $1 billion, and agency issues were acquired, though only in nominal amounts.

Nonfinancial corporations were important holders of short-term agency issues early in the 1960's, but their participation in the agency market, as in the market for U.S. Government securities, has declined since about 1964. The decline in corporate holdings of short-term agency issues is clearly shown in Chart 7 and in Table 3. In 1961 and 1962, corporate holdings of short-term agency issues were about $1.0 billion, or about 15 to 20 per cent of total agency debt outstanding, but by 1966–67 their holdings had fallen to a $300 million to $600 million range—only 3 to 5 per cent of agency debt. Corporate holdings of agency issues due in more than 1 year have never been large.

Over the 1960's U.S. Government securities held in corporate portfolios have also declined, from $10.5 billion early in the 1960's to a $4 billion to $6 billion range currently. Declines in holdings of both agency and U.S. Government securities by nonfinancial corporations are related, in general, to a shift of corporate liquid assets into time deposits as the negotiable CD developed after 1962 and into other types of higher-yielding short-term assets. To a lesser degree they probably relate to the usual reduction in corporate holdings in advanced stages of cyclical expansion and to a reduction in accrued tax liabilities with the speed-up in corporate tax payments. Corporations account for roughly the same share of debt outstanding in both markets.

State and local governments have become increasingly important investors in agency issues, particularly in the short-term maturity sector. They are especially active buyers of FNMA discount notes, which may be tailored to specific maturity dates. But State and local government holdings of securities cover all maturity sectors. For example, holdings of general funds are primarily in short-term liquid issues, and pension fund holdings are concentrated in long-term issues. As of mid-1967, these governments reporting in the Treasury Survey indicated that they held about $1 billion of short-term agency debt and almost $0.5 billion of debt due after 1 year (Table 3). While U.S. Government security holdings were much larger—$15 billion—these governments account for roughly the same share of debt outstanding in both markets.

Investments by State and local governments

in both agency and U.S. Government securities have increased considerably over the 1960's, but the relative growth has been greater in agency issues. Whereas at the end of 1961 holdings of agency issues were only 4 per cent of U.S. debt holdings, by mid-1967 they had risen to 10 per cent;[22] and for short-term issues —those due within 1 year—the increase was from 5 to 18 per cent. A portion of the growth in holdings of agency issues results from the fact that in some States permission to invest in agency issues was granted only recently. A further freeing of investment choices should give impetus to future growth in holdings of agency issues by these governments.

The "all other investors" category accounts for 50 to 60 per cent of nonguaranteed agency debt outstanding. This category includes investor groups not specified in the Treasury Survey, such as individuals, foreign investors, nonbank dealers in Government securities,[23] and nonprofit organizations. Corporate pension trust fund holdings are also included in data shown here; at the end of 1966 these investors held $432 million of nonguaranteed agency debt, spread over the full maturity range. Finally, this category includes holdings of investors belonging to groups specified in the Survey but not reporting to the Treasury. At the end of 1966, nonreporting commercial banks alone held $1.6 billion of nonguaranteed agency debt.

This amalgam of investors has absorbed more than one-half of the increase in nonguaranteed agency debt since the end of 1961. The group accounts for a larger share of outstanding agency debt than it did earlier in the 1960's in all maturity areas except the after-5-year. At the same time their holdings of U.S. Government securities have risen sharply, as shown in Table 3. Such a rise is typical of periods of tight money.

"All other investors" account for roughly the same share of short-term agency issues outstanding as they do of Treasury bills, but they account for a significantly higher share of agency than of Treasury coupon issues, particularly in the long-term maturities (62 versus 37 per cent in mid-1967). It would appear that the larger institutional investors reporting in the Survey find long-term agency issues less desirable investments than Treasury issues, though this difference is diminishing. It undoubtedly relates to lesser marketability, in part due to the small size of individual agency issues.

The sharp rise in nonguaranteed agency debt issued to the public during 1966 was absorbed entirely by "all other investors," whose holdings rose by almost $4 billion. This represented an increase of more than 50 per cent in the group's holdings. "All other investors" absorbed a large volume of U.S. securities during 1966 as well. Their holdings of such issues rose by $5 billion, or 7 per cent.

It is interesting to note that the need for "all other investors" to absorb such a large volume of securities derived from different factors in the two markets. In the agency market, all investor groups reporting in the Treasury Survey with the exception of nonfinancial corporations purchased agency issues on balance during 1966; the reason why holdings of "all other investors" showed such a large increase was that there was a sharp increase in agency debt issued to the public. In the Treasury market, on the other hand, official purchases more than absorbed the rise in Treasury debt. But over the period every reporting investor group sold Government securities, and these were absorbed —at higher yields—into portfolios of "all other investors," presumably for the most part those of individuals. In mid-1967, with the easing of the credit stringency, holdings by "all other investors" of both agency issues and of U.S. Government securities were well below end-of-1966 levels.

Prior to late 1966, only a nominal amount of agency debt was held outside the public's hands. The Federal Reserve currently does not own agency debt outright although it is legally authorized to do so. Since late 1966 it has bought agency issues from securities dealers under repurchase agreements. Acquisitions of agency issues by Treasury trust funds and agencies were undertaken on a large scale be-

[22] If holdings of PC's are added to nonguaranteed agency debt, the percentage is 14 per cent rather than 10 per cent.
[23] Bank dealer holdings are included in commercial bank data.

ginning in August 1966, as a means of alleviating the congestion in that market. Since then, Treasury accounts have acquired some $1.7 billion of nonguaranteed issues, almost entirely through direct allotments at the time of agency financings.

Participation certificates. PC's issued by FNMA as trustee were first offered to the public in late 1964. From that time through 1966 all PC's were in registered form, and presumably the ownership data collected by FNMA were complete as to coverage of specified investor groups. These data, as of the end of each quarter, are presented in Table 6. It can be seen that during the past few years commercial banks accounted for 10 to 20 per cent of FNMA PC's outstanding. At the end of 1966, their holdings totaled $224 million. On that same date, however, both nonbank financial institutions and State and local governments accounted for a larger share of PC's outstanding than banks, but this was not surprising since these groups tend to invest in intermediate- and long-term maturities, the form that most PC's take. Holdings of PC's by nonfinancial corporations are quite small—only about $50 million. The same is true of individuals' holdings, as Table 6 shows. However, a large part of the "all other investors" category

is undoubtedly accounted for by individual trust funds managed by banks.

These FNMA ownership data ceased with the institution of PC's in bearer form in 1967. But beginning with December 1966, the Treasury Survey of Ownership includes data on PC's by issuer—FNMA, Export-Import Bank, and CCC. Unfortunately, the Survey carries no maturity breakdown on the PC's and no separate listing of each issue—thus limiting the usefulness of the data. There is, for example, no way of isolating ownership of the recent large (nonserial) issues of FNMA or of the fully marketable Export-Import Bank issues. Table 7 presents the Treasury Survey data on PC's.

For the end of 1966, all but one of the specified investor groups show smaller holdings than in Table 6 and account for a lesser market share.[24] If one focuses on changes in ownership from the end of 1966 through June 1967, Table 7 shows that there was a considerable rise in PC portfolios of all investor groups as FNMA PC's outstanding rose by $2.8 billion. To some degree this rise in holdings of the larger in-

[24] The exception is corporate pension trust funds, which show larger holdings in the Survey than in FNMA data. This is because banks manage some of the pension funds, and they are to this degree included in the "all other" category of the FNMA data.

TABLE 6: OWNERSHIP OF FNMA PARTICIPATION CERTIFICATES, 1964–66

End of quarter	Commercial banks	Nonbank financial institutions	Nonfinancial corporations		State and local govts.	Individuals	All other investors[1]	Total
			General funds	Pension funds				
			In millions of dollars					
1964–IV	66	67	8	5	17	2	135	300
1965– I	57	66	7	2	23	2	142	300
II	61	62	7	2	25	2	142	300
III	152	165	7	10	83	4	405	825
IV	176	212	8	10	154	7	607	1,170
1966– I	144	220	10	11	177	8	601	1,170
II	234	328	28	9	321	37	1,156	2,110
III	226	312	35	17	329	45	1,110	2,075
IV	224	291	29	21	338	47	1,070	2,020
			Percentage distribution					
1964–IV	22	22	3	2	6	1	45	100
1965– I	19	22	2	1	8	1	48	100
II	21	21	2	1	8	1	47	100
III	18	20	1	1	10	1	49	100
IV	15	18	1	1	13	1	52	100
1966– I	12	19	1	1	15	1	51	100
II	11	16	1	1	15	2	55	100
III	11	15	2	1	16	2	54	100
IV	11	14	1	1	17	2	53	100

[1] Includes partnerships such as investment funds, dealers, and brokers; a major share is held by bank nominees, including some corporate pension funds.

NOTE.—Figures represent all PC's issued by FNMA as trustee.

SOURCE.—Office of Secretary-Treasurer, FNMA.

TABLE 7: OWNERSHIP OF PARTICIPATION CERTIFICATES, 1966 AND 1967

End of quarter	Commer-cial banks	Nonbank financial institu-tions	Nonfinancial corporations		State and local govts.	Official accounts	All other investors	Total
			General funds	Pension funds				
	FNMA PC's In millions of dollars							
1966–IV.................	92	103	26	79	227	...	1,493	2,020
1967– I.................	469	292	56	102	304	500	1,397	3,120
II.................	924	505	39	112	456	900	1,894	4,830
	Percentage distribution							
1966–IV.................	5	5	1	4	11	...	74	100
1967– I.................	18	11	2	4	12	...	53	100
II	24	13	1	3	12	...	48	100
	Export-Import Bank PC's In millions of dollars							
1966–IV.................	271	32	...	14	1	...	815	1,135
1967– I.................	613	91	60	18	56	...	747	1,583
II	686	133	69	18	93	...	743	1,742

SOURCE.—Treasury Survey of Ownership.

stitutional investors was related to the improved marketability of FNMA PC's issued in 1967, which as indicated earlier are in bearer form.

The increases in holdings were largest for the two investor groups that experienced marked improvements in liquidity over the period, namely commercial banks and nonbank financial institutions. As a result, the share of FNMA PC's in public hands held by reporting commercial banks increased from 5 per cent at the end of 1966 to 24 per cent in mid-1967, while the nonbank financial institutions' share rose from 5 to 13 per cent. Shares of nonfinancial corporations and State and local governments remained virtually constant, so the share of "all other investors" dropped from just under 75 to just under 50 per cent.

It is possible to compare ownership of FNMA PC's with the ownership structure of nonguaranteed agency issues and also Treasury issues, but not with any degree of precision. Comparative ownership data as of December 31, 1966, are shown in Table 8, but differences among the markets in the percentages of debt held by the various investor groups may not be meaningful. In the first place, the percentages will vary with the average maturity of debt in each market. Secondly, the share of debt accounted for by nonreporting institutions differs among the markets. If allowance is made for these complications, however, there do appear

to be some significant differences in the degree to which some investors participate in the various markets.

Table 8 shows the relative ownership of reporting commercial banks to be considerably less in PC's than in nonguaranteed agency issues and to be sharply less than in U.S. debt. To some degree this reflects the longer average maturity of PC's. Data for all commercial banks show the same general pattern. Thus, holdings of all commercial banks at the end of 1966[25] accounted for 36 per cent of publicly held U.S. marketable debt, about 25 per cent of agency debt, and only 11 per cent of FNMA PC's. It is clear, however, that commercial banks hold a larger share of the new, more readily tradable PC's.

It is not clear whether *all nonbank* financial institutions hold relatively fewer PC's than agency or Goverment securities. It is apparent from Table 8, however, that the larger reporting institutions hold considerably fewer PC's. At the end of 1966, this group accounted for 5 per cent of the PC's outstanding, compared with about 10 per cent of the issues in the other two markets; and given the longer maturities of the PC issues, one would have expected such issues to account for a greater market share. As noted earlier, these institutions increased their holdings of PC's sharply during the first

[25] Call report data.

TABLE 8: COMPARATIVE OWNERSHIP STRUCTURE,
DECEMBER 31, 1966

Type of debt	Commer-cial banks	Nonbank financial institu-tions	Non-financial corpora-tions (general funds)	State and local govts.	All others	Total held by public
	In millions of dollars					
Treasury Survey data:						
U.S. Govt. marketable debt	47,183	16,573	6,323	15,384	73,689	159,152
Nonguaranteed agency debt	2,997	1,892	715	1,379	10,909	17,893
FNMA PC's	92	103	26	227	1,572	2,020
FNMA data:						
FNMA PC's	224	291	29	338	1,138	2,020
	Percentage distribution					
Treasury Survey data:						
U.S. Govt. marketable debt	30	10	4	10	46	100
Nonguaranteed agency debt	17	11	4	8	61	100
FNMA PC's	5	5	1	11	78	100
FNMA data:						
FNMA PC's	11	14	1	17	56	100

half of 1967, and by June 1967 they accounted for 11 per cent of all PC's outstanding. It would appear that the small size of the serial PC's issued before 1967, and perhaps their registered form, detracted considerably from their appeal to the large institutions.

If one allows for maturity differences, the relative shares of each debt instrument held are much the same for nonfinancial corporations, and the same is true for State and local governments. It is interesting to note, however, that the smaller, nonreporting corporations appear to hold virtually no FNMA PC's (of the total outstanding—$29 million—that was held by nonfinancial corporations at the end of 1966, corporations reporting in the Treasury Survey held all but $3 million, as shown in Table 8) whereas such corporations apparently account for one-half of U.S. debt holdings of corporations.

Finally, because banks and nonbank financial institutions account for a smaller share of the market for PC's, the share of the "all other investors" category is considerably larger. If commercial bank holdings are raised to incorporate all commercial banks, "all other investors" accounted for some 72 per cent of PC's outstanding at the end of 1966, compared with 52 per cent of nonguaranteed agency issues and 40 per cent of U.S. Government securities.

Treasury trust funds and agencies acquired FNMA PC's for the first time during January–June 1967. At mid-1967, they held $900 million of the PC's. As with their nonguaranteed agency debt holdings, these issues were acquired through direct allotments at the times of financings rather than through market purchases.

Treasury Survey data on the ownership of Export-Import Bank PC's (Table 7), as noted earlier, include all PC's outstanding, but of the total only $900 million are fully marketable. Prior to 1967, Export-Import PC's were sold to commercial banks, which in turn were permitted to distribute them to specified types of institutional investors. As a result, banks continue to hold the bulk of these PC's. The $900 million of Export-Import PC's offered since February 1967 are fully marketable. It is probably not far wrong to assume that the rise in holdings of nonfinancial corporations (general funds), State and local governments, and nonbank financial institutions since the end of 1966 has been in these fully marketable issues. If so, at mid-1967 these groups, respectively, accounted for 8, 10, and 11 per cent of the new Export-Import PC's. These market shares are very close to FNMA PC shares, except for nonfinancial corporations, which hold a relatively greater amount of the Export-Import PC's.

IV. HOMOGENEITY OF AGENCY SECURITIES

A question of particular importance to participants in the market for agency securities—lenders and borrowers alike—is whether there is a single homogeneous market for all agency securities or whether, conversely, the securities of each agency form smaller, distinct markets. A related question is whether single agency issues with small amounts outstanding differ from larger agency issues in a manner that might imply less marketability.

To answer these questions, data were assembled on comparative yields and ownership, by issuing agency and by issue size. These data show the agency market to be homogeneous from the standpoint of securities of individual agencies; that is, no consistent and significant differences were found in market yields or in ownership of the separate agency securities. With respect to agency issues of small size, it would appear—on the basis of limited data—that their quoted yields often vary quite widely from the yield curve and that they are lodged to a greater degree than large issues in the portfolios of comparatively inactive investors.

ISSUING AGENCY

Even within a homogeneous market differences in yield and ownership will exist among issues, depending on the maturity of each issue and on less important attributes such as the coupon rate. As pointed out earlier, the maturity characteristics of agency debt differ widely by issuing agency: all debt of FICB and of BC matures within 1 year; some debt of FHLB matures in more than 1 year; and debt of FNMA and FLB is more heavily weighted in the intermediate- and long-term maturity sectors. To abstract from these maturity differences, ownership data are classified by maturity category, and curves relating the yield of every agency issue outstanding to its maturity date are plotted for selected dates.

Yields. Charts 8–12 show plots for agency yield curves in which the securities of the separate agencies are differentiated. The curves include all outstanding agency issues, shown as

of the end of May for the years 1961 through 1967. The market yields that were utilized are those published in the daily quote sheets of the Morgan Guaranty Trust Company.[26] For the 1966 and 1967 dates, the charts depict after-tax yields to corporations in order to adjust for relative coupon size.[27]

Inspection of the charts produces several general impressions: (1) the yield curves are relatively smooth, although less so than the yield curves for U.S. Government securities; (2) the degree of smoothness varies considerably over time and by maturity area; (3) the yield differences among issues of comparable maturity are—as often as not—among issues of the same agency, and there are no consistent differences over time in the yields on the securities of one agency as compared with those of another.

The divergence among yields on agency issues of similar maturity has on several of the observed dates been as large as 50 basis points, and has not uncommonly been around 25 basis points. Such a divergence persists, and to an even greater degree on longer-term issues, when after-tax yields to corporations are utilized.

The dispersion of agency yields around the yield curve is clearly greater than in the U.S. Government securities market. In Chart 13, before- and after-tax yield curves for U.S. Government securities are plotted for the end of May 1967, utilizing Morgan Guaranty quote sheets.[28] When the low coupon issues are ex-

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[26] Differences among dealers in published agency yield quotations on specific issues are quite sizable. On one observation date they ranged up to about 35 basis points (Chart 15, p. 68).

[27] When market security prices are below par, given the same market yield and maturity, issues with high coupons are less attractive to investors than those with low coupons because capital gains are taxed at a lower rate than interest income. Issues with relatively low coupons thus generally carry lower before-tax market yields.

[28] It appears that the yield curve for U.S. Government securities is less smooth if one uses the yields quoted by a single dealer than when composite yield quotations from all dealers are used.

8 | YIELDS OF AGENCY SECURITIES, May 31, 1967

PER CENT

5.5

5.0

4.5

4.0

3.5
3.0

2.5

2.0

1.5

ISSUES OF:
● BC
X FICB
X FHLB
■ FRMA
● FLB
FNMA PC'S
■ EXPORT IMPORT PC'S

MARKET YIELD

AFTER-TAX YIELD TO CORPORATION

MATURITY (YEARS)

1   2   3   4   5   6   7   8   9   10   11   12   13

Data are from daily quotation sheets of Morgan Guaranty Trust Company.

9 | YIELDS OF AGENCY SECURITIES, MAY 31, 1966

MARKET YIELD

AFTER-TAX YIELD TO CORPORATION

PER CENT

5.5

5.0

4.5

3.5

3.0

2.5

2.0

ISSUES OF:
● BC
X FICB
X FHLB
■ FNMA
● FLB

MATURITY (YEARS)

1 2 3 4 5 6 7 8 9 10 11 12 13

Data are from daily quotation sheets of Morgan Guaranty Trust Company.

10 | YIELDS OF AGENCY SECURITIES, May 1963, 1964, and 1965

MAY 31, 1963

MAY 27, 1964

MAY 28, 1965

PER CENT

MATURITY (YEARS)

ISSUES OF:
● BC
X FICB
X FHLB
■ FNMA
● FLB

Market yields, from daily quotation sheets of Morgan Guaranty Trust Company.

11 | YIELDS OF AGENCY SECURITIES, May 31, 1962

PER CENT

4.5

4.0

3.5

3.0

2.5

2.0

1.5

ISSUES OF:
● BC
X FICB
X FHLB
■ FNMA
● FLB

MATURITY (YEARS)

1   2   3   4   5   6   7   8   9   10   11   12   13
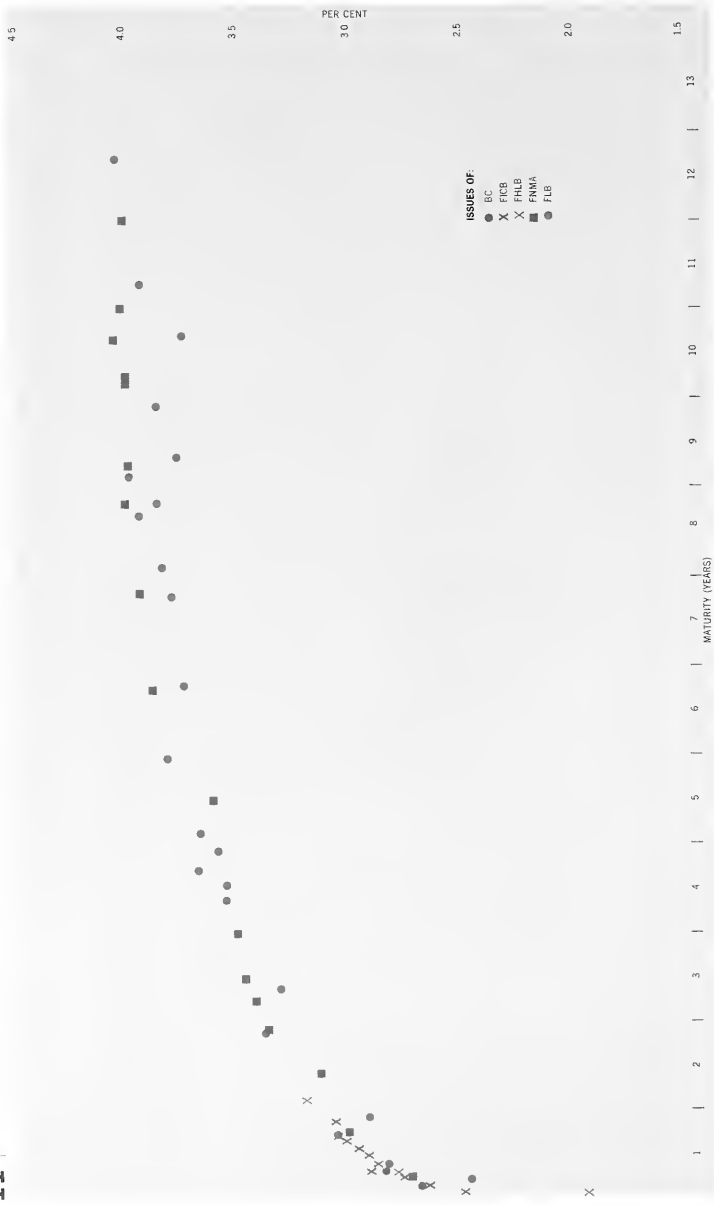
Market yields, from daily quotation sheets of Morgan Guaranty Trust Company.

12 | YIELDS OF AGENCY SECURITIES, May 31, 1961

ISSUES OF:
● BC
× FICB
× FHLB
■ FNMA
● FLB

PER CENT

MATURITY (YEARS)

Market yields, from daily quotation sheets of Morgan Guaranty Trust Company.

13 YIELDS OF TREASURY SECURITIES, May 31, 1967

AFTER-TAX YIELD TO CORPORATION

MARKET YIELD

PER CENT

ISSUES OF:
- 2½% BONDS
- OTHER

MATURITY (YEARS)

Yields on 1½ per cent notes not shown. Data are from daily quotation sheets of Morgan Guaranty Trust Company.

14 | YIELDS OF AGENCY SECURITIES BY ISSUE SIZE, MAY 31, 1967
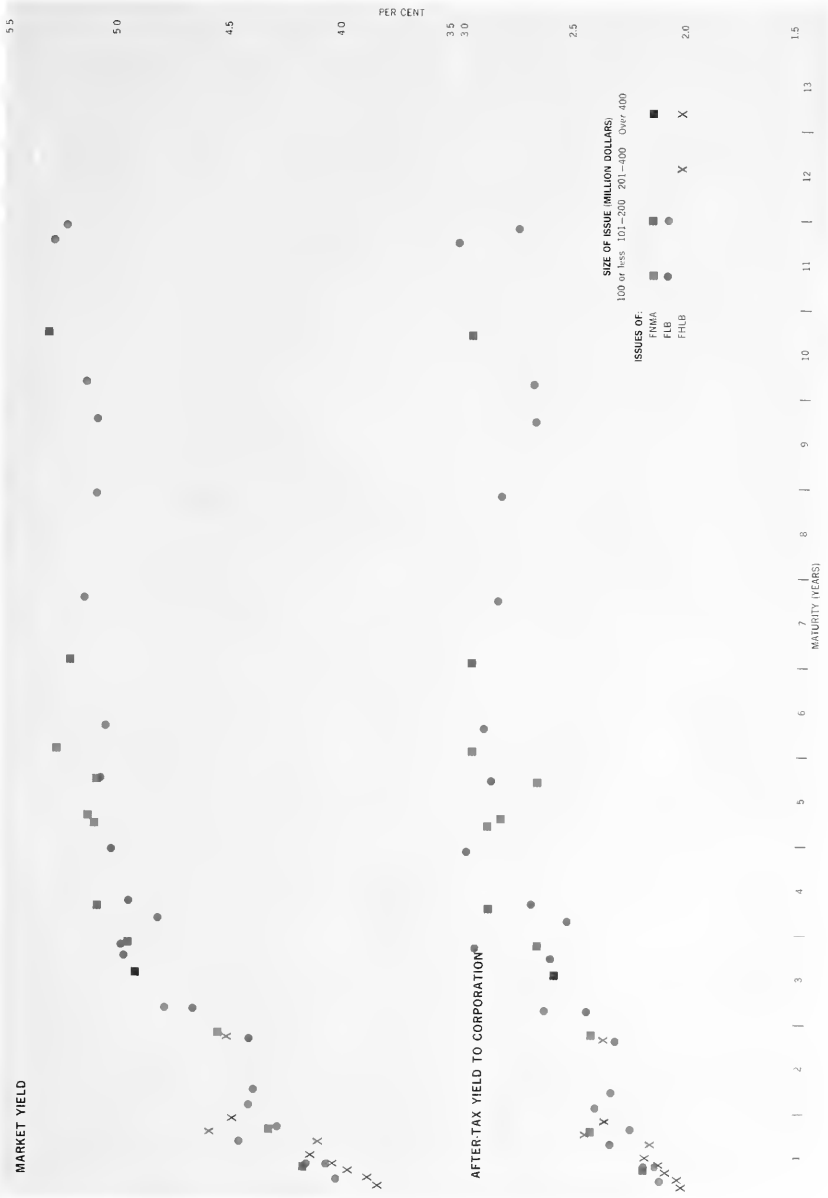
Data are from daily quotation sheets of Morgan Guaranty Trust Company.

15 DIFFERENCES IN YIELDS QUOTED BY MORGAN GUARANTY TRUST COMPANY AND FIRST NATIONAL CITY BANK,
May 31, 1967

AGENCY SECURITIES

FIRST NATIONAL CITY HIGHER

FIRST NATIONAL CITY LOWER

ISSUES OF:
● BC
✕ FICB
✕ FHLB
■ FNMA
● FLB

BASIS POINTS

TREASURY SECURITIES

FIRST NATIONAL CITY HIGHER

FIRST NATIONAL CITY LOWER

MATURITY (YEARS)
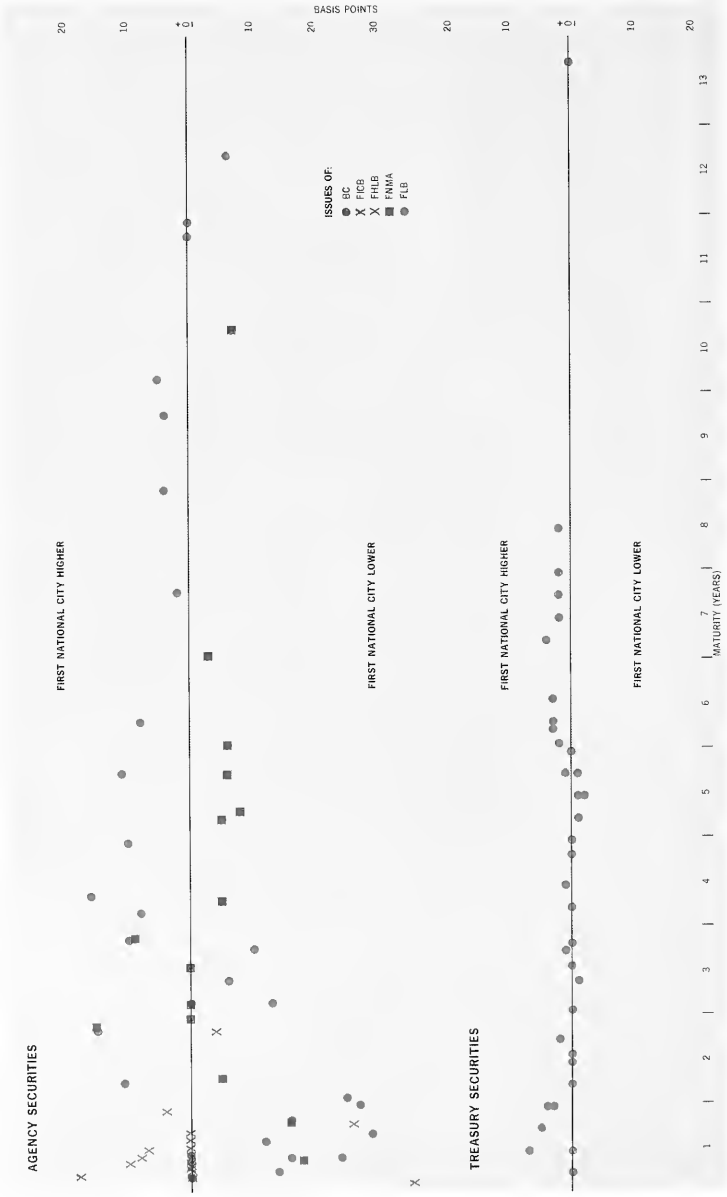
Yields quoted by Morgan Guaranty Trust Company are as of 3:00 p.m.; those by First National City Bank, as of 2:00 p.m.

cluded, the yield curve for Government securities is smoother than for agency issues. The maximum divergence of any specific issue from the curve is no more than 15 basis points and is usually considerably less. Inclusion of the low coupon issues (the 2½ per cent bonds) increases the dispersion of yields around the curve—before-tax yields of such issues are below the curve, and after-tax yields above it.

The smoothness of the agency yield curve has varied rather widely over the 1961–67 period. During 1961–64 it was comparatively smooth. As agency yields began to rise more rapidly in 1965 the dispersion of yields around the curve increased, particularly in the short-term maturity range. By May 1966, when congestion in the agency market was nearing a peak, the dispersion of yields was marked. With the improvement in the agency market in late 1966 and early 1967, the yield curve had again become relatively smooth by May 1967.

In general the agency yield curve has been smoothest for issues due within 1 year, particularly after allowance is made for differences in coupons. This is despite the fact that the within-1-year maturity range is the only one in which all the agencies issue securities.

Differences in yields on agency issues of comparable maturity arose, as often as not, among securities of the same issuing agency. No consistent differences among yields on securities of the separate agencies were evident during the 1960's. And in 1967 there was no divergence between after-tax yields on PC's (either FNMA or fully marketable Export-Import Bank) and yields on regular agency issues of comparable maturity.[29]

At any one point in time there have been differences among yields on the various agency securities. Such deviations can be related primarily to differences in coupons. Particularly in the shorter-term maturity area, coupons on the various agency securities can diverge widely when current interest-rate levels are high or low relative to past interest rates, since short-

term issues of some agencies (FNMA, FLB, and to some degree FHLB) often originated as long-term issues that have approached maturity with the passage of time whereas other agency debt issues (primarily FICB and BC) are always marketed close to current interest rates.

The comparative yield differences that stand out in the accompanying charts can usually be traced to such a movement in interest rates and coupons. The shorter-term portion of the yield curve was relatively smooth in the early 1960's. But as agency yields rose to fairly high levels relative to earlier periods, the yields on FNMA and FLB issues, carrying comparatively low coupons, moved below those on other short-term agency issues. Such a divergence first appeared in the yield curve for 1964, and it became more pronounced in 1965 and 1966. If after-tax yields for 1966 are used, the divergence was erased, of course. And by May 1967, when yields and coupons on new agency issues were considerably reduced, the yield curve was again relatively smooth even on a before-tax basis.

The yield curve for 1967, before tax adjustments, shows market yields of regular FNMA debt to be generally above those on comparable FLB debt, and yields on PC's to be consistently above those on regular agency debt of similar maturity. However, both of these seeming divergences represent coupon differences, at least in part, and on an after-tax basis yields of these issues are equalized.[30]

Ownership. In a homogeneous market one would expect to find the different ownership groups holding roughly the same proportion of the various securities outstanding—abstracting from maturity differences. Were this not the case, securities of some agencies would at times be subject to interest-rate pressures that differed from those on other agency issues or were in fact absent altogether. Table 9 shows the percentage of publicly owned debt of the various agencies held by large investors in the

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[29] The PC yields studied were only those of the large and fully marketable PC's, first issued in early 1967.

[30] The after-tax yields shown overstate the true impact of coupon rates on yields because they utilize the corporate tax rate, which is higher than the marginal tax paid by many investors.

TABLE 9: PROPORTION OF FEDERAL AGENCY DEBT OUTSTANDING HELD BY MAJOR GROUPS OF INVESTORS, 1961–67

Percentage of the total publicly held, in 3 maturity groupings

Type of investor, and date	Within 1 year					1–5 years			After 5 years	
	BC	FICB	FHLB	FNMA[1]	FLB	FHLB	FNMA	FLB	FNMA	FLB
Commercial banks:										
Dec. 31, 1961...	26.9	22.4	27.7	10.5 (17.1)	21.4	32.0	22.8	27.1	5.3	3.9
1962...	39.0	30.7	31.4	12.2 (23.2)	35.6	35.4	24.4	24.4	5.9	5.4
1963...	30.1	29.5	31.2	23.3 (23.3)	27.9	26.7	21.8	25.2	4.8	6.6
1964...	28.3	26.8	27.4	17.7 (12.2)	25.1	17.7	18.6	21.9	4.4	6.3
1965...	28.6	27.3	23.4	15.6 (21.4)	25.6	24.0	13.7	19.5	3.6	8.9
1966...	24.8	22.0	17.0	13.1 (17.1)	21.7	15.3	14.2	17.9	3.9	8.8
Mar. 31, 1967...	23.8	23.7	15.5	11.3 (16.1)	21.7	21.7	14.6	18.8	5.0	14.6
Nonbank financial institutions:										
Dec. 31, 1961...	6.7	7.6	10.4	11.3 (18.0)	8.1	31.2	19.6	14.6	22.9	9.6
1962...	8.3	6.6	12.4	8.7 (15.6)	10.8	18.3	20.1	14.3	19.6	10.2
1963...	10.5	7.7	10.3	11.9 (11.9)	12.2	28.3	23.1	12.5	16.0	9.8
1964...	8.0	8.0	12.4	8.5 (16.3)	8.8	23.5	24.7	13.8	16.3	10.0
1965...	8.0	8.4	12.3	7.0 (14.9)	7.7	19.3	20.5	13.3	15.0	11.4
1966...	7.7	7.9	11.3	7.7 (8.0)	8.0	14.0	17.9	11.9	13.7	9.3
Mar. 31, 1967...	8.2	9.1	12.0	10.8 (9.2)	8.2	16.3	17.9	11.6	14.9	12.6
Nonfinancial corporations:										
Dec. 31, 1961...	26.7	19.1	24.4	22.0 (4.9)	5.5	.8	3.8	1.8	.5	.2
1962...	14.7	14.0	18.3	16.0 (4.0)	7.9	8.6	4.7	2.1	.4	.6
1963...	14.6	13.0	19.3	4.1 (4.1)	5.1	4.8	1.3	1.9	...	.4
1964...	10.2	9.2	10.4	3.1 (...)	2.5	5.2	1.9	2.6	.1	.3
1965...	9.7	8.3	9.1	13.6 (7.5)	7.1	6.5	2.2	2.6	1.6	...
1966...	4.7	3.7	4.1	8.1 (4.9)	5.3	3.1	3.7	2.0	1.5	.6
Mar. 31, 1967...	3.6	3.4	3.3	2.8 (4.2)	3.9	2.1	4.1	2.2	1.8	.6
State and local governments:										
Dec. 31, 1961...	1.1	3.0	2.2	11.4 (5.1)	5.7	3.2	3.0	2.8	5.8	9.4
1962...	2.0	4.7	2.1	17.4 (19.2)	2.3	.6	3.7	1.7	7.6	10.2
1963...	2.4	5.1	2.2	9.9 (9.9)	2.4	.8	1.6	1.5	8.4	10.5
1964...	5.4	5.6	3.5	28.1 (9.2)	3.3	2.7	2.1	4.7	10.7	17.7
1965...	5.9`	10.0	6.5	39.4 (1.0)	4.3	3.0	5.0	7.8	12.0	15.6
1966...	6.0	10.2	4.1	15.2 (5.9)	4.8	3.4	4.2	8.5	12.5	12.0
Mar. 31, 1967...	8.7	7.7	3.7	22.1 (3.4)	5.7	1.8	4.5	8.4	11.7	10.9
Other public investors:										
Dec. 31, 1961...	36.3	46.9	34.7	44.2 (54.6)	59.2	32.8	50.8	53.8	65.6	76.8
1962...	36.0	43.9	35.7	45.8 (38.0)	43.3	37.1	47.2	57.4	66.5	73.6
1963...	40.4	44.3	36.8	50.9 (50.9)	52.4	39.5	52.1	58.9	70.8	72.7
1964...	47.5	50.2	46.3	42.7 (62.2)	59.9	51.0	52.7	57.1	68.5	65.6
1965...	46.7	45.3	48.3	24.3 (55.2)	55.4	47.3	58.6	56.8	67.9	64.1
1966...	56.9	56.2	63.6	55.9 (64.0)	60.2	64.1	60.0	59.7	68.5	69.3
Mar. 31, 1967...	55.7	56.1	65.5	53.0 (67.1)	60.6	58.0	58.9	59.0	66.7	61.3

[1] Percentages in parentheses were computed from totals excluding FNMA discount notes, issued to investors on demand.

SOURCE.—Derived from Treasury Survey of Ownership.

major ownership groups: commercial banks, nonbank financial institutions, nonfinancial corporations, State and local governments, and all others. The ownership percentages are shown for three maturity groupings (debt due within 1 year, in 1 to 5 years, and after 5 years) and for the years 1961 through 1967.

The patterns of ownership show a remarkable similarity. Moreover, the variations in ownership that have occurred were greater in the early 1960's than during the last few years.

It may be well in analyzing the data to remember that small differences in the ownership percentages should be disregarded for a number of reasons. In the first place, small percentage variations in many of the categories involve only minor dollar amounts. Secondly, the maturity categories are quite broad, and within any of the maturity groupings the average maturity of the issues differs from one agency to another. Thirdly, the amount of a specific agency security held by a particular group may sometimes be less than the group would like to maintain in its portfolio, but circumstances may make it impossible for the group to maintain or achieve the desired level; for example, the group may have funds to invest at a time when the agency is retiring debt; or it may have no funds for investment at times when the agency is issuing debt. This may be why commercial bank holdings of FHLB issues were relatively low in December 1966 and

March 1967. Finally, since the percentage of debt held by certain ownership groups varies by maturity (for example, commercial banks hold considerably more short-term debt than long-term), it is to be expected that issues that were originally long-term but that have moved, with the passage of time, into the shorter-term maturity categories will have ownership patterns that vary from those for securities that were short-term when originally issued. The variance in ownership of such issues should be biased in the direction of the ownership percentages for long-term agency issues. In this regard, the ownership percentages for FLB and FNMA issues in the 1- to 5-year sector should differ from 1- to 5-year FHLB issues in the direction of the after-5-year percentages, and the ownership percentages of FLB, FNMA, and FHLB in the within-1-year maturity sector would likewise vary somewhat from those of FICB and BC.

After allowing for some variation in the percentages for the above reasons, there remain two cases in which differences in ownership among agency securities may be significant—although even in these cases the differences are relatively small. Nonbank financial institutions hold a larger share of FNMA and FHLB issues than of other agency securities. This is not surprising, however, in view of the relationship of FHLB to savings and loan associations and of the active participation of most financial institutions in the mortgage market in which FNMA also plays an active role. Secondly, issues of FNMA appear to be held to a lesser degree by commercial banks than are other agency securities;[31] even this difference could be related to the fact that FNMA did not issue a single security over the entire period 1962-IV through 1965-III.

SIZE OF ISSUE

The size of individual issues in the agency market varies over a wide range. On May 31, 1967, single nonguaranteed agency issues were

outstanding in amounts ranging from $60 million to $700 million, and the amounts held by the public ranged from $60 million to $535 million. With but one exception public holdings of the issues of FICB and of BC were in the $243 million to $403 million range. FHLB issues ranged in general from $250 million to $535 million. All of the agency issues with less than $100 million outstanding were obligations of FNMA and of FLB. While FNMA and FLB issues range up to $400 million (publicly held) in size, the large number of small issues makes the average issue of these two agencies significantly less than those of the other agencies.

The size of individual agency issues is considerably less than that of U.S. Government securities, and there are more individual agency issues outstanding than there are Treasury coupon issues. As of the end of May 1967, there were 49 Treasury coupon issues outstanding (excluding the 1½ per cent notes), as compared with 70 separate issues of the five large agencies (not including PC's). In terms of the total outstanding, the average size of Treasury issues was $3.1 billion; in terms of publicly held portions, $1.1 billion. There were only five Treasury issues for which the amount held by the public was less than $1 billion.

Table 10 shows the number of agency issues outstanding, their average issue size, and the range of issue size for selected dates. It is clear from the table that the sizable growth in agency debt from the mid-1950's reflects a growth in both the number and the size of issues. In the 5 years from May 1955 to May 1960, the number of individual agency issues rose from 17 to 56 while the average issue size increased only slightly—and in fact decreased for FNMA and FLB. Between 1960 and 1967, on the other hand, the growth in the number of issues tapered off while the average size of issue increased significantly, from $146 million to $248 million.

Since agency debt will undoubtedly grow further, any differing market characteristics of the small versus the larger issues should be of interest to the agency debt managers, as well as to private and official investors. The evidence gathered for this study suggests that there is

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[31] The relevant ownership comparison is for FNMA issues not including discount notes, that is, the figures in parentheses in Table 9.

TABLE 10: INDIVIDUAL AGENCY ISSUES: NUMBER AND SIZE, SELECTED DATES

Date, and item	FICB	BC	FHLB	FNMA	FLB	All agencies
May 31, 1967:						
Issues outstanding (number)	9	4	11	17	29	70
Amounts (in millions of dollars):						
Average size	365	257	465	196	158	248
(Held by public)	*(343)*	*(257)*	*(400)*	*(168)*	*(152)*	*(226)*
Range of size	236–465	243–275	185–700	63–550	60–341	60–700
(Held by public)	*(161–403)*	*(243–275)*	*(185–535)*	*(63–400)*	*(60–341)*	*(60–535)*
May 31, 1960:						
Issues outstanding (number)	9	3	6	17	21	56
Amounts (in millions of dollars):						
Average size	174	110	199	164	102	146
Range of size	137–210	92–138	105–351	90–797	60–154	60–797
May 31, 1955:						
Issues outstanding (number)	4	3	2	1	7	17
Amounts (in millions of dollars):						
Average size	65	37	71	570	151	126
Range of size	41–91	30–40	60–81	570	71–228	30–570

SOURCE.—Morgan Guaranty Trust Company, daily quotation sheets.

indeed a difference in the marketability[32] of the small issues when compared with larger agency issues. On the basis of one observation in 1967, it appears that (1) quoted yields for the small issues vary more widely off the yield curve[33] and (2) the more active market participants hold these issues to a somewhat lesser degree.

Chart 14 shows for May 31, 1967, the plots for before- and after-tax yield curves differentiating agency debt by issue size. Issues of the FICB and of the BC are not included because they vary only slightly in size. The chart shows clearly that, at least on this one date, the issues for which quoted yields verged most widely off the yield curve were issues of $100 million or less. This stands out particularly after allowance is made for differences in coupons. Yields on the small issues lay below as well as above the yield curve and accounted for a sizable portion of the lack of smoothness of the curve.

Ownership data also appear to point to a lesser tradeability of the small agency issues. In Table 11, the ownership of FLB and FNMA debt on March 31, 1967, is shown differentiated by issue size. In all but one case (FNMA debt due within 1 year) the larger commercial banks and nonfinancial corporations reporting in the Treasury Survey held a greater share of the large agency issues than of the small issues. Those investor groups that are probably less active on the buy and sell sides taken together —nonbank financial institutions and State and local governments—sometimes held greater and sometimes lesser portions of the small issues. And other investors, considerably less active in the market than the above groups, usually held higher—and sometimes sharply higher— shares of the small issues.

With relatively large institutions often holding only minimal amounts of the small agency issues, it is indeed likely that orders to buy these issues—particularly orders of any size— would be filled only with difficulty, and probably at sharply rising prices. The volume of trading in the market and dealers' positions (particularly gross short positions) would also be smaller than for a comparable amount of larger-sized issues. It seems clear then that agency debt could be made more attractive to at least some investors if the size of individual issues were increased.[34]

At the present time, the size of newly offered individual agency issues is determined, by and large, by the operating needs of the particular agency in any month. Should an agency make the overt decision to increase the size of its

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[32] Less marketability of the small issues need not imply diminished liquidity. If small issues are held tightly in investor portfolios, the offered side of the market would be weak but the bid side need not be; that is, a ready market might exist for issues if they were offered by investors.

[33] In addition, spreads in quoted yields among dealers appear, for the debt of some agencies, to be greater on the small agency issues.

[34] It will be recalled that financial institutions increased their portfolios of PC's sharply in 1967 when relatively large-sized issues were introduced.

TABLE 11: DISTRIBUTION AMONG MAJOR GROUPS OF INVESTORS OF FLB AND FNMA DEBT ISSUES CLASSIFIED BY MATURITY AND SIZE, MARCH 31, 1967

In per cent

Maturity, and size of issue (in millions of dollars)	Commercial banks	Nonbank financial institutions	Non-financial corporations	State and local govts.	Other investors	Total held by public
	FLB debt					
Within 1 year:						
Less than 100........	8.8	11.6	.7	13.6	65.3	100.0
100–199	20.8	8.2	3.4	6.5	61.2	100.0
200 and over........	23.5	8.4	5.1	4.2	58.9	100.0
1-5 years:						
Less than 100........	11.9	9.5	1.4	17.3	59.7	100.0
100–199	21.5	12.9	2.8	5.6	57.1	100.0
200 and over........	24.3	11.6	2.4	2.9	58.8	100.0
After 5 years:						
Less than 100........	...	...	...	...	...	...
100–199	8.0	9.3	.8	13.9	67.9	100.0
200 and over........	26.7	18.6	.2	5.4	49.5	100.0
	FNMA debt					
Within 1 year:						
Less than 100........	21.8	14.9	5.7	2.3	55.2	100.0
100–199	24.7	10.0	4.0	2.7	58.0	100.0
200 and over........	13.4	8.3	4.0	3.5	70.8	100.0
1-5 years:						
Less than 100........	5.2	13.0	1.4	9.3	71.3	100.0
100–199	16.3	18.8	3.2	4.1	57.6	100.0
200 and over........	18.8	20.2	6.6	2.0	52.4	100.0
After 5 years:						
Less than 100........	...	...	...	...	...	...
100–199	5.2	14.6	1.8	11.7	66.7	100.0
200 and over........	...	...	...	...	...	...

Source.—Derived from Treasury Survey of Ownership.

issues, this decision would probably make it necessary for the agency to borrow before it actually needed the funds and/or to follow a program of reopening issues already outstanding. Agencies might object to borrowing ahead of need, because it might cost them money in the short run. However, a proposal has been advanced that would eliminate this problem—namely, the establishment of a centralized borrowing authority for all, or some group, of the agencies. Centralized borrowing, if instituted, would permit larger—and more marketable —issues; would reduce the number of financings per month; and would enable a better coordination of financings as between the agency and U.S. Government securities markets. ☐

V. INDICATORS OF MARKET PERFORMANCE

The performance of the secondary market in agency securities may be evaluated in terms of several factors. They include the volume of trading, the size of dealers' positions, and the spread between quoted bid and asked security prices. In general, the marketability—and liquidity—of a security is related to these factors. A large volume of trading implies that investors are able to execute transactions at reasonable speed; and in addition it implies that the market is "broad," since a sizable trading volume probably reflects a large volume of orders on the dealers' books from a wide spectrum of investors. The existence of dealers who take positions in securities is a crucial aspect of the market—making it possible to translate investor orders into transactions with speed, in size, and at prices close to the market. Finally, a small spread between bid and asked prices indicates dealers' willingness to make markets and, at the same time, induces investor participation in the market.

The remainder of this section analyzes these three indicators of agency market performance, in isola‌ion and in comparison with other securities markets. The analysis is in general confined to the period beginning in 1960 because of the lack of data for earlier years.[35] Data are generally classified by term to maturity, since the indicators are quite different in magnitude for short-term and longer-term agency debt. The data include fully marketable PC's for the relevant periods.

VOLUME OF TRADING

Daily-average trading in Federal agency securities has risen sharply from the early 1960's. For securities maturing within 1 year such trading rose from $56 million in 1960–61 to some $150 million in 1966–67—nearly tripling over the period. In the meantime trading in issues maturing after 1 year more than tripled; for such issues, however, the corresponding

volumes were much smaller—$18 million in 1960–61 and $64 million in 1966–67. Chart 16 illustrates the marked secular rise in trading in agency issues; quarterly data are presented in Appendix Table 7.

The growth in trading activity in the agency market has outpaced that in other securities markets, and by 1966–67 activity in both the

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For issues maturing within 1 year the typical bid/asked spread shown is for FHLB, FICB, and BC issues; spreads on FNMA and FLB issues are larger. Spread for 1- to 5-year issues is that for FHLB.

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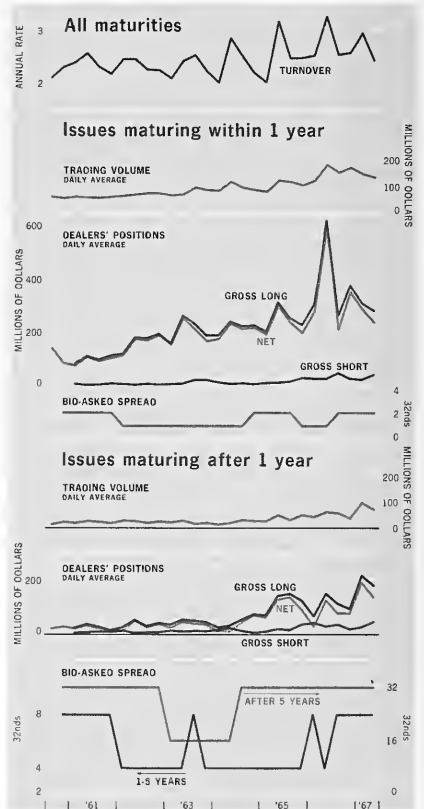
[35] Some data on agency trading and positions are available for 1958 and 1959, but they are not consistent with later data.

TABLE 12: GROSS DEALER TRANSACTIONS IN COMPARATIVE SECURITIES MARKETS, 1960–67

Averages of daily figures, in millions of dollars

Period	Federal agency debt maturing (in years)—		U.S. Govt. debt maturing (in years)—						Bankers' accept-ances
			Within 1						
	Within 1	After 1	Bills	Coupon issues	1–5	5–10	After 10		
1960 (July–Dec.) ..	56	16	818	137	253	57	31		44
1961	56	19	1,035	168	265	54	30		54
1962	68	21	1,229	171	225	120	37		48
1963	78	18	1,200	122	216	141	50		45
1964	94	19	1,298	84	219	126	41		45
1965	105	36	1,402	79	195	102	50		42
1966	156	47	1,586	121	242	110	36		49
1967 (Jan.–June) ..	140	82	1,645	98	289	80	33		66

short-term and longer-term sectors of the agency market had surpassed trading volume in bankers' acceptances and in some maturity sectors of the Government securities market. Table 12 shows figures for dealers' transactions in Federal agency debt, U.S. Government debt, and bankers' acceptances. According to that table, trading in agency issues maturing within 1 year was, by 1966–67, some three times as large as trading in bankers' acceptances or in Treasury issues maturing after 10 years, somewhat larger than trading in Treasury issues maturing within 1 year or in 5 to 10 years, and somewhat smaller than trading in 1- to 5-year Treasury maturities. Activity in Treasury bills of course far outpaces the volume in any other market. Trading in agency issues maturing after 1 year had, by 1966–67, risen to a level roughly comparable to trading in bankers' acceptances or in long-term Treasury debt.

To what factors can this sharp rise in trading in the agency market be attributed? To answer this question, multiple regressions were calculated relating dealers' transactions in agency securities to the independent variables that are significant determinants of transactions in the U.S. Government securities market.[36] The simple least squares regressions related daily-average dealer transactions in agency securities to the independent variables for quarters of the period 1960-III through 1967-I. The results are presented in Table 13.

Three variables explain 97 per cent of the variance in agency transactions during the 1960–67 period: agency debt held by public investors, gross volume of new agency issues, and the level of member banks' free reserves. All three variables were found to be highly significant (at the 1 per cent level) as determinants of transactions.

The secular rise in transactions is explained by a secular rise in agency debt and, to a lesser degree, in gross new issues. These independent variables, as well as transactions, are shown in Chart 17. The chart also makes evident that many of the quarterly peaks in transactions can be related to the volume of new agency issues marketed in that quarter. As shown in Table 13, a rise of $12 million in daily-average transactions was associated with an increase of $1 billion in agency debt, and a $17 million rise in transactions with a $1 billion rise in the gross volume of new agency issues.

The volume of trading was also related to the degree of monetary tightness or ease, as measured by the level of free reserves.[37] The estimated relationship involved a $4 million rise in the volume of trading with a $100 million rise in free reserves (or decline in net borrowed reserves). The negative relationship between trading and monetary tightness probably reflects several factors. In the first place, holders of agency debt may become less willing sellers when sales involve capital losses—the locked-in effect—and more willing sellers when capital gains can be realized. Secondly, dealers' posi-

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[36] The pertinent regression results for the U.S. Government securities market are shown in Louise Ahearn and Janice Peskin, "Market Performance as Reflected in Aggregative Indicators," pp. 93–153.

[37] In an alternative equation, agency transactions were significantly related to the level of interest rates on agency debt. In this case, the volume of trading increased by $19 million with a 1 percentage point decline in agency interest rates.

TABLE 13: RESULTS OF MULTIPLE REGRESSIONS EXPLAINING TRADING IN AGENCY SECURITIES[1]

$\bar{R}^2$	Durbin-Watson ratio	Constant	Net regression coefficients, and standard errors (in parentheses)					
			Agency debt held by public (billions of dollars)[2]		Gross new agency issues to public (billions of dollars)[3]		Free reserves (millions of dollars)[4]	
.97	[5] 2.08	—64.52	[6] 11.53	(.89)	[6] 17.01	(2.20)	[6] .04	(.01)

[1] The dependent variable is gross dealer transactions in agency securities (all maturities and including participation certificates), quarterly averages of daily figures in millions of dollars. The data are shown in Appendix Table 7. Regressions were run for the period 1960-III–1967-I.

[2] Agency debt (including PC's) held by public investors; quarterly averages of end-of-month data (three during quarter and last month of preceding quarter).

[3] Gross new agency debt (including PC's) issued to public investors; total during quarter.

[4] Quarterly average of monthly averages.

[5] No positive serial correlation (Theil and Nagar's table: 5 per cent significance level for rejecting null hypothesis of residual independence).

[6] Significantly different from zero at 1 per cent level.

tions decline when money is tight, and with low positions the translation of investor buy orders into purchases becomes more difficult.

These same variables were generally found to be significant determinants of trading volume in the U.S. Government securities market dur-

17 TRANSACTIONS IN AGENCY SECURITIES AND CAUSAL VARIABLES

ing the 1960's, as discussed in Section III of the Ahearn-Peskin study, but the magnitudes of the relationships often differ from those found in the agency market. Trading in U.S. Government securities was found to be more responsive to shifts in monetary ease or tightness than was agency trading. A $100 million rise in free reserves, for example, was associated with increases of $12 million in trading in intermediate-term Treasury coupon issues and of $58 million in trading in Treasury bills, as compared with only $4 million in agency trading. The associated elasticities[38] were also somewhat higher for Treasury issues, ranging from 0.08 to 0.19 compared with 0.05 for agency issues.

The response of trading to increases in debt in the agency and Treasury markets varies, but with no discernible pattern. The rise in trading for a $1 billion increase in debt is larger for agency issues than for Treasury coupon issues but is smaller than for Treasury bills, as the first line of Table 14 shows.[39] The elasticity of trading (second line of table) varies between 0.8 and 2.1 with respect to Treasury debt and stands at 1.2 for the agency market. The elasticity for the agency market indicates that a given percentage rise in debt held by public

[38] Defined as the ratio between the percentage change in trading and the percentage change in free reserves, or $\dfrac{\Delta T}{\Delta F} \cdot \dfrac{F}{T}$

where $T =$ trading
$F =$ free reserves

[39] Debt was defined as the total amount held by the public for the agency and Treasury coupon markets, but as total debt outstanding for the Treasury bill market where official holdings are actively sold and purchased.

investors causes a somewhat greater percentage rise in the volume of trading. Only for short-term Treasury coupon issues is the elasticity less than 1.0.

TABLE 14: TRADING AND DEBT RELATIONSHIPS IN SELECTED MARKETS

Item	Agency market	U.S. Govt. securities market		
		Bills	Coupon issues maturing (in years)—	
			Within 1	5–10
Rise in trading (millions of dollars) per $1.0 billion rise in debt [1]	12	39	5	8
Elasticity: $\left(\dfrac{\Delta \text{ trading}}{\Delta \text{ debt}} \cdot \dfrac{\text{debt}}{\text{trading}}\right)$ [2] ...	1.2	1.6	.8	2.1

[1] Coefficients of multiple regression studies.
[2] At mean values (1960-III—1967-I) of debt and trading.

There appears to be no pattern in the differences in elasticities among the markets. The differences obviously do not relate to the maturities of the debt. Nor do they relate to the relative amounts of debt outstanding in any sector, since the greatest amount of debt is in Treasury bills and the least in agency issues. There is also no variance in the elasticities that might be traced to debt turnover (trading/debt) ratios in the various market sectors; the highest elasticity (5- to 10-year Treasury issues) is in the sector for which turnover is the lowest, but the second highest elasticity (Treasury bills) is in the sector where turnover is the greatest.

According to both this study and the Ahearn-Peskin study, the amount of debt outstanding was generally established as being the most important determinant of trading activity in a securities market. Thus it is useful to view changes in market activity after making rough allowance for the sizable shifts that have occurred in debt outstanding. Such changes are apparent from the data in Appendix Table 8 and in Chart 16, which show the annual rate of turnover of agency debt, defined as daily-average trading multiplied by 249 (the number of trading days in most years) and divided by the average debt held by the public. During the 1960's as a whole, the annual rate of turnover of agency debt averaged 2.5. As is evident in the first column of Table 15, there was a clear upward trend in the agency turnover rate, especially after 1963. This upward trend undoubtedly reflects the rising volume of gross new agency issues.

Table 15 also includes turnover rates for various maturity sectors of the U.S. Government securities market. In the Treasury market, the turnover rate increases with the nearness to maturity of the coupon issues, and it is considerably larger for Treasury bills than for coupon issues. The rate of turnover in agency issues is higher than for short-term Treasury coupon issues—and considerably so in view of the fact that long-term agency issues are included in the agency turnover rate. Turnover in the agency market is less than half that in the Treasury bill market, however.

The gross volume of new agency issues not only explains some of the upward trend in turnover in the agency market, but also probably accounts for some of the greater turnover in the agency market as compared with the Treasury coupon market. New agency securities are issued virtually every month, and often

TABLE 15: ANNUAL RATES OF TURNOVER, 1960–67

Period	Agency debt	U.S. Govt. debt [1]				
		Treasury bills	Coupon issues maturing (in years)—			
			Within 1	1–5	5–10	After 10
1960 (July–Dec.).....	2.22	5.45	1.73	1.04	.79	.39
1961	2.38	6.46	1.60	1.24	.68	.37
1962	2.37	6.98	1.52	1.15	1.30	.45
1963	2.34	6.12	1.50	1.12	1.11	.70
1964	2.41	6.14	1.34	1.16	.95	.53
1965	2.56	6.19	1.27	1.08	.78	.62
1966	2.75	6.62	1.82	1.32	.97	.46
1967 (Jan.–June).....	2.71	6.35	1.71	1.40	.88	.43

[1] Turnover rates for U.S. Govt. debt were derived from Appendix Table 2 of the Ahearn-Peskin study (p. 136 of this publication). Debt held by the public was the denominator for all classes except for Treasury bills, where the total outstanding was used.

in considerable size—thus enlarging both the volume of trading in and the turnover of agency securities. For example, had there been no new agency debt issues during the period 1966-I through 1967-I, the daily volume of trading in agency issues—instead of averaging $211 million—might have been only about $150 million; and the turnover rate an average 1.99, instead of 2.79.[40] In comparing the agency market with other securities markets, it should thus be remembered that the volume of new issues can be an important source of trading differences. In some sectors of the U.S. Government securities market, to note a particular case, financings in coupon issues are considerably less frequent.

The importance of gross new issues to trading activity raises the question of just how much trading there is in the agency market in periods between financings. It has sometimes been alleged, for example, that it is very difficult to effect trades—particularly purchases—except during financings. For this reason, an attempt was made to ascertain how much trading did occur in nonfinancing periods. Since agency financings occur so often, however, there are not a great number of such interfinancing periods[41] to observe. Data for such periods in 1966 and 1967 indicate a daily volume of trading quite similar to the $150 million noted in the preceding paragraph (when all gross new issues were excluded).

Daily-average trading for weekly periods during 1966 shows a wide variance, from a low of $68 million to a high of $259 million for agency issues due within 1 year, and from $12 million to $191 million for longer-term agency issues. The highs of course occurred during financings. But when daily trading for all weeks in which there were no financings is

TABLE 16: CHARACTERISTICS OF DAILY-AVERAGE TRADING WEEKLY IN AGENCY SECURITIES DURING 1966

In millions of dollars

Line	Characteristic	Securities maturing (in years)—	
		Within 1	After 1
1	Highest week	259	191
2	Lowest week	68	12
3	Average: For year	156	47
4	Excluding financing periods[1]	121	28
5	Range excluding financing periods[1] ..	68–181	12–54

[1] Number of weeks without financing periods was 12 for short-term and 27 for longer-term issues.

averaged for the year, it shows no startling drop from average trading on all days in the short-term sector. In fact, the decline was from $156 million to $121 million (lines 3 and 4 of Table 16). Trading in long-term issues drops considerably, however. It will be noted that agency trading in both maturities combined, exclusive of financing periods, averaged $149 million a day during 1966.

For short-term agency issues, there were only 5 weeks in 1966 when trading averaged $100 million a day or less. In 39 of the weeks, trading ranged from $100 million to $200 million, and in the remaining 8 weeks was above $200 million. For longer-term agency issues, trading averaged less than $20 million a day in 5 weeks but was most often in a range of $20 million to $60 million.

In the first half of 1967, the number of agency financings dropped considerably, because the FHLB made no offerings. Analyses of trading on nonfinancing days during February, March, and April 1967[42] indicate that trading in short-term agency issues showed an average daily volume of $125 million. The lowest volume was $39 million and the highest $197 million; on 8 of the 30 days, trading was less than $100 million. For agency issues due after 1 year, daily trading averaged $57 million, with a low of $24 million and a high of $109 million. Again, the exclusion of trading on financing days does not radically alter one's impression of over-all market activity, at

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[40] Actual gross new agency issues per quarter averaged $4.0 billion over this period; and for every billion dollars of new issues, trading was estimated to be $17 million higher. The estimated turnover rate of 1.99 uses the actual level of debt, though without any new issues the amount of debt would have been less.

[41] Excludes the period—usually several weeks in duration—from the offering date through the payment date for every new agency issue.

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[42] The number of such nonfinancing days was 30 for short-term agency issues and 32 for long-term issues.

TABLE 17: DEALER NET POSITIONS IN COMPARATIVE SECURITIES MARKETS, 1961–67

Averages of daily figures in millions of dollars

Period	Federal agency debt maturing (in years)—		U.S. Govt. debt maturing (in years)—						Bankers' accept-ances
	Within 1	After 1	Within 1		1–5	5–10	After 10	
			Bills	Coupon issues					
1961	96	18	1,921	438	337	25	28	22
1962	163	30	2,424	499	273	95	27	35
1963	196	35	2,542	334	383	98	50	103
1964	212	33	2,636	265	309	131	85	206
1965	233	104	2,629	186	140	193	197	208
1966	361	76	1,925	335	142	56	16	284
1967 (Jan.–June)..	264	165	2,874	329	520	117	83	404

least for short-term issues. Total trading averaged $140 million a day during the first half of 1967, only somewhat above the $125 million on nonfinancing days.

Despite some exaggeration of agency trading relative to trading in certain other securities markets, it seems clear—from both the data and from dealers' comments—that activity in the market for short-term agency issues is equivalent to, if not greater than, that in the market for short-term Treasury coupon issues. Moreover, it is evident that there has been a marked improvement in recent years in the performance of the agency market as evidenced by the volume of trading and turnover. The growth in activity suggests increased "breadth" of the agency market; it implies, as well, a greater marketability of agency securities—that is, the execution of investor buy and sell orders with greater speed, in greater size, and probably at prices closer to the market.

DEALERS' POSITIONS

Dealers' daily-average positions in agency securities have, like transactions, risen sharply since the early 1960's. On the average during the first half of 1967 dealers held daily net positions of $264 million in agency issues due within 1 year and of $165 million in longer-term agency issues. These net position levels were, respectively, some three and nine times larger than in 1961. Agency positions are shown in Chart 16 and in Appendix Tables 9 and 10.

As Chart 16 shows, dealers' gross long and short positions have also risen considerably.

Gross long positions of dealers represent securities owned outright, and gross short positions represent securities that are borrowed and sold and that must be covered later. The rise in gross positions indicates an increased willingness and ability of dealers to both buy and sell agency securities.

Dealers' net positions in agency securities due within 1 year have in recent years been of the same order of magnitude as dealers' net positions in short-term Treasury coupon issues and bankers' acceptances. Net positions in longer-term agency issues have been not too different from net positions in any one maturity sector of the longer-term Treasury market. If all Treasury issues due after 1 year were lumped together, agency positions would of course appear small in comparison.

These comparative data on net positions in various securities markets are shown in Table 17. The sharp upward trend in agency positions, as well as in positions in bankers' acceptances, stands out clearly. Positions in Treasury coupon issues, on the other hand, show no trend, except perhaps for after-5-year maturities.

While gross long positions in agency securities are, like net positions, roughly comparable with those in specific maturity sectors of the Treasury coupon market, gross short positions in agency issues are decidedly smaller. Table 18 presents data on gross short positions. Such positions in agency securities due within 1 and after 1 year each averaged about $35 million a day during 1966 and 1967, considerably less than such positions in the Treasury market. The small size of gross short positions in agency

TABLE 18: DEALER GROSS POSITIONS IN COMPARATIVE SECURITIES MARKETS, 1961–67

Averages of daily figures in millions of dollars

| Period | Federal agency debt maturing (in years)— | | U.S. Govt. debt maturing (in years)— | | | | |
| | Within 1 | After 1 | Within 1 | | 1–5 | 5–10 | After 10 |
			Bills	Coupon issues			
Gross long:							
1961	104	29	2,044	484	516	85	56
1962	172	41	2,604	540	417	158	75
1963	214	50	2,709	361	547	239	94
1964	224	51	2,808	297	503	277	130
1965	253	127	2,865	262	353	276	236
1966	396	111	2,268	412	315	163	63
1967 (Jan.–June). . .	299	206	3,117	391	632	170	127
Gross short:							
1961	8	11	125	46	180	60	29
1962	8	11	177	42	144	63	49
1963	18	15	165	28	164	141	45
1964	12	18	175	29	194	147	46
1965	20	24	235	76	213	83	40
1966	35	35	343	77	172	108	47
1967 (Jan.–June). . .	35	40	244	62	112	54	44

issues indicates a weakness on the offered side of the agency market, at least when compared with the U.S. Government securities market.[43]

The low level of gross short positions probably reflects two factors. First, dealers may have difficulty finding investors who are willing to lend agency securities in any reasonable volume.[44] Secondly, investor orders to sell may not be in sufficient size to guarantee that dealers are able to buy any specific agency issue at a future date in order to enable return of the borrowed security.

As with dealer transactions, multiple regressions were run on daily-average net, gross long, and gross short positions for quarters of the period 1961-I through 1967-I. The results provide at least tentative answers to two important questions: (1) What factors have caused dealers' positions to rise during the 1960's? (2) Are agency positions responsive to the same factors as positions in U.S. Government securities, and in the same magnitudes?

A model of position determination must in-clude several groups of variables, each of which influences dealers' profits and thus the level of positions that dealers want to hold.[45] Dealers' profits (or losses) may be categorized as: (1) speculative, (2) trading, or (3) "interest carry." Speculative profits (or losses) result from capital gains and losses on the securities held in position as security prices fluctuate. When security prices rise, capital gains are realized on gross long positions and capital losses are experienced on securities sold short. The opposite is true when security prices decline. Thus expectations of near-term rises in security prices should cause dealers to increase gross long positions and cut gross short positions.

Trading operations contribute to dealers' profits. Trading profits depend on the spread between bid and asked security prices, the volume of securities traded, and trading costs. Interest carry on securities held in position is also an important item in the dealers' profit outlook. Nonbank dealers finance their positions by short-term borrowings, and at the same time they earn interest on the securities they hold. When interest paid on borrowings is greater than interest earned, there is a "nega-

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[43] The small size of gross short positions probably limits the size of dealer gross long positions, thus reflecting back on the bid side of the market. In periods of expectations of falling security prices, an inability of dealers to hedge long positions by selling short would probably lead to a greater cutback in gross long positions than would otherwise occur.

[44] The small size of many outstanding agency issues adds to the difficulty, since it probably decreases the amount of any specific issue held by one, or a few, investor(s).

[45] What follows is only a minimal description of the theoretical model, which is described in detail in Section IV of the Ahearn-Peskin study of the U.S. Government securities market (pp. 113–32). A review of that section, including the parts on measurement difficulties, would be helpful for an understanding of this discussion.

tive" carry; when the interest earned is greater, there is a "positive" carry. A rising positive carry or a falling negative carry should induce dealers to hold larger positions.

In addition, dealers underwrite the sale of new agency issues, and their gross and net long positions should rise with the size and frequency of agency financings. In general, official accounts have not purchased and sold agency securities in the market. Hence their transactions did not form a part of the model tested.

The regression results are shown in Table 19. The model tested explains 85 per cent of the variance in dealers' net agency positions, 91 per cent of the variance in gross long positions, and 69 per cent of the variance in gross short positions during the 1960's. The model accounted for a larger proportion of the variance in long positions of agency securities during the 1960's than did essentially the same model for positions in the U.S. Government securities market. But only two of the variables tested— gross new agency issues and the volume of agency trading or, alternatively, agency debt— were significant determinants of agency positions. Neither interest carry nor expectations of future security prices (as measured by the change in agency yields during the last quarter,[46]

[46] Table 19 presents the regression results for net and gross long positions including this variable. The sign of its coefficient is of some interest. In every instance there is a positive relationship between long positions and the preceding quarter's change in agency yields. While the variable is not significant at the 5 per cent level, still the probability that the true coefficient is zero or negative is only 9 to 12 per cent. In the U.S. Government securities market, on the

TABLE 19: RESULTS OF MULTIPLE REGRESSIONS EXPLAINING DEALERS' POSITIONS IN FEDERAL AGENCY SECURITIES[1]

Dependent variable (millions of dollars)	$\bar{R}^2$	Durbin-Watson ratio	Constant	Net regression coefficients, and standard errors (in parentheses)					
				Gross new agency issues to public [2] (in billions of dollars)	Average volume of trading in agency issues, two preceding quarters [3] (in millions of dollars)	Agency debt held by public [4] (in billions of dollars)	Change in free reserves [5] (in millions of dollars)	Change in agency yield, preceding quarter [6] (basis points)	Interest carry on agency securities [7] (basis points)
Net positions:									
(1)......	.85	‡ 1.76	−39.46	† 90.75 (11.61)	* .71 (.31)	...	...	...	...
(2)......	.85	1.39	−31.12	† 84.69 (12.01)	.64 (.50)	...	...	1.27 (.82)	.07 (.44)
(3)......	.85	‡ 1.91	−56.68	† 83.39 (13.31)	...	* 9.57 (3.99)	...	...	...
Gross long positions:									
(4)......	.91	1.31	−34.86	† 90.14 (9.93)	† .88 (.26)	...	...	1.18 (.61)	...
(5)......	.91	1.38	−22.13	† 90.17 (10.14)	.77 (.43)	...	...	1.07 (.70)	−.12 (.37)
(6)......	.92	‡ 1.52	−57.31	† 82.10 (10.96)	...	† 11.88 (3.40)	...	1.03 (.61)	...
Gross short positions:									
(7)......	.64	‡ 1.75	−13.48	...	† .43 (.06)	...	−.060 (.029)	...	...
(8)......	.69	‡ 1.66	−20.68	...	•••	† 4.64 (.64)	−.034 (.025)	...	...

[1] The dependent variable is dealers' positions in agency securities (all maturities and including PC's), quarterly averages of daily figures in millions of dollars. The data are shown in Appendix Tables 9 and 10. Regressions were run for the period 1961-1—1967-1.

[2] Total (including PC's) during quarter.

[3] Daily-average gross dealer transactions.

[4] Quarterly averages (including PC's) of end-of-month data (three during quarter and last month of preceding quarter).

[5] Change, based on quarterly averages of monthly averages; excludes all such quarterly changes of less than $50 million.

[6] Changes in quarterly averages of monthly yields on 3- and 6-month agency issues averaged. Source of basic yield data was Salomon Brothers and Hutzler, *An Analytical Record of Yields and Yield Spreads*, Part III.

[7] Interest carry is interest earned on agency securities held in position less financing costs. Interest earned was measured by averaging coupon rates on most outstanding agency issues for the middle month of the quarter. The series on financing costs represents average posted rates for new loans in Federal funds at the major New York City banks. Financing costs were then subtracted from interest earned; a plus indicates "positive carry," and a minus "negative carry."

‡ No positive serial correlation (Theil and Nagar's table: 1 per cent significance level for rejecting null hypothesis of residual independence).

† Significantly different from zero at the 1 per cent level.

* Significantly different from zero at the 5 per cent level.

the change in free reserves, or the change in the discount rate) were found to be significant.

For gross short positions, however, the change in free reserves fell just short of being significant in one equation (equation 7). In this case, gross short positions were negatively associated with changes (positive) in free reserves, as expected. The coefficient relating short positions and free reserve changes was smaller for agency securities than for U.S. Government securities. Positions as well as transactions in agency securities thus appear to be consistently less responsive to changing monetary conditions than is the case for U.S. Government securities.

This lesser responsiveness of trading and positions in agency securities to monetary developments during the 1960's is not without foundation. As pointed out in Section III, until about 1965 yields on agency issues were declining relative to those on Treasury issues—

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other hand, positions in intermediate- and long-term issues were related negatively (and significantly) to the preceding quarter's change in Treasury yields; and with a coefficient large enough to indicate virtually no chance of the true coefficient being positive.

Several points can be made with respect to this apparent difference in behavior in the two markets: (1) The difference appears to some degree to be one between short-term and long-term markets in general. Thus, in the short-term U.S. Government securities market the change in yields during the last quarter was not significant as a determinant of positions, and while its coefficient was always negative, the standard errors were very large. This might indicate that dealers generally expect movements in long-term yields to continue their direction and to move relatively smoothly over the cycle but that they expect yields on short-term securities to move in a more erratic manner—as with the season, or with near-term money market conditions. It could also indicate that dealers project short-term yield movements in a more sophisticated manner than they do those on long-term yields. (2) The difference does not arise from divergent movements in yields on agency and Treasury securities. During the 1960's yield changes on agency issues and on intermediate- and long-term Government securities (the areas where there was a significant difference in coefficient signs) were positively related—the simple correlation coefficient was about 55 per cent. (3) To the degree that these relationships truly measure dealers' expectations, it would appear that dealers expect that Treasury yield movements (at least on long-term issues) will continue in the same direction but that yield changes for agency issues will reverse direction over quarterly periods.

that is, the yield spread was being reduced. Probably of even greater importance was the absence of any selling of agency securities by commercial banks with the tightening of monetary policy as the 1960's progressed, whereas sales of Treasury issues by such banks were quite heavy.

The most important determinant of dealers' gross and net long positions in agency securities during the 1960's has been gross new issues of agency debt. For every increase of $1 billion in new agency issues, daily long positions (net and gross) were some $82 million to $91 million higher on the average during the quarter.

This response of positions to gross new issues in the agency market was virtually identical with that found for Treasury bills and greater than that found for Treasury coupon issues, where the coefficients ranged between $14 million and $51 million. However, it is impossible to draw conclusions about dealers' underwriting in the various markets from these regression results because the size of the financing coefficients depends on the number of financings in the quarter, the number of separate issues offered per financing, and the dates of the financing(s) within the quarter. And these factors vary sharply among the markets for Treasury bills, Treasury coupon issues, and agency issues; there may be an average of one financing a quarter in Treasury coupon issues but as many as 15 financings a quarter in Treasury bills. Positions, as well as transactions, in agency securities are of course enlarged relative to the Treasury coupon market by the greater over-all volume of new issues.

There is a basic difference in the source of underwriting profits in the U.S. Government and agency markets. The method of marketing new agency issues is to distribute them to large selling groups who receive commissions ranging from about $0.50 to $3.50 per $1,000[47] of issues. In the U.S. Government securities market, there are no such commissions, and the new issue is made attractive to investors by

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[47] The size of the commission increases with the maturity of the new issue.

pricing it below comparable outstanding issues. While price discounting of necessity occurs for the agency issues as well, in view of the commission to underwriters such discounting may be less than on Treasury issues. At least one dealer who was interviewed voiced the opinion that underwriting of Treasury issues was in fact more profitable than underwriting of agency issues, because of the more attractive pricing of Treasury issues.

The second independent variable found to be a significant determinant of positions in agency debt was a measure of trading activity. Such activity was measured by the average volume of daily trading during the preceding two quarters[48] or, alternatively, by the amount of publicly held agency debt outstanding. Equations 1 and 4 show a rise of $0.71 million in net positions and of $0.88 million in gross long positions with a rise of $1 million in trading volume.[49] Gross short positions were also positively related to trading, by $0.43 million per $1 million trading rise (equation 7). While the coefficient is only half the size of that for long positions, it represents a much greater percentage rise with trading activity than for long positions.

As an alternative measure of trading activity, the amount of agency debt outstanding was also significantly and positively associated with positions. Equations 3, 6, and 8 show increases of $9.6 million in daily-average net positions, of $11.9 million in daily-average gross long positions, and of $4.6 million in daily-average gross short positions with a $1 billion rise in agency debt. These coefficients imply a similar —perhaps slightly greater—rise in positions with trading than do the trading coefficients

themselves, given the relationship found earlier of an $11.5 million rise in trading with a $1 billion rise in debt.[50]

These results thus indicate generally a somewhat less than proportional rise in positions with trading; that is, a $1 million rise in trading causes a less than $1 million rise in positions. In the U.S. Government securities market, on the other hand, positions rose by somewhat more than the increase in trading. However, data inadequacies make this finding only tentative.

While trading and new issues were the only independent variables found to be significant determinants of agency positions, several other variables difficult to measure may well affect dealers' desires to hold agency issues relative to U.S. Government issues. In the first place, the interest carry on agency debt is greater than on U.S. Government securities since agency interest rates are higher.[51] Secondly, the risk of capital loss on agency debt held in position may be greater than on U.S. Government securities. This might be the case for any number of reasons, including: (1) greater fluctuations in prices of agency security issues; (2) greater difficulty in forecasting movements in yields and prices of agency issues; (3) diminished ability to alter gross positions in response to expectational stimuli; and (4) the frequency of new financings.

For whatever reasons, the profitability of agency operations is certainly implied by the sharp rise in dealers' positions, absolutely and relative to positions in Treasury issues. The

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[48] Because the relationship between trading and positions may be two-way, with trading to some degree dependent on positions, and because the volume of new issues causes trading and positions to rise concurrently, the volume of trading was used for preceding quarters rather than for the same quarter to avoid a bias in the coefficients.

[49] The reader will note that coefficients are smaller in equations 2 and 5, where trading was not significant. The lack of significance was caused by multicollinearity between trading and interest carry and, to a lesser degree, between trading and yield changes in the preceding quarter.

[50] See Table 13.

[51] To some degree the higher interest earned on agency securities might be counterbalanced by higher dealer borrowing costs on such securities. Higher average borrowing costs would result if dealers found it more difficult to sell agency issues under repurchase agreements. In this respect, it was not until late in 1966 that the Federal Reserve was given the authority to purchase (outright or under RP's) nonguaranteed agency debt. Moreover, responses of institutional investors to a questionnaire (see Joseph Scherer, "Institutional Investors in the Government Securities Market," Part 1 of this series, pp. 64 and 65) showed the number of investors who enter into repurchase and resale agreements to be considerably less for agency securities than for U.S. Government securities (29 versus 55 per cent).

higher positions lend added support to the observation that the performance of the agency market has indeed improved in recent years.

SPREADS BETWEEN QUOTED BID AND ASKED PRICES

Spreads between quoted bid and offered prices are a key factor in the functioning of securities markets. In a general sense, the size of spreads is indicative of the degree of "depth, breadth, and resiliency" characterizing a particular market. More specifically, small spreads would indicate a willingness of dealers to operate on both sides of the market.[52] In addition, small spreads engender a broad investor participation as the cost to the investor of transactions is diminished.

In Chart 16 and in Appendix Table 11, spreads are shown for the various agency securities by maturity category. A note of caution must be introduced in interpreting these data, which are derived from published quotations of one particular dealer (Morgan Guaranty Trust Company). As is true of quoted spreads in the U.S. Government securities market, the published quotations overstate the size of the spread for all preferred customers, whose trades take place at "inside" quotations. Additional sources of error in the data for spreads on agency issues may arise from the use of only one dealer's price quotations and from the potential inaccuracy of price quotations because of the relative inactivity in trading in some longer-term agency issues. Nevertheless, the published quotations are the only available source of spread data.

Data derived from published spreads show some differences among the issues of the various agencies as well as among the different maturities. Quoted spreads on the short-term issues of FICB, FHLB, and BC have in general fluctuated between 1/32 and 2/32 since 1958.

Spreads on the short-term issues of FNMA and FLB, on the other hand, have more generally ranged between 2/32 and 4/32. This difference in spreads is probably indicative of lesser activity in the FNMA and FLB issues and is attributable at least in part to the smaller average size of these issues.

Quoted spreads on agency issues bearing maturities of 1 to 5 years have ranged between 4/32 and a full point (32/32) since 1958. To some degree, the movement in these spreads over time reflects shifts in the maturity structure of issues within the 1- to 5-year category; the shorter-term issues of course carry the smaller spreads. Over and above differences that stem from differences in maturities, the FHLB issues have in recent years carried somewhat lower spreads when compared with FNMA and FLB issues. On the long-term agency securities, issued by FNMA and FLB, quoted spreads have been ½ point or 1 point over the entire period.

Spreads on PC's have generally been the same as on FNMA and FLB issues in the 1- to 5-year and after-5-year maturities. Since 1966, they have been ½ or 1 point on both FNMA and Export-Import Bank PC's.

Interviews conducted with dealers disclosed some information on the spreads at which agency issues actually trade, at least for the larger customers.[53] In general, the dealers interviewed said that short-term agency issues trade at a 1/32 spread, but that the spread could be as low as 1/64. It was noted, however, that short-term FNMA issues trade at a larger spread, probably 4/32. It was less clear at what spreads the longer-term issues trade, but one dealer pointed to around a 4/32 spread on 2- to 3-year issues and another noted a fair amount of business done at a ¼ point spread on the longer-term agency issues. In every case, these spreads are less than the quoted spreads shown in the accompanying tables.

In only one case, that of the shortest-term issues, does there appear to have been any secular decline in quoted spreads with the rapid growth in trading activity and debt in the

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[52] In a healthy market, spreads must be subject to some minimum level consistent with dealer profitability. A reduction in spreads reduces dealers' trading profits unless the volume of trading rises correspondingly. Trading profits may be especially important when other dealer profits are limited by either high carrying costs or steadily rising interest rates.

[53] Odd-lots trade at greater spreads.

TABLE 20: MOST TYPICAL SPREADS IN COMPARATIVE SECURITIES MARKETS, 1958–66

In 32nds except for Treasury bills, which are in basis points

Date	Federal agency debt maturing (in years)—					U.S. Govt. debt maturing (in years)—				
	Within 1		1–5		After 5	Within 1		3–5	5–10	After 10
	FICB, FHLB, and BC	FNMA and FLB	FHLB	FNMA, FLB, and PC's	FNMA, FLB, and PC's	3–mo. bills	6–13 mo. coupon issues			
1958......	2	2	8	8	16–32	3–4	2	4	8	8
1959......	2	2	8	8	16–32	4	2	4	6	8
1960......	2	4	16	16	32	3	4	4	8	8
1961......	2	2	8	8	32	3	2	4	8	8
1962......	1	2	4	8	32	2	2	4	8	8
1963......	1	2	4	8	16	2	2	2	6	8
1964......	1	2	4	8	16–32	2	2	4	4	8
1965......	2	4	4	8–16	32	2	2	4	4	8
1966......	1–2	4	8	16–32	32	3	2	4	4	8

agency market. For FICB, BC, and FHLB issues due within 1 year the quoted spread during 1962–64 was 1/32 as compared with a 2/32 spread in prior years. One interviewed dealer also noted a decline in trading spreads in recent years. With the sharp rise in interest rates in 1965 and 1966, quoted spreads on all agency issues increased.

Quoted spreads on short-term agency issues compare favorably with those on Treasury bills and short-term coupon issues. If anything, the quoted agency spreads are smaller, as shown in Table 20. With a lengthening of maturities, however, there is a widening disparity among quoted spreads on agency and U.S. Government issues. In the intermediate-term sector, agency spreads have in recent years ranged from 4/32 to a full point, compared with a 4/32 spread on Treasury issues. Where, for the longer-term securities, quoted spreads on agency issues were 16/32 or 1 point, Treasury spreads were 8/32. It is probable that the spreads at which intermediate- and long-term agency issues actually trade are considerably below those quoted and that they are also closer to the spreads at which Treasury issues trade. It is unlikely, however, that they are as low as those on Treasury issues.

The evidence, possibly misleading, shows no indication of any secular decline in spreads over the 1960's on agency securities other than the shortest-term issues. Nevertheless, the small size of spreads on shorter-term agency issues indicates a strong market. On the other hand, the relatively large quoted spreads on long-term and on certain short-term issues point to a lesser tradability of issues in some specific sectors of the agency market. □

VI. APPENDIX TABLES

APPENDIX TABLE 1
AGENCY DEBT OUTSTANDING, QUARTERLY, 1954–67

In millions of dollars

End of quarter	Non-guaranteed [1]	PC's [2]	Total
1954– I....	1,871	...	1,871
II....	1,155	...	1,155
III....	2,092	...	2,092
IV....	2,064	...	2,064
1955– I....	2,615	...	2,615
II....	2,931	...	2,931
III....	3,172	...	3,172
IV....	3,575	...	3,575
1956– I....	3,681	...	3,681
II....	3,888	...	3,888
III....	4,129	...	4,129
IV....	4,018	...	4,018
1957– I....	4,415	...	4,415
II....	5,016	...	5,016
III....	5,205	...	5,205
IV....	6,220	...	6,220
1958– I....	6,327	...	6,327
II....	5,422	...	5,422
III....	5,637	...	5,637
IV....	5,722	...	5,722
1959– I....	5,902	...	5,902
II....	6,707	...	6,707
III....	7,519	...	7,519
IV....	7,917	...	7,917
1960– I....	7,753	...	7,753
II....	8,403	...	8,403
III....	7,726	...	7,726
IV....	7,910	...	7,910
1961– I....	7,429	...	7,429
II....	7,765	...	7,765
III....	8,312	...	8,312
IV....	8,574	...	8,574
1962– I....	8,995	...	8,995
II....	9,332	...	9,332
III....	9,883	...	9,883
IV....	10,133	...	10,133
1963– I....	9,267	...	9,267
II....	10,192	...	10,192
III....	10,870	...	10,870
IV....	11,705	...	11,705
1964– I....	11,133	...	11,133
II....	11,865	...	11,865
III....	11,996	...	11,996
IV....	12,127	300	12,427
1965– I....	12,246	300	12,546
II....	13,460	300	13,760
III....	13,965	825	14,790
IV....	14,086	1,170	15,256
1966– I....	15,055	1,170	16,225
II....	17,626	2,610	20,236
III....	18,396	2,075	20,471
IV....	19,249	2,020	21,269
1967– I....	18,604	3,620	22,224
II....	18,026	5,730	23,756

[1] Represents debt of the FICB, FLB, BC, FHLB, FNMA, and TVA. Data are from the Treasury Survey of Ownership.
[2] Includes only fully marketable participation certificates: all FNMA PC's, Export-Import Bank PC's issued in and after February 1967, and CCC certificate issued in April 1966 and retired in August 1966.

APPENDIX TABLE 2
TYPES OF NONGUARANTEED AGENCY DEBT OUTSTANDING, QUARTERLY, 1954–67

In millions of dollars

End of quarter	BC	FICB	FLB	FHLB	FNMA	TVA	Total
1954– I......	110	617	940	204	...	...	1,871
II......	72	353	679	51	...	...	1,155
III......	120	776	1,017	179	...	...	2,092
IV......	120	641	1,030	273	...	...	2,064
1955– I......	120	699	1,085	141	570	...	2,615
II......	110	793	1,117	341	570	...	2,931
III......	110	824	1,133	535	570	...	3,172
IV......	110	657	1,263	975	570	...	3,575
1956– I......	110	702	1,321	878	670	...	3,681
II......	133	834	1,322	929	670	...	3,888
III......	143	861	1,437	918	770	...	4,129
IV......	143	705	1,437	963	770	...	4,018
1957– I......	185	767	1,519	724	1,220	...	4,415
II......	182	924	1,552	738	1,620	...	5,016
III......	207	948	1,600	765	1,685	...	5,205
IV......	222	886	1,599	826	2,687	...	6,220
1958– I......	191	971	1,625	476	3,064	...	6,327
II......	199	1,159	1,646	456	1,962	...	5,422
III......	232	1,205	1,687	616	1,897	...	5,637
IV......	252	1,116	1,743	714	1,897	...	5,722
1959– I......	258	1,206	1,792	699	1,947	...	5,902
II......	284	1,456	1,888	992	2,087	...	6,707
III......	320	1,524	1,986	1,402	2,287	...	7,519
IV......	364	1,356	1,986	1,774	2,437	...	7,917
1960– I......	360	1,416	2,047	1,293	2,637	...	7,753
II......	330	1,600	2,137	1,255	3,081	...	8,403
III......	346	1,665	2,137	1,167	2,411	...	7,726
IV......	407	1,454	2,210	1,266	2,523	50	7,910
1961– I......	404	1,519	2,210	829	2,416	50	7,429
II......	382	1,723	2,357	1,055	2,198	50	7,765
III......	384	1,782	2,431	1,335	2,281	100	8,312
IV......	435	1,585	2,431	1,571	2,453	100	8,574
1962– I......	452	1,644	2,495	1,602	2,658	145	8,995
II......	430	1,855	2,550	1,797	2,556	145	9,332
III......	475	1,930	2,596	2,257	2,481	145	9,883
IV......	505	1,727	2,628	2,707	2,422	145	10,133
1963– I......	480	1,842	2,661	2,014	2,126	145	9,267
II......	459	2,133	2,725	2,770	1,960	145	10,192
III......	473	2,233	2,796	3,299	1,899	170	10,870
IV......	589	1,952	2,834	4,363	1,787	180	11,705
1964– I......	586	2,069	2,886	3,627	1,785	180	11,133
II......	498	2,315	2,973	4,201	1,698	180	11,865
III......	538	2,424	3,102	4,182	1,571	180	11,996
IV......	686	2,112	3,169	4,369	1,601	190	12,127
1965– I......	723	2,206	3,298	4,090	1,739	190	12,246
II......	687	2,462	3,532	4,757	1,797	225	13,460
III......	708	2,603	3,612	5,046	1,756	240	13,965
IV......	797	2,235	3,710	5,221	1,884	240	14,086
1966– I......	819	2,470	3,813	5,060	2,648	245	15,055
II......	844	2,853	4,105	6,309	3,269	245	17,626
III......	882	2,991	4,295	6,765	3,178	285	18,396
IV......	1,074	2,786	4,385	6,859	3,800	345	19,249
1967– I......	1,113	2,944	4,450	5,741	4,010	345	18,604
II......	1,042	3,297	4,611	4,585	4,078	415	18,026

SOURCE.—Treasury Survey of Ownership.

APPENDIX TABLE 3
NET EXPENDITURES, OR RECEIPTS (−), OF SELECTED AGENCIES, QUARTERLY, 1961–67

In millions of dollars

Quarter	BC	FICB	FLB	FHLB	Total
1961– I....	−3	64	−2	−704	−645
II....	−25	204	149	276	604
III....	4	57	77	358	496
IV....	50	−196	−3	458	309
1962– I....	18	58	64	−541	−401
II....	−21	212	57	596	844
III....	45	75	47	432	599
IV....	29	−204	32	273	130
1963– I....	−24	114	34	−1,137	−1,013
II....	−21	291	64	797	1,131
III....	14	100	71	983	1,168
IV....	116	−282	39	639	512
1964– I....	−3	118	52	−543	−376
II....	−89	246	87	494	738
III....	40	109	129	181	459
IV....	149	−311	69	261	168
1965– I....	37	94	129	−519	−259
II....	−36	256	234	737	1,191
III....	20	139	80	406	645
IV....	87	−266	103	99	23
1966– I....	23	135	99	−146	111
II....	24	384	292	933	1,633
III....	38	138	191	588	955
IV....	193	−205	101	−636	−547
1967– I....	39	159	53	−2,129	−1,878
II....	−71	354	161	−1,329	−885

Source.—*Monthly Statement of Receipts and Expenditures of the U.S. Government.*

APPENDIX TABLE 4
MATURITY STRUCTURE OF NONGUARANTEED AGENCY DEBT, QUARTERLY, 1960–67

In millions of dollars

End of quarter	Maturing (in years)—			
	Within 1	1–5	After 5	Total
1960– II......	5,326	1,717	1,360	8,403
III......	4,720	1,446	1,560	7,726
IV......	4,414	1,786	1,710	7,910
1961– I......	4,225	1,493	1,710	7,429
II......	3,953	2,060	1,752	7,765
III......	4,256	2,154	1,902	8,312
IV......	4,400	2,272	1,902	8,574
1962– I......	4,690	2,003	2,302	8,995
II......	4,932	2,098	2,302	9,332
III......	5,438	2,143	2,302	9,883
IV......	5,788	2,043	2,302	10,133
1963– I......	4,773	2,229	2,264	9,267
II......	5,363	2,586	2,238	10,192
III......	6,228	2,408	2,233	10,870
IV......	7,360	2,113	2,232	11,705
1964– I......	6,788	2,213	2,132	11,133
II......	7,318	2,503	2,044	11,865
III......	7,184	2,833	1,979	11,996
IV......	7,406	2,742	1,979	12,127
1965– I......	7,729	2,764	1,754	12,246
II......	8,475	3,114	1,871	13,460
III......	9,136	3,163	1,665	13,965
IV......	9,164	3,335	1,590	14,086
1966– I......	10,127	3,214	1,713	15,055
II......	12,435	3,387	1,803	17,626
III......	12,670	3,932	1,794	18,396
IV......	13,446	4,008	1,794	19,249
1967– I......	12,469	4,225	1,909	18,604
II......	12,236	3,912	1,879	18,026

Source.—Derived from the Treasury Survey of Ownership.

APPENDIX TABLE 5
MARKET YIELDS ON FEDERAL AGENCY AND U.S. GOVERNMENT SECURITIES AT CONSTANT MATURITIES, QUARTERLY, 1963–67

In per cent per annum

Quarter	1-year			3-year			5-year			10-year		
	Agency	U.S. Govt.	Spread	Agency	U.S. Govt.	Spread	Agency	U.S. Govt.	Spread	Agency	U.S. Govt.	Spread
1963– I....	3.24	3.06	.18	3.59	3.43	.16	3.89	3.70	.19	4.08	3.94	.14
II....	3.26	3.09	.17	3.62	3.45	.17	3.89	3.72	.17	4.08	3.97	.11
III....	3.76	3.48	.28	3.95	3.76	.19	4.08	3.87	.21	4.18	3.99	.19
IV....	3.88	3.68	.20	4.04	3.92	.12	4.13	4.01	.12	4.24	4.15	.09
1964– I....	4.07	3.93	.14	4.26	4.15	.11	4.30	4.16	.14	4.35	4.23	.12
II....	4.10	3.90	.20	4.26	4.11	.15	4.33	4.11	.22	4.33	4.19	.14
III....	4.00	3.77	.23	4.13	3.97	.16	4.25	4.06	.19	4.32	4.20	.12
IV....	4.08	3.86	.22	4.15	4.02	.13	4.29	4.06	.23	4.35	4.18	.17
1965– I....	4.27	4.04	.23	4.30	4.12	.18	4.33	4.14	.19	4.34	4.20	.14
II....	4.35	4.03	.32	4.35	4.09	.26	4.42	4.15	.27	4.44	4.23	.21
III....	4.47	4.31	.16	4.51	4.27	.24	4.54	4.27	.27	4.56	4.31	.25
IV....	4.58	4.39	.19	4.68	4.47	.21	4.71	4.47	.24	4.69	4.46	.23
1966– I....	5.23	4.97	.26	5.28	5.01	.27	5.23	4.97	.26	5.08	4.83	.25
II....	5.53	4.92	.61	5.47	4.98	.49	5.26	4.89	.37	5.16	4.78	.38
III....	6.06	5.67	.39	6.09	5.74	.35	5.86	5.51	.35	5.66	5.22	.44
IV....	5.87	5.38	.49	5.67	5.35	.32	5.48	5.18	.30	5.32	5.00	.32
1967– I....	5.00	4.60	.40	5.07	4.62	.45	5.07	4.64	.43	5.07	4.56	.51
II....	4.70	4.32	.38	4.97	4.56	.41	5.19	4.78	.41	5.20	4.81	.39

Note.—Yields derived from yield curves drawn on selected dates. Quarterly yields are averages for all dates within the quarter if yield curves were drawn on more than one date. Based on bid quotations.

Source.—U.S. Treasury Department.

APPENDIX TABLE 6
YIELD SPREADS, QUARTERLY, 1954–67

In basis points

Quarter	3-month agency yield less—			10- to 12-year agency yield less—	
	3-month Treasury bills		3-month CD's	10-year U.S. Govt. bond	10-year Aa new corporate [1]
	Market yield	Investment yield			
1954– I.....	24	22	...	...	...
II.....	27	25	...	...	...
III.....	2	0	...	...	...
IV.....	8	6	...	...	...
1955– I.....	5	2	...	...	...
II.....	22	19	...	...	...
III.....	32	28	...	...	...
IV.....	26	21	...	...	...
1956– I.....	30	25	...	...	...
II.....	43	38	...	...	...
III.....	24	19	...	25	–13
IV.....	29	23	...	34	–24
1957– I.....	18	12	...	51	– 4
II.....	25	18	...	35	–26
III.....	23	15	...	36	–22
IV.....	47	40	...	71	– 2
1958– I.....	5	1	...	53	– 9
II.....	7	5	...	42	–11
III.....	5	1	...	9	–23
IV.....	2	– 4	...	29	–18
1959– I.....	15	9	...	29	–14
II.....	22	16	...	31	–14
III.....	16	7	...	18	–25
IV.....	37	26	...	20	–21
1960– I.....	35	25	...	31	0
II.....	23	17	...	27	– 8
III.....	16	11	...	27	–18
IV.....	26	21	...	20	–25
1961– I.....	15	10	...	24	–22
II.....	3	– 2	...	33	–10
III.....	12	7	...	37	–13
IV.....	9	4	...	21	–19
1962– I.....	2	– 4	...	22	– 9
II.....	5	0	...	13	–13
III.....	6	0	–23	17	–11
IV.....	3	– 3	–22	8	–10
1963– I.....	5	– 1	–22	12	–11
II.....	14	8	– 6	6	– 9
III.....	19	12	4	9	–14
IV.....	13	5	–13	1	–16
1964– I.....	5	– 3	–24	5	–14
II.....	17	9	–16	3	–15
III.....	26	18	–12	1	–15
IV.....	27	18	– 7	5	–18
1965– I.....	12	2	–15	7	– 9
II.....	23	13	–17	14	–18
III.....	24	15	–21	20	–15
IV.....	23	13	–15	15	–16
1966– I.....	29	18	–10	18	–10
II.....	42	31	–30	32	–17
III.....	62	50	–24	29	–37
IV.....	33	19	–19	39	–54
1967– I.....	26	15	–52	49	–30
II.....	23	14	–53	52	–25

[1] Equipment trust certificates.

NOTE.—Spreads are quarterly averages of monthly data. Bills quoted at bid, other issues at offer.

SOURCE.—Based on data in Salomon Brothers and Hutzler, *An Analytical Record of Yields and Yield Spreads*, Parts I and III.

APPENDIX TABLE 7
GROSS DEALER TRANSACTIONS IN FEDERAL AGENCY SECURITIES, QUARTERLY, 1960–67

In millions of dollars

Quarter	Maturing (in years)—		Total
	Within 1	After 1	
1960–III.....	58	11	69
IV.....	53	20	73
1961– I.....	58	16	74
II.....	55	23	78
III.....	54	20	74
IV.....	58	15	73
1962– I.....	62	25	87
II.....	67	23	90
III.....	72	16	88
IV.....	71	21	92
1963– I.....	64	18	82
II.....	68	25	93
III.....	94	13	107
IV.....	84	16	100
1964– I.....	82	10	92
II.....	116	16	132
III.....	94	27	121
IV.....	85	24	109
1965– I.....	78	23	101
II.....	121	47	168
III.....	116	28	144
IV.....	103	47	150
1966– I.....	121	40	161
II.....	181	59	240
III.....	152	55	207
IV.....	171	35	206
1967– I.....	146	95	241
II.....	133	69	202

NOTE.—Averages of daily figures. Transactions include dealer purchases and sales but exclude allotments of new issues, maturities, exchanges, and repurchase agreements. Classification is by final maturity date. Averages are based on the number of trading days in the quarter; PC's are included.

SOURCE.—Market Statistics Division, Federal Reserve Bank of New York.

APPENDIX TABLE 8
TURNOVER OF FEDERAL AGENCY DEBT, QUARTERLY, 1960–67

Quarter	Annual rate	Quarter	Annual rate
1960–III.....	2.12	1964– I.....	2.03
IV.....	2.32	II.....	2.87
1961– I.....	2.41	III.....	2.53
II.....	2.58	IV.....	2.31
III.....	2.32	1965– I.....	2.04
IV.....	2.19	II.....	3.19
		III.....	2.49
1962– I.....	2.47	IV.....	2.50
II.....	2.47		
III.....	2.27	1966– I.....	2.55
IV.....	2.26	II.....	3.28
1963– I.....	2.11	III.....	2.56
II.....	2.44	IV.....	2.60
III.....	2.55	1967– I.....	2.97
IV.....	2.24	II.....	2.45

NOTE.—Annual rate represents daily-average gross dealer transactions multiplied by 249 divided by agency debt (including PC's) held by the public.

APPENDIX TABLE 9
DEALER NET POSITIONS IN FEDERAL AGENCY SECURITIES, QUARTERLY, 1960–67

In millions of dollars

| Quarter | Maturing (in years)— | | Total |
	Within 1	After 1	
1960–III.....	142	19	161
IV.....	86	26	112
1961– I.....	77	19	96
II.....	109	31	140
III.....	93	18	111
IV.....	105	5	110
1962– I.....	115	11	126
II.....	177	50	227
III.....	171	24	195
IV.....	191	36	227
1963– I.....	156	22	178
II.....	255	44	299
III.....	212	38	250
IV.....	168	34	202
1964– I.....	177	10	187
II.....	234	9	243
III.....	215	42	257
IV.....	220	69	289
1965– I.....	194	61	255
II.....	301	128	429
III.....	238	138	376
IV.....	200	90	290
1966– I.....	280	26	306
II.....	591	125	716
III.....	213	77	290
IV.....	352	77	429
1967– I.....	288	192	480
II.....	239	137	376

NOTE.—Averages of daily figures for number of trading days in the quarter. Data are on a commitment basis; they include securities sold by dealers under repurchase agreement. Securities are classified by final maturity date, and they include PC's.

SOURCE.—Market Statistics Division, Federal Reserve Bank of New York.

APPENDIX TABLE 10
DEALER GROSS POSITIONS IN FEDERAL AGENCY SECURITIES, QUARTERLY, 1961–67

In millions of dollars

| Quarter | Maturing (in years)— | | | | Total | |
| | Within 1 | | After 1 | | | |
	Gross long	Gross short	Gross long	Gross short	Gross long	Gross short
1961– I......	86	9	27	8	114	17
II......	114	5	41	10	154	15
III......	101	7	31	13	132	20
IV......	116	11	18	13	134	24
1962– I......	123	9	29	17	151	26
II......	184	6	57	7	241	13
III......	181	10	34	10	215	20
IV......	198	7	45	10	244	17
1963– I......	162	9	39	17	201	26
II......	266	11	58	13	324	24
III......	236	25	54	16	290	42
IV......	192	25	49	15	240	40
1964– I......	193	16	29	19	222	35
II......	244	10	36	26	279	37
III......	227	12	58	16	285	28
IV......	230	9	79	9	309	18
1965– I......	207	14	74	13	281	27
II......	316	15	148	23	464	37
III......	257	19	156	19	413	37
IV......	232	32	130	40	362	71
1966– I......	310	30	71	46	381	76
II......	625	29	156	33	781	62
III......	267	51	118	40	385	90
IV......	380	29	99	22	479	51
1967– I......	313	26	224	30	537	56
II......	285	44	187	50	472	94

NOTE.—Averages of daily figures. Data are on a commitment basis, are classified by final maturity date, and include PC's. Gross long positions include securities sold under repurchase agreement.

SOURCE.—Market Statistics Division, Federal Reserve Bank of New York.

APPENDIX TABLE 11
SPREAD BETWEEN DEALERS' QUOTED BID AND ASKED PRICES
ON FEDERAL AGENCY SECURITIES, QUARTERLY, 1958–67

Most typical spreads, in 32nds

Quarter	BC debentures[1]	FICB debentures[1]	FHLB issues maturing (in years)—		FNMA debentures maturing (in years)—			FLB bonds maturing (in years)—			FNMA PC's maturing (in years)—			Export-Import Bank PC's maturing (in years)[2]—	
			Within 1	1–5	Within 1	1–5	After 5	Within 1	1–5	After 5	Within 1	1–5	After 5	1–5	After 5
1958– I	4	2	2	(3)	4	4	8	2–4	8	32	...	...	...	...	..
II	2	2	2	4	2	8	8–16	2	8	32	...	...	...	...	...
III	2–3	3	3	8	2–3	8	16	2	8	32	...	...	...	...	...
IV	2	2	2	8	2–3	8	16	2	8	32	...	...	...	...	...
1959– I	2	2	2	8	2	8	16	2	8	32	...	...	...	...	...
II	2	2	2	8	2	8	16	4	8	32	...	...	...	...	...
III	2	2	2	8	2	8	16	4	8	32	...	...	...	...	...
IV	2	2	2	16	2	8	16	4	8	32	...	...	...	...	...
1960– I	2	2	2	16	2	16	32	4	16	32	...	...	...	...	...
II	2	2	2	16	2	16	32	4	16	32	...	...	...	...	...
III	2	2	2	16	4	16	32	4	16	32	...	...	...	...	...
IV	2	2	2	8	4	8	16	4	8	32	...	...	...	...	...
1961– I	2	2	2	8	2	8	16	2	8	32	...	...	...	...	...
II	2	2	2	8	2	8	16	2	8	32	...	...	...	...	...
III	2	2	2	8	2	8	32	2	16	32	...	...	...	...	...
IV	2	2	2	8	2	8	32	2	16	32	...	...	...	...	...
1962– I	1	1	1	4	2	4	32	2	8	32	...	...	...	...	...
II	1	1	1	(3)	2	4	32	2	8	32	...	...	...	...	...
III	1	1	1	(3)	2	8	32	2	8	32	...	...	...	...	...
IV	1	1	1	4	2	4	32	2	8	32	...	...	...	...	...
1963– I	1	1	1	4	2	4	16	1–2	8	16	...	...	...	...	...
II	1	1	1	4	2	4	16	1–2	8	16	...	...	...	...	...
III	1	1	1	8	2	8	16	2	8	16	...	...	...	...	...
IV	1	1	1	4	2	8	16	1–2	8	16	...	...	...	...	...
1964– I	1	1	1	4	2	4	16	2	8	16	...	...	...	...	...
II	1	1	1	4	2	4–16	16	2	8	16	...	...	...	...	...
III	1	1	1	4	2	16	32	2	8	32	...	...	...	...	...
IV	2	2	2	4	2–4	16	32	4	8	32	...	...	...	...	...
1965– I	2	2	2	4	4	4–16	32	2–4	8	32	...	...	...	...	...
II	2	2	2	4	2–4	16	32	4	8	32	2–4	8	16	...	...
III	2	2	2	4	4	4–16	32	4	8	32	4	8	16	...	...
IV	1	1	1	4	4	16	16–32	4	8–16	16–32	4	16	32	...	...
1966– I	1	1	1	8	4	16–32	16–32	2–4	16–32	32	8	16–32	16–32	...	...
II	1	1	1	8	4	32	32	2–8	16–32	32	8	32	32	...	...
III	2	2	2	8	4	32	32	4–8	16–32	32	16	32	32	...	...
IV	2	2	2	8	4	32	32	4–8	16–32	32	16	32	32	...	...
1967– I	2	2	2	8	4	32	32	4–8	16–32	32	16	[4]16–32	[4]16–32	16	16
II	2	2	2	8	4	32	32	4	32	32	16	32	32	32	32

[1] All such debentures mature within 1 year.
[2] Includes only the fully marketable PC's, first issued in February 1967.
[3] No issues outstanding in this maturity.
[4] Spread of 16 was on the new, larger FNMA PC's, while spread of 32 was on the earlier serial issues. Prior to 1967, only serial PC issues were outstanding.

Note.—Quarterly figures were derived from observations on the last trading day of each month. Generally, the typical spread is the one that existed in 2 out of 3 months.
Source.—Morgan Guaranty Trust Company, Government Bond Department, daily quotation sheets.

MARKET PERFORMANCE AS REFLECTED IN AGGREGATIVE INDICATORS

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CONTENTS

I. INTRODUCTION

The performance of the market for U.S. Government securities is the subject of this study. Market performance cannot be defined neatly or summarized by a single statistical measure. However, an efficient market is generally considered to be one possessing "depth, breadth, and resiliency," with these qualities defined in terms of orders on the dealers' books. The market

. . . possesses depth when there are orders, either actual orders or orders that can be readily uncovered, both above and below the market. The market has breadth when these orders are in volume and come from widely divergent investor groups. It is resilient when new orders pour promptly into the market to take advantage of sharp and unexpected fluctuations in prices.[1]

At the other extreme, in a disorderly declining market, "selling feeds on itself so rapidly and menacingly that it discourages both short covering and the placement of offsetting new orders." [2]

In more general terms, it is usually agreed that an adequately functioning U.S. Government securities market is one that has the capacity to accommodate Treasury financings, Federal Reserve open market operations, and private investment transactions at reasonable speed and cost. Such a market would be characterized by continuity in trading at prices that reflect demand and supply; it would not exhibit extremely sharp daily price movements or very large spreads between bid and asked prices, which would suggest unwillingness by investors and/or dealers to maintain an active market.

Although a lack of data concerning orders

on the dealers' books prevents the development of statistical indicators that directly measure "depth, breadth, and resiliency," this study analyzes a number of indicators that do approximate some of these technical characteristics as well as the more general criteria. At least they should signal changes over time in the underlying market characteristics.[3]

The study focuses on the following indicators: daily-average volume of trading, annual rate of turnover of the marketable U.S. debt, 16th lowest daily volume of trading in each quarter, dealers' daily-average positions, frequency of small and large daily price changes, and spreads between quoted bid and asked prices. Each indicator was selected in part because it approximates desirable or undesirable attributes of the market, and in part because it measures an essential operational characteristic of the market. In the analysis we attempt to answer two questions: First, how have these indicators behaved, and what explains their behavior? In particular, how was the market affected by Treasury debt management policy and by open market operations of official accounts—that is, the Federal Reserve and the Treasury? And second, did market performance, as reflected in these indicators, depart further from the "ideal" in the 1960's than in the 1950's?

Because performance may vary greatly in different segments of the market, the indicators were examined on a quarterly basis from the early 1950's through the mid-1960's for selected maturity classes of U.S. Government securities—Treasury bills, and other securities maturing within 1 year, in 1 to 5 years, in 5 to 10 years, and after 10 years. Charts 1–5 on pages 102–06 present profiles of market performance, as defined by the indicators, for each maturity class.   ☐

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[1] From the 1952 report of the *Ad Hoc* Subcommittee on the Government Securities Market. See U.S. Congress, Joint Committee on the Economic Report, Subcommittee on Economic Stabilization (Flanders Committee), *United States Monetary Policy: Recent Thinking and Experience Hearings,* 83rd Cong., 2nd Sess., 1954, p. 265.

[2] *Ibid.,* p. 268. A similar definition applies to a disorderly rising market.

[3] It should be noted that these definitions and the selected indicators reflect activity of both dealers and customers because performance of a dealer market—as distinct from performance of the dealers—depends on the behavior of customers as well as on the functioning of dealers.

II. CONCLUSIONS

The major conclusions of this study are listed below. Readers should note, however, that there are errors and inconsistencies in the dealer data, as discussed on page 101, as well as statistical problems in the regression analyses. Further analysis of the available data is possible and desirable.

1. Market performance, as reflected in the several indicators based on trading, showed few signs of secular deterioration from the 1950's to the 1960's.[4] Only in coupon issues maturing within 1 year was there clear-cut evidence of such deterioration.[5] For issues maturing in 1 to 5 and in 5 to 10 years all indicators based on trading suggested secular improvement in performance; and for bills and after-10-year maturities the indicators offered conflicting evidence. Specifically, daily-average trading was higher in the 1960's in all maturity classes except coupon issues maturing within 1 year. And the annual rate of turnover of the marketable U.S. debt—a rough adjustment of trading for debt outstanding—was generally greater in the 1960's in 1- to 5- and in 5- to 10-year maturities, was slightly lower in bills, and was considerably lower in other short-term issues and in bonds maturing after 10 years. And finally, there was no evidence of increased discontinuities in trading—whether measured by the 16th lowest daily volume of trading in each quarter or by volatility in quarterly data on daily-average trading—except in coupon issues maturing within 1 year.

2. In both the 1950's and 1960's there were sizable *short-run* fluctuations in the indicators based on trading, and in this sense market performance was subject to periods of deterioration and of improvement. The relative variation in trading was greater in 5- to 10- and after-10-year bonds—implying that short-run variation in market performance was more pronounced in the long-term market. In part these fluctuations reflected cyclical movements in free reserves and interest rates, with the volume of trading rising in periods of easy money and falling when credit policy tightened noticeably, and thus causing appropriate countercyclical changes in the liquidity of Government securities. Movements in trading also were related to U.S. Government debt outstanding, Treasury financings, official operations in the market, and swapping for tax purposes.

3. Trading was positively associated with the size of Treasury financings throughout the period studied. Thus to the extent that advance refundings made possible more long-term bond offerings, they contributed to a higher average level of market activity. Corroborating the opinion of market participants, Treasury financings in long-term bonds also caused a widening of the spread between daily-average trading and trading on low days (as measured by volume on the 16th lowest day). Nevertheless, during the 1960's the rise in trading on low days was almost as much as that in daily-average trading.

4. No evidence was found that official transactions in coupon securities caused market activity in the same quarter to dry up. On the contrary, market activity was positively related to official activity in bills and in 5- to 10- and after-10-year maturities, although this association was less pronounced in the 1960's. The stimulative impact on trading in 5- to 10- and after-10-year bonds was caused by Treasury operations; Federal Reserve operations did not show a significant relationship to trading activity.

5. Analysis of dealers' positions unearthed little or no evidence of secular deterioration from the 1950's to the 1960's in the performance of dealers as gauged by their inventory practices. However, this study made no attempt to find out whether dealers' profits over the period were sufficient to justify their long-run

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[4] Note that the 1960's cover only the period through 1965 or mid-1966 and do not include the difficult periods in financial markets later in 1966 and in 1969.

[5] During most of the 1960's the Treasury did not issue certificates.

continuance in business.[6] The raw data on dealers' daily-average net positions show a substantial rise from the 1950's to the 1960's in all maturity categories with the exception of coupon issues maturing within 1 year, where trading and debt were also lower, explaining the drop in positions. In intermediate-term issues—those maturing in 1 to 5 years—however, these data may be misleading, and it is possible that such positions were steady or even declined somewhat from the 1950's to the 1960's. Where positions increased, the rise is explained largely by the greater volume of gross new Treasury bill issues and in some cases by new coupon issues, the sharply increased day-to-day stability in security prices (and yields), the increased volume of transactions in coupon issues by official accounts, and the change in the reporting basis and number of reporting dealers in mid-1960.

6. Transactions by official accounts had a significant influence on dealers' positions in the 1960's, whereas in general no such relationship was found in the 1950's. In Treasury bills dealers accommodated large net purchases by official accounts, in part, by drawing down their positions. The institution of any substantial volume of official operations in coupon issues in late 1960 and early 1961—generally on the buy side of the market—allegedly increased uncertainty and engendered expectations of a one-way (upward) movement in prices. This study found that for issues due in 5 to 10 and after 10 years dealers did increase their gross (and net) long positions in response to official purchases. But in no sector of the coupon market was there any evidence that dealers reduced their gross short positions as a result of System purchases, though in several cases declines in gross short positions were associated with Treasury purchases.

7. Dealers' response to the greater day-to-day stability in security prices (and yields) during the 1960's was to increase net long positions rather than to withdraw from the market. This rise in positions probably reflected the lessened risk of capital losses as well as an attempt to increase the volume of trading (and hopefully trading profits) in a period when speculative profits were limited.

8. Dealers' position policy was generally destabilizing insofar as interest rates were concerned, but such policy aided in the attainment of monetary policy targets over quarterly periods, during both the 1950's and 1960's. In this connection dealers drew down their positions in response to past increases in interest rates, thus adding further to upward rate pressures. They also decreased their positions in response to current increases in the discount rate and in net borrowed reserves.

9. Daily price changes were far smaller in the 1960's, especially from mid-1962 through mid-1965, than in the 1950's, illustrating the increased stability in securities markets.

10. The published data on spreads between bid and asked prices (or yields) corroborate statements by dealers that spreads on Treasury bills declined from the 1950's to the 1960's. For coupon issues the data show that there was no change in spreads on issues maturing within 5 years, that spreads on 5- to 10-year issues fluctuated around the same levels in the 1960's as in the 1950's, and that there was a generally greater spread on after-10-year maturities, though the spread on these issues had been at the higher level since 1957. These data must be interpreted cautiously, however, for they overstate the size of the spread at which large trades take place and they may also give an inaccurate picture of movements in the spreads over time. □

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[6] For an analysis of the dealer profit picture see William G. Colby, Jr., "Dealer Profits and Capital Availability in the U.S. Government Securities Industry, 1955–65," Part 3 of this series.

III. TRADING AND RELATED INDICATORS

This section assesses the performance of the Government securities market in terms of trading and a number of related indicators. First, the basic data on the volume and volatility of trading in the 1950's and 1960's are examined. Then the conclusions drawn from these data are scrutinized for statistical and economic problems and further refined with regression analysis. Finally, as an additional check on the accuracy of conclusions based on the average daily volume of trading, two related indicators of performance—the annual rate of turnover of the marketable U.S. debt and the 16th lowest daily volume of trading—are studied in less detail.

COMPARISON OF AVERAGE LEVEL AND VOLATILITY OF TRADING

The average daily volume of trading is, of course, the outstanding operational characteristic of any securities market. As a first approximation a large and growing trading volume is a desirable feature for it implies that customers are able to carry out necessary transactions. In addition, it approximates "breadth," since orders from a wide group of investors would probably involve a large volume of actual transactions. Secondly, an ideal market should not be characterized by sharp quarterly variations from the average level of trading, because such fluctuations would imply that the markets were sometimes thin. On both of these counts market performance improved from the 1950's to the 1960's, except in coupon issues maturing within 1 year (Charts 1–5 and Tables 1 and 2).

Daily-average trading in all maturities except for coupon securities maturing within 1 year fluctuated around higher average levels in the 1960's than in the 1950's, as Table 1 shows. Trading in bonds maturing after 10 years averaged $32 million a day from the second quarter of 1953 through the first quarter of 1960 compared with an average of $40 million a day from the third quarter of 1960

through the fourth quarter of 1965. For securities maturing in 5 to 10 years the average daily volume rose from $67 million to $104 million, while for 1- to 5-year maturities it moved from $158 million to $227 million. In Treasury bills the secular increase in trading was especially pronounced, with trading in the 1960's averaging about $1.2 billion a day, almost twice as much as in the 1950's. Only in other securities maturing within 1 year was daily-average trading usually lower in the 1960's than in the 1950's: in this class the average level dropped to $126 million from $195 million.

TABLE 1: U.S. GOVERNMENT SECURITIES: INDICATORS OF TRADING IN THE 1950's AND 1960's, BY MATURITY CLASS

Indicator and period	Treas- ury bills[1]	Coupon issues maturing (in years)—			
		Within 1	1–5	5–10	After 10
Trading volume:					
Daily average:					
In millions of dollars:					
1950's	634	195	158	67	32
1960's	1,196	126	227	104	40
Percentage change	*+89*	*−35*	*+44*	*+55*	*+25*
16th lowest day:					
In millions of dollars:					
1950's	450	125	109	44	19
1960's	973	72	156	67	23
Percentage change	*+116*	*−42*	*+43*	*+52*	*+21*
Turnover of marketable debt:					
Annual rate:					
1950's	6.52	1.66	1.01	.59	.68
1960s'	6.29	1.47	1.14	.95	.52
Percentage change	*−3*	*−11*	*+13*	*+61*	*−23*

[1] In the tables and text of this paper, the term Treasury bills encompasses all maturities—that is, 4- to 12-month issues as well as 3-month bills.

NOTE.—Data for the 1950's are based on average quarterly figures for 1953-II—1960-I; those for the 1960's, on averages for 1960-III—1965-IV.

Table 2, which shows the coefficient of relative variation (that is, the standard deviation of the quarterly data expressed as a percentage of the mean), implies that daily-average trading was less volatile in the 1960's than in the 1950's, again except for coupon issues maturing within 1 year. This measure of volatility declined about the same amount for intermediate- and long-term issues—from 52 to 38 for bonds maturing after 10 years, from 55 to 38 for 5- to 10-year bonds, and from 40 to 22

In per cent

Indicator and period[2]	Treasury bills	Coupon issues maturing (in years)—			
		Within 1	1–5	5–10	After 10
Daily-average trading:					
1950's and 1960's..	36	38	35	52	47
1950's	20	30	40	55	52
1960's	16	35	22	38	38
Annual rate of turnover:					
1950's and 1960's..	10	22	29	45	64
1950's	9	24	36	48	70
1960's	9	18	18	29	39

[1] Equals the standard deviation of quarterly data in Appendix Tables 1 and 2 divided by the mean.
[2] 1950's and 1960's cover 1953-II—1965-IV; 1950's cover 1953-II—1960-I; 1960's cover 1960-III—1965-IV.

for 1- to 5-year maturities. The decline in volatility was much smaller for bills, while volatility increased slightly for short-term coupon issues. Table 2 also shows that the relative variation in trading was far larger in the long-term market (5- to 10- and after-10-year maturities) than in the short- and intermediate-term markets—thus implying that performance in the long-term market was subject to greater cycles of deterioration and improvement than the short-term market.

STATISTICAL PROBLEMS IN BASIC DATA

Whereas the analysis of the basic data on trading indicates a secular improvement in the performance of most sectors of the market in the 1960's and sizable short-run fluctuations in performance within the entire period, these conclusions represent only a first approximation. Both statistical problems and market developments call for further analysis. The primary statistical problem is the change in the series on trading in mid-1960. Unfortunately, the biases thus introduced are in opposite directions, so the net effect on comparisons of trading in the 1950's with that in the 1960's is indeterminable.[7]

Theoretically, the average daily volume of trading includes dealers' gross purchases plus their gross sales, but excludes their allotments,

maturities, and exchanges of Treasury issues as well as securities bought or sold under repurchase agreements. Before mid-1960, however, there were probably many instances in which allotments, exchanges, maturities, and repurchase agreements were included in the trading statistics. Although some errors may exist in later data too, this statistical discrepancy most likely led to overstatement of trading in the 1950's compared with the 1960's.

A second change in the data involves the maturity classification of securities. Before mid-1960 securities were supposed to be classified by first call date; after that they were classified by final maturity. To the extent that these instructions were followed, trading in securities maturing after 10 years was understated in the 1950's and trading in coupon securities maturing within 1 year was overstated. In the two intermediate-term maturity classes, debt outstanding in the 1950's was sometimes larger when classified by first call and sometimes smaller, making it impossible to specify the direction of the statistical bias.

Another problem with the series on trading is that data for one dealer were not available prior to mid-1960, thus causing some understatement of trading in the 1950's. The lack of these data was probably of little importance in the long-term market but of sizable importance in the market for bills and other short-term securities. The number of dealers included in the statistical series was changed at other times too, but the dealers involved did not account for a large segment of the market at the time of the change.

REGRESSION ANALYSIS OF TRADING

The most important problems in analyzing and appraising long- and short-run changes in the daily-average volume of trading are such related economic developments as changes in the volume of Treasury debt outstanding; the volume and timing of Treasury financings; Treasury and Federal Reserve operations in the market; interest-rate levels, and expectations concerning changes in these levels; monetary policy; and swapping for tax purposes.

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[7] 1953-II—1960-I and 1960-III—1965-IV.

1 | **U.S. TREASURY BILLS**
Profile of Market Performance, 1950-66
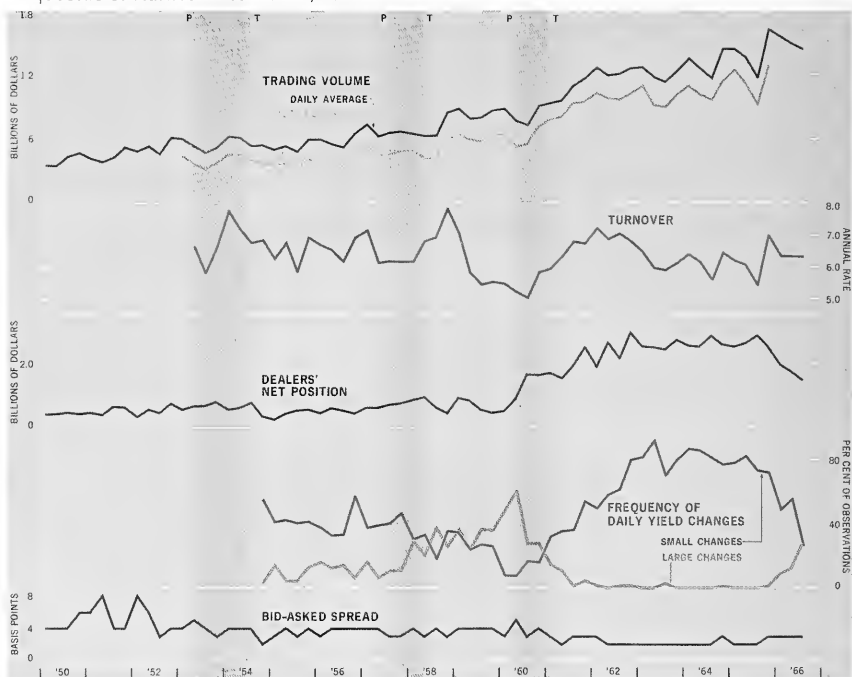
For notes, see p. 106.

Such developments are responsible for much of the fluctuation in trading evident in the charts and the tables. Moreover, they influence a judgment as to the desirability of such changes in trading volume. For example, a somewhat lower volume of trading is not undesirable if the stock in trade (that is, volume of debt) declines or if the monetary authorities are trying to restrain inflation by reducing the liquidity of debt. Similarly, an excessively high volume of trading may imply speculation—a development that could have undesirable after-effects on the market.

The effects of many of these economic developments can be seen in the charts, but in order to measure statistically the impact of such developments on daily-average trading over the quarter, multiple regressions were calculated for the entire period (1953-II—1965-IV) and for the 1950's (1953-II—1960-I) and 1960's (1960-III—1965-IV), separately.[8] The regressions "explained" a relatively high proportion of the variation in daily-average trading, ranging from 96 per cent for bills in the entire period to a low of about 50 per cent for 1- to 5-year issues in the 1960's. Of the 15 regressions, six explained more than 80 per cent of the variation in trading and only three (involving 1- to 5-year issues) explained less than 60 per cent.

[8] For a more detailed description of the regression analysis, see Note to Appendix Table 10, pp. 142 and 143. Regression results are shown in Appendix Table 11.

2 | **U.S. GOVERNMENT SECURITIES (OTHER THAN BILLS) MATURING IN 1 YEAR OR LESS**
Profile of Market Performance, 1950-66
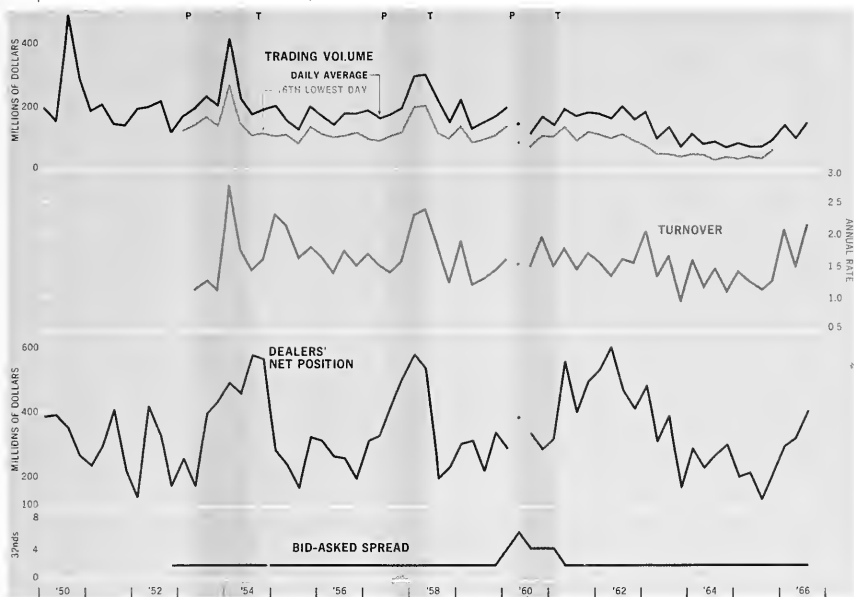
For notes, see p. 106.

In three of the five equations for the entire period, there appears to be serial correlation of the residuals—which means, among other things, that the usual tests for significance are invalid. This problem was almost entirely eliminated in the subperiods, however, where only one of the 10 regressions showed serial correlation. By running separate regressions for the subperiods, the problem caused by the change in the series on trading also was overcome because the data are consistent within each period.

A remaining problem is that several of the explanatory variables—especially those measuring monetary policy and interest-rate expectations—are related to each other (multicollinearity). Therefore, it is not possible to assess with accuracy the impact of each of the variables on trading. Nevertheless, the results do confirm the importance of several groups of economic variables.

U.S. debt outstanding. The supply of securities available for trading should be one determinant of trading. Marketable U.S. Government debt held outside the Federal Reserve and the Treasury was used as the measure of the volume of securities in each maturity class except bills, where the total amount of bills outstanding was selected. This distinction reflects the fact that the Federal Reserve and the Treasury often sold bills but seldom sold coupon issues. Dealer positions might also be considered a measure of the volume of securities available for trading; and there was a relatively high correlation between trading and positions. The causation, however, runs in both directions, since heavy trading encourages—and indeed requires—that dealers hold higher positions. Using dealer positions on the previous day as a measure of the supply for trading on the next day might solve the problem for daily regressions, but with quarterly data the lag is

3 U.S. GOVERNMENT SECURITIES MATURING IN 1-5 YEARS
Profile of Market Performance, 1950-66
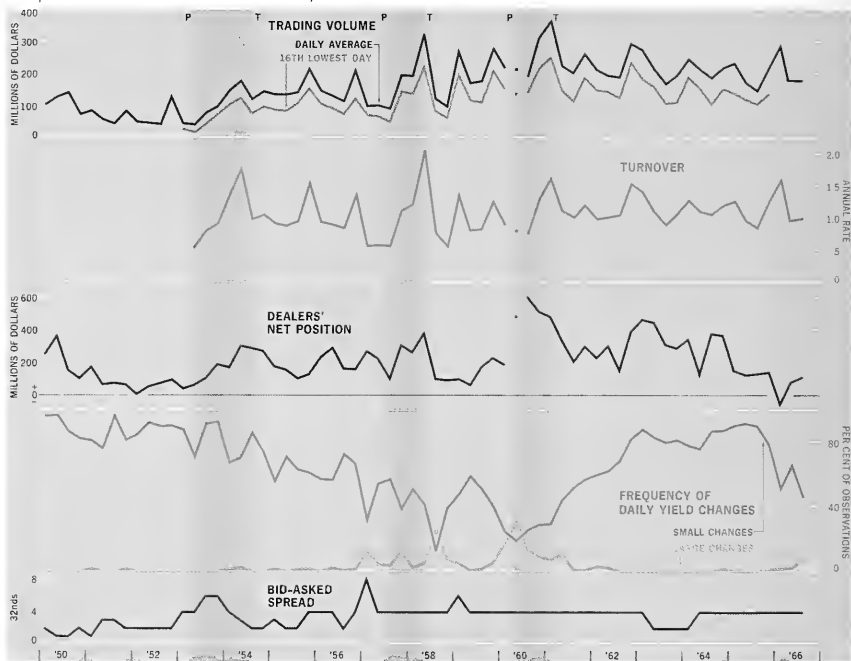
For notes, see p. 106.

too long to be reasonable. Thus, dealer positions were not included in the regressions.

As expected, the volume of debt outstanding was found to be one of the most important determinants of the daily-average volume of trading in all maturity classes except bonds maturing after 10 years. Debt outstanding was more important in explaining the variation in trading over the entire period than in subperiods, partly because changes in the composition of the debt were larger then. A large change in debt was necessary in order to effect even a small increase in trading. For the entire period, a $1 billion increase in debt outstanding resulted in an increase of only about $20 million in trading in bills and from $3 million to $4 million in the other maturity classes where it was significant. When debt out-

standing was significant, the impact on trading was usually larger in the 1960's than in the 1950's or in the two periods combined.

A number of major movements in trading visible in the charts can be explained in part by changes in debt outstanding. These include the sharply higher volume of trading in Treasury bills in the 1960's, the decline after 1962 in trading in coupon securities maturing within 1 year, and the activity in 5- to 10-year bonds in 1962–64.

Trading by official accounts. According to some market participants, trading by the Federal Reserve System and the Treasury, particularly in longer maturities, tends to depress activity by other customers, in part because potential buyers believe that price levels are artificially high and so they are hesitant to

4 | **U.S. GOVERNMENT SECURITIES MATURING IN 5-10 YEARS**
Profile of Market Performance, 1950-66
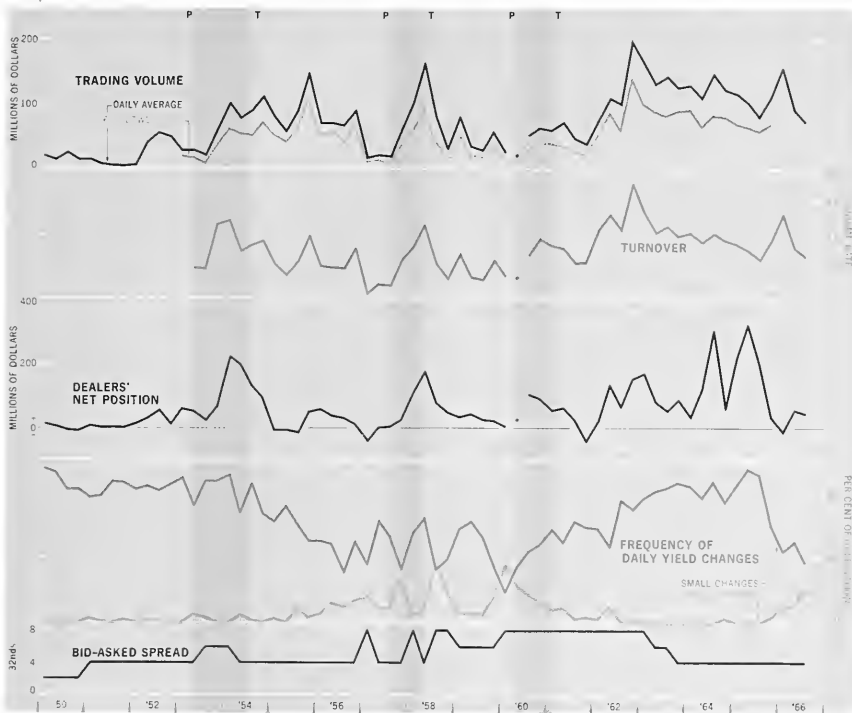
For notes, see p. 106.

buy. In addition, it is sometimes argued that sellers also delay sales in anticipation of higher prices. On the other hand, dealers say that if the official accounts are buying, sellers sometimes seize the opportunity to get out of a position they would otherwise continue to hold. There is also some feeling that Treasury purchases of securities during financings improves the atmosphere and so may lead to greater activity.[9]

This study revealed no negative impact of official purchases on trading; on the contrary it found some evidence that official transactions led to increases in trading. Trading by the Federal Reserve and the Treasury (considered together) had a positive impact on daily-average trading in bills and on trading in the two longest maturity classes for the entire period under discussion.

[9] The survey of institutional investors (see Joseph Scherer, "Institutional Investors in the Government Securities Market," Part 1 of this series) provided somewhat contradictory responses on this point. Respondents accounting for 31 per cent of total market activity reported in the survey indicated that

their ability to conduct transactions decreased because of official operations. Activity of the other respondents was not affected, or it increased. Unfortunately, no distinction was made between the impact of official operations during Treasury financings and at other times, and no dollar magnitudes for changes were requested.

5 | **U.S. GOVERNMENT SECURITIES MATURING AFTER 10 YEARS**
Profile of Market Performance, 1950-66
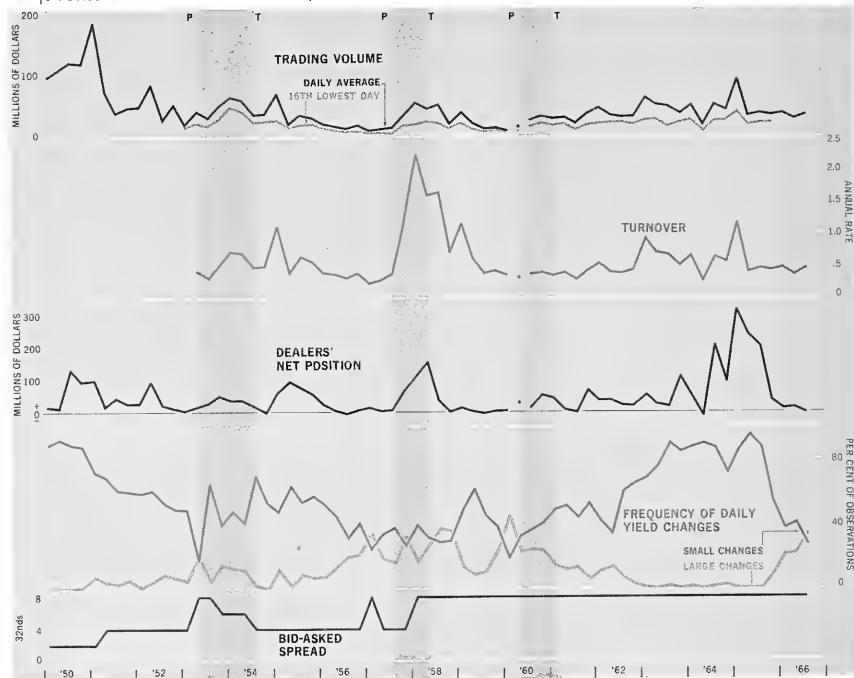
NOTES TO CHARTS 1–5

● Indicates change in series.

Data are quarterly.　　P = peak; T = trough.

Trading volume: Transactions include dealer purchases and dealer sales, but exclude allotments of new issues, exchanges, maturities, and repurchase agreements. Until mid-May 1960 securities were to be classified by first call date, thereafter by final maturity. Averages are based on the number of trading days in the quarter. Source: 1950 through mid-May 1960, Securities Department, Federal Reserve Bank of New York; mid-May 1960 on, Market Statistics Division, Federal Reserve Bank of New York.

Turnover: For coupon issues the annual rate equals daily-average gross dealer transactions multiplied by 249 divided by marketable debt held by the public. Until mid-May 1960 securities are classified by first call, thereafter by final maturity. For Treasury bills the divisor is bills outstanding.

Dealers' net position: Data are on a commitment basis and include securities sold by dealers under repurchase agreement since mid-May 1960. From 1950 through the fourth quarter of 1960, however, some dealers may have reported differently. Securities were to be classified by first call prior to mid-May 1960 and by final maturity thereafter. Averages are based on the number of trading days in the quarter. Source: 1950 through mid-May 1960, Securities Department, Federal Reserve Bank

of New York; mid-May 1960 on, Market Statistics Division, Federal Reserve Bank of New York.

Frequency of daily yield changes: The 3-month bill and usually two issues in each of the other maturity classes were used in the calculations. Source: daily quotation sheets prepared by the Securities Department, Federal Reserve Bank of New York, and later by the Market Statistics Division, Federal Reserve Bank of New York. The sizes of changes are as follows:

	Large (minimum change)	Small (maximum change)
Chart 1	5 basis points	1 basis point
Chart 3	6/32 point	1/32 point
Charts 4 and 5	8/32 point	2/32 point

Bid-asked spread: The quarterly series were derived from observations on the 15th of each month (for Chart 2 on the Wednesday closest to the 15th). The typical spread is the one that existed on the 15th of two out of the three months; or if the spreads were different, the middle spread. Source: 1950 through February 1953, U.S. Treasury, *Prices and Yields of Public Marketable Securities Issued by the U.S. Government and Federal Agencies;* beginning with March 1953, Board of Governors of the Federal Reserve System, daily quotation sheets.

Moreover, this effect was still significant (at the 5 per cent level) when total trading was adjusted to exclude trading by official accounts. In bills an increase of $1 million in official transactions resulted in an increase of slightly more than $2 million in daily-average trading (excluding official accounts); in 5- to 10-year issues the corresponding increase was almost $4 million; and for after-10-year issues almost $2 million. In all these equations, however, positive serial correlation exists, so there is some doubt about the significance of the results.

Separate examination of the 1950's and 1960's showed less evidence of this positive association between official transactions and daily-average trading (excluding official transactions). Significant positive relationships (when other significant variables were held constant) existed for bills in the 1950's; also for securities maturing in 5 to 10 and after 10 years in the 1950's but not in the 1960's. The correlation for longer-term issues in the 1950's reflects substantial official purchases in periods of market crises, such as in 1958, and is probably somewhat unreliable because official operations did not occur often. In the case of bills, a significant positive correlation existed before other variables were added in the 1960's; but for 5- to 10-year and after-10-year maturities the positive relationship was just below the required significance level in both the simple and multiple correlations in the 1960's.

On the possibility that official activity stimulated trading among dealers, thus hiding a *lower* level of activity by investors, similar regressions were run for the 1960's for private trading (excluding trading by official accounts, brokers, and dealers).[10] No significant relationships between official activity and private trading were found in these multiple regressions, but there was a significant positive simple correlation coefficient for bonds maturing after 10 years.

Since Treasury purchases of coupon issues were usually concentrated around financings

and might be expected to have a more stimulative effect than Federal Reserve purchases that occurred at other times, regressions were also calculated with the trading activity of the Treasury and of the Federal Reserve treated as separate variables. These regressions showed that the positive impact of official transactions in coupon issues on other trading was a result of Treasury operations. Coefficients for Federal Reserve operations were not significant. In the multiple regressions to explain trading (excluding that for official accounts) significant positive coefficients were found for Treasury operations in 5- to 10- and after-10-year issues in the entire period and in the 1950's. These coefficients were about the same size as those for Federal Reserve and Treasury operations taken together. In these multiple regressions Treasury operations also had a significant positive influence in the 1960's on private trading (excluding that of brokers and dealers and official accounts) in bonds maturing after 10 years; for such issues an increase of $1 million in Treasury operations led to an increase of $1.2 million in private trading.[11]

It is possible that further refinement of the data, such as separating purchases from sales and using periods shorter than a quarter, would have revealed a negative impact of official transactions on trading. But no such negative relationship appeared in an earlier analysis of daily data on both sales and purchases of private customers during Treasury rights financings from March 1961 through July 1964 and on days without financings during a period of relatively heavy official activity—August 22, 1962, through December 31, 1963. The earlier study found that private customers were encouraged to increase their purchases and their sales of 5- to 10- and after-10-year issues by

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[10] No such data are available for the 1950's.

[11] The equation was

Trading =
$$-\ 26.3\ +\ 1.21\ x_2\ +\ 6.54\ x_5\ -\ 6.60\ x_7\ +\ 2.09\ x_{10}$$
$$(.54)(1.65)(1.96)(1.13)$$

The adjusted R^2 was .638; the D-W ratio was 1.405. The numbers in parentheses are standard errors of the regression coefficients. x_2 is Treasury operations, and the other variables are listed in Appendix Table 10.

official operations during rights financings. On days without financings official buying of those maturities was associated with higher sales by private customers but no change in purchases.[12] The stimulation of sales by private customers supports the dealers' contention that official buying leads to dumping by other investors. Another, but less probable, explanation is that official accounts buy securities when they are available—availability presumably being increased by large sales to dealers by private customers. The higher volume of private purchases during financings when official accounts were active suggests that some buyers at least were encouraged, probably by the improved market tone.[13]

Treasury financings. Treasury financings in coupon issues lead to heavy trading by dealers and customers in both rights and new issues, and they also promote swapping in outstanding issues for a number of days during and after each financing. Even for periods as long as a quarter such heavy trading should cause higher daily-average trading—an expectation that was confirmed by the regressions. While new issues of Treasury bills also stimulate trading, no significant relationship was uncovered, possibly because of the use of the net change in bills outstanding instead of a series on gross issues.

Trading in coupon issues due within 1 year was stimulated by the volume of rights (in this maturity class) held by the public—an increase of $1 billion in rights being associated with a rise of $4 million in daily-average trading for the entire period. Although the volume of rights had an important influence on trading in both the 1950's and 1960's, the magnitude of the response was far larger in the 1950's. An increase of $1 billion in rights led to an $11 million rise in trading in the 1950's as against only $2 million in the 1960's. This lower coefficient for the 1960's may have resulted from the introduction of pre-refundings. Lack of knowledge or the option of continuing to hold the rights may have led to lower trading in rights relative to the amount held by the public in pre-refundings.

Trading in 1- to 5-year issues responded to the volume of new issues sold to the public in the 1950's and to the volume of rights in this maturity class held by the public in the 1960's. The importance of rights in the 1960's obviously reflects the introduction of advance refundings. Neither variable was significant for the period as a whole—in the case of new issues partly because of intercorrelation with debt outstanding.

In longer-maturity classes an increase of $1 billion in the volume of new issues sold to the public led to an increase in daily-average trading of roughly $4 million to $6 million for 5- to 10-year maturities and $12 million to $15 million for after-10-year maturities. When this financing occurred in the last month of the quarter, the positive impact on that quarter was more than wiped out for bonds maturing after 10 years, perhaps because some of the heavy trading that normally occurs after a financing was pushed into the next quarter while the lull in trading that usually precedes a financing fell in the current quarter. For 5- to 10-year bonds the volume of new issues was significant in the 1950's but not quite significant in the 1960's; for long-term bonds it was significant in both periods, although the timing variable showed up only in the 1960's.

In view of the relatively small size of the

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[12] Although the relationships between private trading were significant, they explained only a very small part of the variation in daily trading. In addition the number of days with large official operations was small.

[13] One byproduct of this study is a possible way to measure the market's resiliency. In a resilient market purchases by private customers would presumably increase in response to a precipitous drop in prices while market sales by private customers would rise following an unusually sharp rise in prices.

This study tested the relationship of daily private purchases and private sales to the average change in prices on the previous day (for 1- to 5-, 5- to 10-, and after-10-year Government securities) for days without financings in the period Aug. 22, 1962–Dec. 31, 1963. The desired positive relationship between sales by private customers and price changes did show up in all maturity classes, but there was no significant relationship between private buying and price changes. Although the task of updating the daily figures would be time-consuming, it might be useful to study the relationship of daily private purchases and private sales and price changes on the previous day (possibly testing other lags, too) in a period when price changes were larger, as for example, September 1965–August 1966.

sample, advance refundings were not considered separately from other financings, so the differential effect (if any) of the size of various types of financing on secondary market activity could not be assessed. Nevertheless, because the size of financings in general was positively associated with the level of daily-average trading and since a much smaller volume of long-term bonds would probably have been sold in the 1960's without advance refundings, the advance refundings may well have promoted activity in the Government securities market.

Monetary policy and interest-rate expectations. The charts for most maturity classes show that there has been a definite cyclical pattern in daily-average trading—with trading rising in recessions and declining, less uniformly, late in expansions. This showed up in the regressions in the form of a significant relationship between trading in all maturity classes and at least one of a group of variables representing the stance of monetary policy and expectations about interest rates and security prices (free reserves, the level of rates, the change in rates in the current quarter, and the change in rates in the previous quarter). Because of the multicollinearity among these variables, however, not much importance can be attached to the particular ones that were significant in any equation.

In general, daily-average trading was lower in a climate of tight money—in other words, when free reserves were low and interest rates high. Such a reaction might be anticipated if good business and tight money were expected to continue, because the outlook for Government bond prices would be poor and other bonds would often be more attractive on a rate basis while stocks would offer the possibility of participating in the business boom. In addition, potential buyers might delay because they hoped prices would move still lower while sellers might be locked in by their unwillingness to take established losses, even though still greater losses were possible. Moreover, the dealers' unwillingness to position securities at such times would slow down execution of orders that did appear.

In the 1950's, a change in rates in the previous quarter frequently had a negative impact

on trading in coupon issues, possibly because a faster rise in rates also led buyers to expect further increases and so discouraged purchases. The change in rates was not important in the 1960's, but interest rates were far more stable in the latter period.[14]

A certain degree of such cyclical deterioration and improvement in this aspect of market performance, and hence in the liquidity of Government securities, probably is consistent with a countercyclical monetary policy. In inflationary periods the difficulty of finding buyers may slow down sales of Government securities by banks or other lenders and thus reduce the rate of growth in loans. In recessions, on the other hand, any contribution that greater ease in selling securities can make toward financing business recovery would be welcome. Of course, both excessive speculative activity in recessions or practically complete disappearance of activity at any price in booms could lead to disorderly markets and to financial crises.

Swapping for tax purposes. According to many dealers a lower volume of tax swapping by commercial banks caused some deterioration in the market in the 1960's. Tax swapping refers to the sale of a security at a loss and the simultaneous purchase of a similar security at about the same price. This may increase banks' after-tax profits over time, because capital losses may be deducted from taxable income while capital gains are taxed at the 25 per cent capital gains rate. For example, in the year when the swap takes place, taxes paid will be reduced by roughly 50 per cent of the loss. Taxes to be paid when the newly purchased bond matures—at which time a gain (difference between purchase price and maturity value) is recorded—will be larger, but only by roughly 25 per cent of the loss on the original purchase. So the tax swap will have increased after-tax profits by approximately 25 per cent of the loss. Unfortunately, no fully satisfactory proxy for tax swapping was available, but a dummy variable for the fourth quar-

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[14] It should be noted again that the discussion is based on regressions that did not cover 1966 but ended with the fourth quarter of 1965.

ter of the year, a time when banks frequently concentrate transactions for tax purposes, was included in the regressions. One reason why tax swapping may be heavier in the fourth quarter of the year is that banks may not know until then whether the year is suitable for a loss year.

In the 1- to 5- and 5- to 10-year maturity classes daily-average trading did show a significant rise in the fourth quarter—amounting to about $31 million for 1- to 5-year issues and $24 million for 5- to 10-year bonds for the 1950's and 1960's taken together. Moreover, both the size of this seasonal increase and its significance were greater in the 1950's than in the 1960's, thus tending to support the argument that tax swapping was smaller in the 1960's when prices of securities were unusually stable.

Number of dealers. Over the years covered by this study the number of dealers included in the statistics has changed several times. Normally, a change in the number of dealers should not cause a change in customer activity, although total activity would be redistributed among the dealers. In cases where the dealer added had previously been trading, however, the more complete coverage of the market would imply greater activity. In addition, with more dealers, interdealer activity, and hence total activity, might well expand. To test this last hypothesis, a series on the number of reporting dealers was included in the regressions, but the results were inconsistent. In longer-maturity classes a significant positive relationship did appear, but it is possible that this variable was acting as a measure of trend and did not have significance for the hypothesis being tested.

ANNUAL RATE OF TURNOVER OF U.S. GOVERNMENT MARKETABLE DEBT

The preceding discussion has established that changes in the available volume of securities or debt outstanding affected market activity. In order to help visualize the changes in activity or performance after *rough* allowance for this important environmental change, a series on the annual rate of turnover of the marketable

U.S. Government debt was developed for each maturity class. This series is defined as daily-average trading multiplied by 249 (the number of trading days in most years) and then divided by the average debt held by the public (for bills, total debt outstanding). Except for bills, Treasury and Federal Reserve holdings are excluded from debt because these accounts seldom sold such securities in this period and hence their holdings could not be considered as a part of the available market supply. As indicated earlier, maturity classifications of the debt are based on first call date until the middle of the second quarter of 1960, and thereafter are based on final maturity, in order to correspond to reporting instructions on the trading data.

A rise in this indicator, like a rise in daily-average trading, implies improved market performance. Such an interpretation, however, assumes that trading should change in the same proportion as debt outstanding in order for market performance to remain unchanged—an assumption that is not necessarily justified. In addition, the statistical problems caused by the change in the definition of maturity classes (from first call to final maturity) may be magnified in this indicator, especially for bonds maturing after 10 years and for coupon securities maturing within 1 year.[15] Therefore, the rate of turnover of the debt should be regarded only as a supplement to daily-average trading, not as a superior indicator of performance. Moreover, as was the case with daily-average trading, the rate of turnover of debt would be expected to show considerable change in either direction because of economic developments, and such short-run or cyclical movements are not necessarily undesirable.

[15] For bonds maturing after 10 years, debt outstanding—the divisor for the rate of turnover in the 1950's—was far smaller (less than half as large) than if a final maturity definition had been used. In addition, the dealer data on trading were sometimes mistakenly classified by final maturity in the 1950's. Thus, the rate of turnover of long-term debt in the 1950's was overstated. Similarly, the rate of turnover for coupon securities maturing within 1 year was understated in the 1950's. The problem is minor in intermediate-term maturity classes because average debt outstanding was about the same on both bases.

These series on the rate of turnover of the debt are shown in the charts (pages 102–06) and in Appendix Table 2. As Table 1 (page 100) illustrates, the turnover rate for intermediate-term securities in the 1960's fluctuated about an average level that was higher than in the 1950's. In bills the average level was very slightly lower in the 1960's—the strong upward trend evident in daily-average trading in bills was completely eliminated. In coupon securities maturing within 1 year and bonds maturing after 10 years, short-run movements were around a definitely lower level in the 1960's. For long-term securities the decline may have been caused by the overstatement of the turnover rate in the 1950's, which probably resulted from the statistical problems in the definition of debt maturing after 10 years. In all maturity classes short-run movements were more marked than any trend, and they were also more evident than in volume of trading.

The volatility in the annual rate of turnover of the marketable debt, as well as in the daily-average volume of trading, was generally greater in the 1950's than in the 1960's for all maturity classes, as shown in Table 2, which presents the coefficient of relative variation (that is, the standard deviation of quarterly data expressed as a percentage of the mean). While this might be considered a sign of improved market performance in the 1960's, it was a result of underlying economic conditions that have been shown to explain variations in trading, and it might easily be reversed if more phases of the business cycle appear in the remaining years of the 1960's. Table 2 also shows that the relative variation in turnover, as in trading, was larger in 5- to 10- and after-10-year bonds than in shorter maturities, thus implying that the long-term market was subject to periods of greater deterioration and improvement than the short-term market.

Multiple regression analysis was also used to relate the movement in this indicator to other economic developments. Much smaller portions of such movements (usually about 30 to 60 per cent) were explained than for daily-average trading, in part because debt outstanding was incorporated into the indicator itself. Indeed,

in the 1960's no significant correlation was found for 5- to 10-year issues.

Much the same sets of variables were important in explaining the rate of turnover as were significant in explaining the daily-average volume of trading. The volume of new issues sold to the public again caused higher turnover in intermediate- and long-term issues, except sometimes when the financing occurred at the end of the quarter; and the volume of rights held by the public led to higher turnover in coupon issues maturing within 1 year and in 1- to 5-year issues in the 1960's. Open market operations of official accounts exerted a positive influence on bills and on 5- to 10-year bonds for the entire period and for the 1950's; and for this indicator the positive relationship also held in the 1960's for bills and bonds maturing after 10 years. Variables for monetary policy, interest-rate expectations, and tax swapping also had an impact on the turnover rate that was similar to that on daily-average trading.

16TH LOWEST DAILY VOLUME OF TRADING

The average daily volume of trading, as well as the annual rate of turnover, may conceal discontinuities in daily trading, especially when the average is expanded by heavy trading for a few days during a Treasury financing. Some market participants have claimed that advance refundings in the 1960's have had just this result in the intermediate- and long-term markets. They contend that although *average* trading has been maintained or has increased, trading on days between financings has at times dried up almost completely. To appraise this criticism, special attention was given to days when trading was lowest; and as a market indicator, series were constructed to show the 16th lowest daily volume of trading in each quarter.[16] Daily trading would be below this level approximately 25 per cent of the time, since there are roughly 63 or 64 trading days in a quarter. Moreover, this indicator would be influenced by days of light trading and, in contrast to the average, would *not* be influenced by days when trading

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[16] See Appendix Table 3 and Charts 1–5.

was heavy, unless, of course, trading was almost always heavy. A decline in this indicator in the 1960's would imply greater discontinuities in daily trading and thus a deterioration in market performance, even if the *average* daily volume of trading increased.

The charts, however, show that this indicator rose and fell with the average daily volume of trading in all maturity classes. In no maturity class was trading on the 16th lowest day down in the 1960's when average daily trading was up (Table 1).

In longer maturities, however, the percentage increase was slightly smaller than in average daily trading. Average daily trading in bonds maturing after 10 years rose 25 per cent from the 1950's to the 1960's, while trading on the 16th lowest day rose 21 per cent. In the 5- to 10-year class the increases were 55 per cent and 52 per cent, respectively. It seems likely that this slightly smaller improvement in trading on the 16th lowest day than in daily-average trading was at least partly a result of advance refundings since trading was concentrated during refundings and drawn away from other days. This is indicated in the charts by the failure of trading on the 16th lowest day to rise proportionately with average daily trading at most peaks, as it would have if the higher average level had been evenly distributed throughout the quarter. Further consideration reveals that frequently those peaks in trading were caused at least partly by Treasury financings.

For bonds maturing after 10 years, the only peaks in daily-average trading where trading on the 16th lowest day rose as much as (actually relatively more than) the average were those in the 1953–54 and 1960–61 recessions, when there were no Treasury financings in this maturity class. At other peaks in daily-average trading—all of them associated with Treasury

financings—the percentage rise in the daily average was greater than that in trading on the 16th lowest day. These impressions were confirmed by simple correlation coefficients between new issues sold to the public in Treasury financings and the ratio of trading on the 16th lowest day to daily-average trading of 0.666 in the 1950's and 0.561 in the 1960's.[17]

In the 5- to 10-year maturity class the impact of financings on the relationship between daily-average trading and trading on the 16th lowest day is less obvious because there were more financings; and peaks in trading volume cannot be attributed so clearly to financings. Nevertheless, the ratio of trading on the 16th lowest day to daily-average trading for 5- to 10-year bonds was low or falling from mid-1962 through 1963, in the third quarter of 1964, and in early 1958—all of which were periods of high trading and a large volume of Treasury financing.

To the extent that more long-term financings were accomplished in the 1960's because of the advance refunding technique than in the 1950's or than would otherwise have been possible, advance refundings can be said to have caused a larger difference between average daily trading and trading on the 16th lowest day. But as noted earlier, this wider spread occurred at a time when both daily-average trading and trading on the 16th lowest day were increasing sharply. Thus the rise in daily-average trading, caused in part by financings, did not mask a disappearance of markets between financings; and although trading declined between financings in the 1960's, even this level of trading between financings was substantially larger than in the 1950's. □

[17] Incidentally, in the 1960's there was a correlation of −.412 between official transactions and this ratio, implying that official transactions also led to a wider spread between trading on peak days and trading on low days.

IV. DEALERS' POSITIONS

A primary characteristic of the U.S. Government securities market is the existence of dealers who take positions in securities in the process of accommodating buy and sell orders of investors; that is, in the process of making markets. While position-taking is not a necessary condition for the existence of a market—the only requisite is to bring buyers and sellers together—it is clear that the quality of a market for securities is improved by functioning dealers. For the private investor it means a more liquid and a more marketable asset, one that can be bought (or sold) with little, if any, delay and that can be traded in large amounts with little price concession. Moreover, the sizable operations of the U.S. Treasury and the Federal Reserve System might be precluded if there were no dealers to underwrite Treasury financings and System sales, as well as to enable System purchases.

Any deterioration in the willingness of dealers to operate should thus be viewed as a deterioration in the state of the market for U.S. Government securities. While the most direct way of studying this aspect of market performance would be through an analysis of the size of the "buy" and "sell" commitments that dealers make, together with the prices at which those commitments are made, and of the lag between dealer commitments and investor buy (or sell) orders, the data necessary for such an analysis do not exist. However, data on dealers' positions do exist, and the willingness of dealers to make commitments is closely related to their positions. A large gross long position (the outright purchase and ownership of securities) indicates a willingness to buy, while a large gross short position (securities borrowed in order to make a sale) indicates a willingness to sell.

Net positions are the difference between gross long and gross short positions, and their size reflects primarily the extent to which dealers hedge gross long positions by selling short. If in fact the volume of securities sold short exceeds the amount owned outright, net positions will be negative. If there is a decline in net positions, this does not necessarily imply that the dealer is less willing to make buy and sell commitments. Such a decline, for example, may result from increases in both gross long and gross short positions, but with gross short positions rising by a larger absolute amount. As a practical matter, however, fluctuations in net positions are often parallel to those in gross long positions; this is because gross long positions, and changes in them, are usually much larger than corresponding figures for gross short positions.

A glance at movements in dealers' daily-average net positions since the early 1950's, as presented in the charts and in Appendix Table 4, underlines two main characteristics of such positions: short-run volatility, and a higher average level in the 1960's as compared with the 1950's. In all market sectors, except for coupon issues due within 1 year, net positions rose quite sharply from the 1950's to the 1960's. As shown in Table 3, in the 1960's dealers held daily net positions averaging $268 million in 1- to 5-year issues, one-third higher than in the 1950's; $98 million in 5- to 10-year issues, more than three-fourths higher than in the 1950's; and $67 million in after-10-year issues, more than double their levels in the 1950's. In Treasury bills, dealers' daily net positions averaged $2.3 billion in the 1960's compared with only $0.6 billion in the 1950's.

TABLE 3: DAILY NET POSITIONS IN U.S. GOVERNMENT SECURITIES, BY MATURITY

Maturity	Average level (in millions of dollars)		Percentage change in level
	1950's	1960's	
Treasury bills	603	2,308	+283
Coupon issues maturing (in years):			
Within 1	343	341	—1
1–5	201	268	+33
5–10	55	98	+78
After 10	31	67	+116

NOTE.—Based on averages of quarterly data for the periods 1954-I—1960-I and 1960-IV—1966-III, shown in Appendix Table 4.

In practical terms, data on gross positions were not available for the 1950's. During the 1960's, dealers' gross positions have fluctuated

sharply, as shown in Appendix Table 5 and in Chart 6. By 1966 gross short positions were, in all maturity areas, at higher levels than in late 1960, while gross long positions were higher in some maturity areas and lower in others.

Apart from the obvious notation that dealers do indeed carry positions of some size, no conclusions about shifts in dealers' willingness to take positions may be drawn from such a simple inspection of the data. The sharp rise in net positions from the 1950's to the 1960's does not in and of itself indicate improved performance; nor does the decline in some gross long positions over the 1960's necessarily indicate a deterioration in dealer performance. In the first place, the data on dealers' positions are not consistent from the 1950's to the 1960's, and this fact accounts for a large part of the rise in bill positions, and possibly for some of the rise in other maturity areas. More will be said later concerning this inconsistency in the data.

But over and above data problems, dealers alter the size of their positions in an attempt to improve their earnings, and these position movements, which may be thus explained, should be viewed not as basic shifts in the performance of the dealer function but as the *sine qua non* for the maintenance of that function. For example, an inability to hedge, and indeed cut, long positions as security prices fall would result in such a severe impairment of earnings that a dealer firm could not remain in business very long. Thus it is crucial, in assessing market performance as indicated by dealer position-taking, to know the reasons behind changes in dealers' positions.

In the remainder of this section a model of the determination of dealers' positions is formulated and estimated for the 1950's and for the 1960's. It attempts to ascertain the degree to which movements in positions can be explained by such factors as (1) Treasury financings; (2) Federal Reserve open market operations; (3) the financial environment, including expected future interest rates and dealer financing costs; and (4) the volume of trading in

6 DEALERS' DAILY - AVERAGE GROSS POSITIONS

TREASURY BILLS

GROSS LONG

NET

3,000

2,000

1,000

0

COUPON ISSUES MATURING - WITHIN 1 YEAR

GROSS LONG

NET

500

0

1 TO 5 YEARS

GROSS LONG

NET

500

±0

5 TO 10 YEARS

GROSS LONG

NET

500

±0

AFTER 10 YEARS

GROSS LONG

NET

500

±0

MILLIONS OF DOLLARS

'60   '62   '64   '66
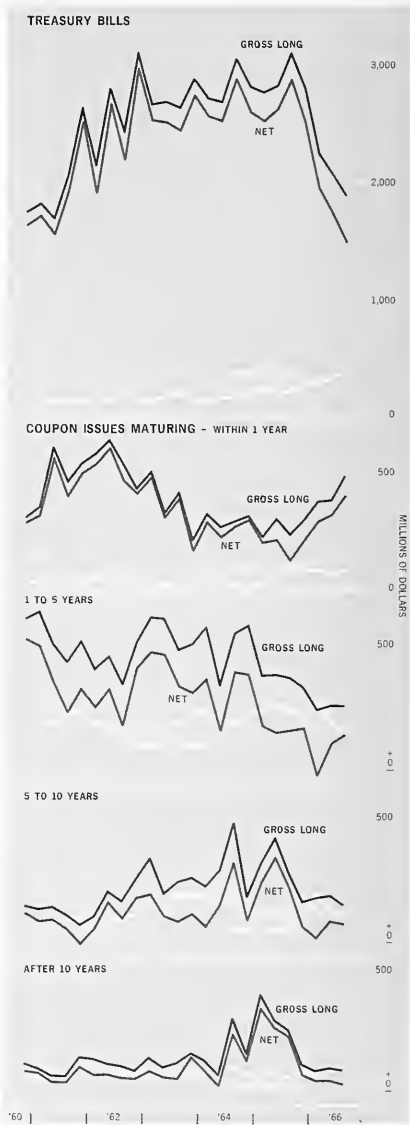
securities. The model, once estimated, can then be used to pinpoint causes of the observed changes in dealers' positions. Also, the model tries to ascertain the impact on dealers' positions of several of the important factors composing the altered environment in the U.S. Government securities market during the 1960's, such as the greater stability of interest rates and Federal Reserve operations in coupon issues.

Utilizing such analyses, the final part of this section attempts to draw some conclusions about dealer performance in the 1960's as compared with the 1950's.

THE MODEL

Underlying the model of the determination of dealers' positions tested here are two primary assertions:

First, it is claimed that, on the average over one quarter of a year, dealers' daily positions are generally in equilibrium; that is, dealers' actual positions are equal to their desired positions. Such an assertion at first glance may seem at odds with the statement that in an efficiently functioning market the dealers will readily absorb investor buy and sell orders, even though such absorption may lead to actual levels of dealers' positions that vary from the desired. These statements may be reconciled, however, by consideration of the process whereby dealer positions that diverge from the desired are brought to an equilibrium level. Given such a divergence, one would expect dealers to react by changing their bid and offered prices, in order to elicit greater net purchases or sales by investors and thus bring actual positions into line with desired positions.[18] This adjustment process might be almost instantaneous, but in any event it would be very rapid relative to a period as long as one quarter of a year.

An added factor that allows dealers to maintain positions basically in equilibrium and still satisfy investor orders rapidly is that the size

of a transaction for a single investor[19] is usually small in relation to the dealer's position, at least for short-term issues. Thus, while it is likely that such transactions will be partially reflected in position levels, so that by the end of any day the actual position of a dealer will vary slightly from the desired, such a variance should be relatively minor. Furthermore, it should partially average out over the quarter. The variance of actual from desired positions should be greater on this account for longer-term bonds, where the size of an individual transaction may be large relative to the dealer's position in that maturity.[20] When all is considered, it is probable that some divergence between actual and desired positions does occur; if so, the model tested here would be unlikely to explain fully the variance in dealers' positions.

Secondly, the model asserts that the desired level of dealers' positions is a function of profitability and of the basic economic factors influencing that profitability. In an extreme case such as one of a sustained period of losses (involving at least several years), dealers might respond by withdrawing completely from the market or by reducing gross positions to minimal levels in an attempt to reduce losses while still remaining in business. In the more normal short-run situation, dealers will vary the size of their gross positions and the relationship between their gross long and gross short posi-

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[18] The new level of security prices, of course, might also alter dealers' desired positions.

[19] The model explicitly includes Treasury and Federal Reserve transactions, which are large enough to affect dealers' positions significantly and which may also alter the level of desired positions.

[20] In both the long- and short-term sectors of the market, seasonal and cyclical forces may cause a wide range of investors to enter the market simultaneously on either the buy or sell side. Dealers' responses to such investor transactions that are occasioned by the business cycle are likely to be reflected in changes in yields and prices of securities rather than in a sustained deviation between desired and actual position because one would expect dealers to move with the market rather than against it. Strong seasonal net purchases or sales by investors are more likely to be reflected in dealers' positions if dealers are aware of the seasonal nature of the transactions. To account for the latter possibility, seasonal dummies were included in the regressions, and in some cases these were significant.

tions—and thus the size of their net positions—in order to augment profits (or reduce losses).

For purposes of analysis, dealers' profits (or losses) may be said to flow from three main sources: (1) speculative operations; (2) trading operations; and (3) "interest carry." Speculative profits (or losses) derive from capital gains and losses on the securities held by dealers as prices of the securities fluctuate. A gross long position will bring profits when prices of securities are rising (yields are declining), and a gross short position will bring profits when such prices are falling. Thus, if security prices are expected to fall in the near term, dealers' net positions should be relatively low (and possibly negative) as gross short positions are increased while gross long positions decline.

The certainty with which expectations are held should also have an impact on positions. Growing uncertainty about the interest-rate outlook might well lead to a decline in gross positions and should certainly bring about increased hedging of gross long positions by gross short positions so that net positions decline.

Profits are also derived from trading. The size of such profits depends on the volume of trading and on the spreads between bid and offered prices, less trading costs. Enhanced profit opportunities resulting from either a greater volume of trading or wider spreads[21] should be associated with larger positions (gross and net), although this is more important as a factor underlying long-run position levels than as a factor in short-run fluctuations in positions. A potentially important factor influencing trading profits is the share of trading accounted for by small odd-lot transactions. Such transactions involve higher unit trading costs, though the higher costs are often offset at least in part by wider spreads. A shift in the share of debt held by commercial banks, which generally involves an opposite shift in the share of debt held by individuals, who presumably account for the bulk of odd-lot transactions, might thus influence profitability and positions.

Interest carry is also an important factor in

the dealer's profit statement. Nonbank dealers finance their positions by borrowing short-term funds—generally from the major New York City banks, from "outside" banks, or from corporations.[22] Meanwhile, the securities they hold in position earn interest. When interest paid on the funds borrowed to finance the position is more than interest earned on the securities held, there is a "negative carry"; when interest earned is greater than interest paid on borrowings, there is a "positive carry." A rising negative carry or a falling positive carry should induce dealers to lighten their portfolios.

A theoretical framework accounting for the determination of dealers' positions would not be complete without allowing for the influence of Treasury financings and of Federal Reserve and Treasury open market operations. Dealers play a major role in underwriting Treasury financings. While it is difficult to conceive of large-scale financings without dealer underwriting, it must be noted that dealers would be unlikely to position newly offered Treasury securities if they could not expect some profits, either speculative or trading, in subsequent market activity. The relationship between financings and dealers' positions is complex,[23] but as a general rule positions (gross and net) are positively related to financings unless the financing is very late in the quarter.

Dealers also accommodate a large volume of market transactions both for the System and for Treasury trust funds. Such purchases and sales may have two distinguishable impacts on dealers' positions. In the first place, because official transactions on *any one day* are often large in relation to total market transactions and to dealers' positions,[24] they may cause dealers' positions to diverge temporarily from the desired level. This is likely to be the case when purchases and sales do not net out over the quarter—that is, when net purchases or

[21] Assuming, of course, that marginal revenue exceeds marginal cost.

[22] See Louise Freeman, "The Financing of Government Securities Dealers," Federal Reserve Bank of New York *Monthly Review*, June 1964.

[23] The precise relationships will be detailed when the empirical results are presented.

[24] Daily-average official transactions over the entire quarter are minute compared with daily-average total market transactions or dealers' positions, even in the bill area.

net sales are considerable. Secondly, official transactions may cause a shift in the level of positions that dealers want to hold because of (1) the impact of such transactions on expectations concerning either prices of securities in the future or the success of a Treasury financing and (2) their possible effect on uncertainty.

The relative importance of these two impacts may vary by maturity area: For bills and short-term coupon issues the first impact should predominate, while for longer-term coupon issues price and uncertainty effects would gain in importance. To complicate matters further, the impact on positions may vary depending on whether the transactor is the Federal Reserve or the Treasury, and on whether the Treasury transaction is in support of a financing. In the specific case of Federal Reserve operations in coupon issues, undertaken in late 1960 and early 1961 and concentrated on the buy side of the market, such purchases would be expected to induce dealers to hold larger gross long and net positions but smaller gross short positions, if indeed they have any noticeable impact.

DATA AND EMPIRICAL RESULTS

A model of dealer behavior was estimated by the simple least-squares technique, with quarterly data, for the three time periods: 1954-I—1966-III; 1954-I—1960-I; and 1960-IV—1966-III.[25] For each time period, regressions were calculated for five maturity classes of U.S. Government securities: bills, and four groups of coupon securities—within 1 year, 1 through 5 years, 5 through 10 years, and after 10 years.

The dependent variables were daily-average dealers' positions in U.S. Government securities. For the 1950's and 1960's together, and for the 1950's, only net positions were analyzed. For the 1960's gross long positions (including repurchase agreements) and gross short positions were analyzed as well as net positions.

While the specification of the theoretical model is reasonably straightforward, a number of problems were encountered in attempting to estimate the model. To allow the reader to reach his own conclusions about the reliability of the empirical results, these problems are presented in some detail. They include both insufficiencies in the data and the difficulties of measuring the theoretical relationships, in particular multicollinearity.

Data. Data problems were encountered from the outset, because the data for dealers' positions were not reported on a consistent basis. In mid-1960, as noted in Section III, the reporting basis was changed in certain respects, and the number of reporting dealers was increased at the same time that the trading series was changed. Specifically, securities held in position were supposed to be classified by the first call date before mid-1960 and by the final maturity date thereafter. Moreover, repurchase agreements for all dealers and investment accounts for nonbank dealers were included in positions in the later period, whereas dealer reporting practices in this respect had not been uniform earlier.

The extent and direction of the bias in the data on dealers' positions, as a result of these statistical discrepancies, vary from the 1950's to the 1960's. The lack of data in the 1950's for one dealer with a substantial business led to an understatement of positions in that period as compared with the 1960's, particularly in bills. The less comprehensive inclusion of repurchase agreements in the 1950's also resulted in an understatement of positions, primarily in bills and short-term coupon issues. Finally, the shift from a first-call to a final-maturity basis in reporting coupon issues meant an understatement of positions in after-10-year issues and an overstatement of positions in within-1-year issues during the 1950's; insofar as intermediate-term issues were concerned, the impact is unclear. The net result of these various sources of statistical bias is a clear-cut understatement of dealers' positions in Treasury bills and to a lesser degree in after-10-year maturities in the 1950's. The impact on other maturity classes, while unclear, is likely to be

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[25] The shorter periods subdivide the longer period into the 1950's and 1960's and also into periods for which all of the dealer data are consistent.

some understatement in the 1950's, except perhaps for coupon issues maturing within 1 year.

This data problem is not present in the regression analyses of the two subperiods because the data are consistent within each period.[26] In the regression analyses of the entire period 1954-I—1966-III, a dummy variable equal to +1 in every quarter from 1960-II through 1966-III was introduced to account for the data discrepancy. In only one maturity class, that for Treasury bills, did this variable account for any significant change in dealers' positions. But for bills the effect of this dummy, and thus presumably the reporting shift, was substantial. In the period beginning with 1960-II dealers' net bill positions were higher by about $1.1 billion as a result.[27]

There are also some strategic inadequacies in the data for a number of the independent variables. The most serious shortcoming in this regard is an inability to measure satisfactorily dealers' expectations of future interest rates.

A number of variables were employed in this study to measure expectations. In general, these measures postulate that expectations of future movements in security prices are based on what has happened in past periods or on what is currently happening. The specific variables tested in the regressions were the change in interest rates in the preceding quarter,[28] and the current change in the discount rate and in free reserves.[29] In addition to allowing for expected *changes* in interest rates, the study incorporated a measure of expected stability in interest rates. A high frequency of small daily changes in prices or yields over the quarter would indicate that near-term expectations are for relative stability in interest rates.

A measure of the certainty with which expectations are held is even more difficult to derive. However, by using published data on daily yield levels, it was possible to construct a series on the number of turning points in yields in the quarter weighted by the size of the turnaround. Or to put it another way, the series is the summation over the quarter of the absolute sizes

of turning points: $\sum\limits_{t=1}^{n} | \Delta (\Delta i) |$

where i = interest rates and t = number of days in the quarter when Δi has changed direction. The larger the number—that is, the more daily changes in interest rates shift direction and the greater the size of the shifts—the greater would be the postulated degree of uncertainty. In practice this variable is highly correlated (negatively) with the frequency of small daily price or yield changes; hence the relative impacts on dealers' positions of the certainty with which expectations are held and of expectations of rate stability cannot be separated.[30]

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[26] In comparing the two subperiods, the data differences would presumably be reflected in a larger (positive) constant term for the 1960's when compared with the 1950's, *ceteris paribus*.

[27] See Appendix Table 13, variable X_{34}. This dummy variable was the single most important determinant (as defined by the largest beta coefficient and partial correlation coefficient) of dealers' net bill positions for the whole 1954–66 period. It is possible, however, that the dummy was picking up other structural changes from the 1950's to the 1960's that were not specifically included in the regression as independent variables. As an alternative, a series on the number of reporting dealers was tried in the regressions. The number of reporting dealers varied between 16 and 21 during the 1954–66 period and was greatest during the 1960's. As with the dummy, it was found to be a significant determinant of positions only for Treasury bills. The dummy was used in the final regressions because use of the dealer series postulates a linearity assumption (positions rise by the same amount with each new reporting dealer) that is not valid.

[28] The use of changes in interest rates in the current quarter would have improved the regression results but would at the same time have resulted in biased coefficients. The bias would occur because current changes in such rates may be a result, as well as a cause, of changes in current positions. For example, a rising negative carry might lead dealers to reduce their positions, in turn putting interest rates under upward pressure.

[29] Changes in free reserves were tried in the regressions in an unadjusted form and also in a form that excluded all quarterly changes of less than $50 million. Performance of the latter form was better, as had been expected, because dealers are aware that small misses in free reserves do not indicate a shift in monetary policy.

[30] The simple correlation between this measure of uncertainty and the frequency of small daily yield changes for Treasury bills was −.78 in the 1954–66

These expectational measures obviously leave much to be desired. Dealers' expectations are based at least partly, and perhaps mainly, on forecasts of policy actions—monetary or fiscal—and of credit demands that will not necessarily be related to current or past movements in these variables. Moreover, a quarterly period is too long to allow adequately for the much shorter time horizon dealers undoubtedly have in taking advantage of expected price (and rate) movements.

Measurement of the factors affecting trading profits presented a number of problems. A series on trading costs is not available, and the series on spreads between bid and asked prices of securities originated for this study is not felt to be reliable enough to use in the regressions. While figures on the volume of trading are available, they must be used carefully since (1) both the volume of trading and positions increase simultaneously during Treasury financings; and (2) there is probably a two-way relationship between trading and positions—with size of position having some influence on trading volume, as well as the more important influence of trading on positions. For these reasons, this study utilized for the most part either the volume of trading during the preceding quarter or debt outstanding as a proxy for trading volume.

The difficulties of deriving series to measure interest carry (interest earned less financing costs) are many. Insofar as costs are concerned, series showing what nonbank dealers pay for "out-of-town" funds are rough at best, and those showing financing costs in New York are based largely on posted rates, not rates actually paid.[31] In addition, bank dealers utilize internal funds, for which a cost is not available. Since dealer loan rates can often be considerably lower for funds borrowed out of town than for funds borrowed in New York, particularly when money is tight, a shift in the relative amounts borrowed from these two sources can significantly alter interest carry.

From the interest-earned side, shifts in the composition of the dealers' portfolio among specific Treasury issues can importantly affect interest carry. Because the portfolio composition is unknown, however, the only measure of interest earned that this study could use was a simple unweighted average of market yields on bills (the latest 3-month, 6-month, and 1-year bills)[32] and an unweighted average of coupon rates on other outstanding Treasury issues.[33] From this measure of interest earned, financing costs were subtracted to yield a measure of interest carry.

Empirical results. As noted earlier, separate multiple regressions on dealers' net positions were calculated for three periods: 1954-I—1966-III; 1954-I—1960-I; and 1960-IV—1966-III; and for five maturity classes. For the period of the 1960's, regressions were also calculated for gross long and gross short positions. The resulting 25 final equations are presented in Appendix Table 13. In addition, for the

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period, —.64 in the 1950's, and —.84 in the 1960's. Differences between the two series arise when there are sizable and frequent *one-directional* movements in interest rates. Such movements should occur in certain stages of the cycle, increasing the frequency of yield changes but not affecting the measure of uncertainty. The decreased correlation between the two measures in the 1950's when compared with the 1960's may be explained in this light.

[31] An average of posted rates overstates dealer borrowing costs because dealers satisfy their borrowing needs at the lowest posted rates. Also, extensive use of repurchase agreements by the Federal Reserve lowers dealer borrowing costs. The alternative measures of financing rates used in this study include: (1) the midpoint of posted rates on new loans in Federal funds at the New York City banks; (2) the midpoint of typical posted rates on new and renewal loans at the New York City banks; and (3) the midpoint of typical out-of-town loan rates. Posted dealer loan rates at the New York City banks are reported daily to the Federal Reserve Bank of New York. "Out-of-town" rates are derived from informal reports by dealers to the Trading Desk at the New York Federal Reserve Bank indicating the rates at which they cover the bulk of their financing needs.

[32] The turnover of dealers' holdings of Treasury bills may be so large as to make this measure of interest carry on bills almost meaningless. To the extent that dealers sell newly auctioned bills prior to the payment date they incur no financing costs (for weekly auctions of 3-month and 6-month bills, dealer sales begin on Tuesday but the payment date is not until Thursday). And since interest on Treasury bills accrues as the bills approach maturity, a rapid turnover may eliminate interest earned.

[33] The 1½ per cent notes were not included in the average of coupon rates.

two subperiods the table includes equations using the same variables as those that appear in the equation for the entire 1954–66 period.

The number of observations, particularly for the subperiods, was quite small relative to the number of variables specified in the theoretical model. For this reason, the final equations generally include only those variables that were significant at the 5 per cent level at least. In some cases, however, variables were included in the final equations if they were close to being significant and carried the expected coefficient sign and size.

The proportion of the variance in dealers' positions explained by the equations differs considerably by maturity category and by data period. The adjusted R^2 ($\bar{R}^2$) ranges from a high of 0.93 (for net positions in Treasury bills during 1954–66) to a low of 0.38 (for gross short positions in coupon issues maturing within 1 year during the 1960's). Of the 25 final equations, $\bar{R}^2$ was at or above 0.75 in seven equations and below 0.50 in four equations.[34] In every maturity category except for Treasury bills the variance in net positions in the two subperiods was more fully explained than in the entire 1954–66 period taken alone.

It is difficult to characterize the over-all reliability of the regression results. In just under half of the final equations, no basis was found for rejecting a hypothesis of no serial correlation of the residuals.[35] But in the remainder there was evidence of negative (in 5 of the 25 final equations) or positive serial correlation, thus raising some doubts about the true significance of the regression coefficients.[36]

Multicollinearity[37] presents even more difficulty. Its presence has led to the exclusion from the final equations of some variables that might actually be significant determinants of dealers' positions and in these cases probably made the coefficients of certain of the remaining (multicollinear) independent variables larger, and of greater significance, than would otherwise have been the case. Multicollinearity in this study involves primarily the following independent variables: new issues in Treasury financings, the volume of trading and debt outstanding, official market transactions, and the frequency of small daily price and yield changes.

During the period studied, and particularly beginning in the early 1960's, these variables in some maturity areas all increased considerably. The problem was particularly serious for the Treasury bill sector during the 1960's when the frequency of small daily yield changes by itself accounted for some 75 per cent of the variance in net bill positions—to the exclusion of all other theoretically important variables. Since this percentage seemed to be completely unreasonable, this variable was dropped from the final equation.[38] In interpreting the statistical results, one should keep in mind these data and estimation problems. But these problems notwithstanding, the estimated model was for the most part consistent with *a priori* expectations.[39]

Expectations of future interest rates. Changes in security prices are probably the most important determinant of dealers' profits;[40] therefore, it is not surprising that expectations of future interest rates were found to be a critical factor considered by dealers in determining the size of positions they would carry.

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[34] Because of the small number of degrees of freedom in the equations for the subperiods, there is a wide divergence between R^2 and $\bar{R}^2$. In most of the final equations for the subperiods the unadjusted R^2 accounts for 5 to 10 per cent more of the variance in dealers' positions.

[35] Based on a table in Theil and Nagar, using 1 per cent significance levels.

[36] Serial correlation of the residuals, while it leaves the estimated regression coefficients unbiased, results in an understatement of the computed standard errors and an invalidity of the usual significance tests.

[37] In J. Johnston, *Econometric Methods* (New York: McGraw-Hill Book Company, 1963), p. 201, multi-

collinearity is defined as ". . . the general problem which arises when some or all of the explanatory variables in a relation are so highly correlated one with another that it becomes very difficult, if not impossible, to disentangle their separate influences and obtain a reasonably precise estimate of their relative effects."

[38] See Appendix Table 13, pp. 151–53.

[39] There is one other known econometric study of dealers' positions: Ira O. Scott, Jr., *Government Securities Market* (New York: McGraw-Hill Book Company, 1965). Comparison of the empirical results is difficult because of diverse specification and time periods, but the model's results do not appear to be inconsistent with the results of this study.

[40] Colby, *op. cit.*

**TABLE 4: NET REGRESSION COEFFICIENTS: IMPACT OF DEALERS'
EXPECTATIONS OF FUTURE INTEREST RATES ON THEIR POSITIONS**

Position in U.S. Govt. securities, by maturity class, and period	Change in—			Frequency of *small* daily price and yield changes (X_4) (in per cent)	Uncertainty (X_5)
	Discount rate (X_1) (in basis points)	Free reserves > $50 million (X_2) (in millions of dollars)	Interest rates in preceding quarter (X_3) (in basis points)		
	(1)	(2)	(3)	(4)	(5)
Treasury bills:					
Net: 1950's and 1960's.	...	* .51	...	† 9.63	...
1950's	...	...	† −1.68	...	...
1960's	...	1.60	...	...	−3.06
Gross long: 1960's.....	...	* 1.57	...	...	−2.65
Gross short: 1960's.....	...	† −.27	...	...	...
Coupon issues maturing (in years):					
Within 1:					
Net: 1950's and 1960's.	† −1.33	...	...	...	...
1950's	† −1.55	...	...	...	...
1–5:					
Net: 1950's and 1960's.	...	† .31	...	...	...
1950's	† −1.91	...	...	...	...
1960's	...	...	* −2.52	...	...
Gross short: 1960's.....	...	...	† 1.78	† 2.18	...
5–10:					
Net: 1950's and 1960's.	...	...	−.40	* 1.26	...
1950's	...	* .10	...	...	...
1960's	...	...	† −2.05	† 2.23	...
Gross long: 1960's.....	...	...	* −1.56	† 3.05	...
Gross short: 1960's.....	...	* −.25	...	...	...
After 10:					
Net: 1950's and 1960's.	* −.56	...	...	† 1.30	...
1950's	* −.43	...	...	...	...
1960's	...	...	* −3.12	† 1.72	...
Gross long: 1960's.....	...	...	* −2.46	† 1.70	...
Gross short: 1960's.....	* .31	...	...	† .49	...

* Significantly different from zero at the 5 per cent level.
† Significantly different from zero at the 1 per cent level.
NOTE.—These coefficients for the expectational variables are as they appear in the final multiple regression equations, Table 13. If any maturity category or period of time is not shown above, no expectational variable was found to be significant. The coefficients reflect an impact of $1 million on daily-average positions over the quarter.

An association between positions and expected changes in security prices was found to be significant in virtually every maturity category for all three periods tested. Table 4 summarizes the findings of this study concerning the impact of dealers' expectations of future interest rates on positions.

Daily-average net positions in any quarter were negatively related to changes in yields in the preceding quarter (Table 4, column 3) — implying that dealers expected the direction of rate changes in the preceding quarter to continue. Net positions were also negatively related to current changes in the discount rate (column 1) and positively related to changes in free reserves (column 2). In all cases, dealers expected past or current policies and interest rate movements to continue, and they altered their positions accordingly. Such operations were generally destabilizing insofar as interest rates were concerned (at least for quarterly periods),

but they aided in the attainment of monetary policy targets.

The change in net positions associated with expectational currents resulted from movements in both gross long and gross short positions. When interest rates were expected to rise, gross long positions declined and gross short positions rose. Thus the size of the coefficient for rate expectations was always larger for net positions than for gross long positions.

Because of multicollinearity only one of the three expectational measures was used in any one equation, and no great import should be attached to the particular measure. For most maturity categories, the most significant expectational measure in the 1950's was the change in the discount rate; during the 1960's it was the change in yields in the preceding quarter. Such a shift reflects, at least in part, the fact that during the 1960's the discount rate was changed only three times and usually after

the 3-month bill yield had risen above the discount rate.[41]

During the 1950's, expectations concerning future security prices were often the most important determinant of dealers' net positions. But during the 1960's they were not so important a factor; the reason, in part at least, is that the economic climate had led generally to expectations of interest rate stability and that some variables used to measure expectations were unusually stable.

As already noted, expectations were a significant factor in position determination in all maturity categories. However, one would anticipate that expectations would be most important in longer-term maturities, where relatively small yield changes involve sizable capital gains and losses. And this was generally found to be the case. While the size of the coefficients of expectational variables was often smaller in the longer-term maturity areas, after allowing for the differences in average size of position, the impact of expectational factors on positions was considerably larger in percentage terms in the longer-term sectors than in other maturity categories.

As to expected interest-rate stability, dealers' net positions (and in some cases gross long and gross short positions) were significantly influenced in a positive relationship by the frequency of small daily price and yield changes during the quarter[42] (Table 4, column 4). This variable was significant only for Treasury bills and the longer-term coupon issues and only for the 1960's and the entire 1954–66 period.[43] In these cases, however, it was one of the most important factors affecting movements in dealers' positions.

During most of the 1960's, until about mid-1965, day-to-day rate stability increased sharply.[44] Its positive impact on positions certainly reflects the decreased risk of capital losses on gross positions that is inherent in greater rate stability: thus the significance for positions in longer-term issues. But in addition it probably reflects an attempt by dealers to increase the volume of trading—and trading profits—in a period when speculative profits were restricted because of the lack of fluctuation in securities prices: thus its importance for Treasury bill positions.

The variable constructed to measure uncertainty (column 5) was tested only in the Treasury bill and the after-10-year maturity sectors. It was not significant in the latter sector, but it was almost significant for Treasury bill positions in the 1960's—presumably as a substitute for the frequency of small daily yield changes, which was not utilized in the final equation for bills for the 1960's. In this case, as uncertainty increased, positions declined.

Trading and debt. The empirical results of the impact of trading activity on dealers' positions are not altogether satisfactory. Furthermore, they are rather difficult to evaluate. This certainly stems in part from the data difficulties noted earlier, but it also stems from multicollinearity problems involving particularly debt outstanding, as well as volume of trading. As a result, for a number of the final equations—notably for the 1950's in intermediate-term maturities and for 5- to 10-year issues generally—no significant relationships were found between positions and trading. Table 5 lists the study's findings on trading and debt measures.

In only one maturity category, coupon issues due within 1 year, did such measures consistently and significantly account for some of the variance in dealers' positions.[45] For these issues, trading was one of the most important determinants of positions. A \$1 billion increase in publicly held debt was associated with a \$9 million rise in net positions of coupon issues due within 1 year in the 1954–66 period and

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[41] During the 1954-1–1960-I period it had been changed during 16 quarters.

[42] Small daily yield changes were defined as 1 basis point or less for Treasury bills and small daily price changes as 2/32 or less for issues maturing after 5 years.

[43] Its insignificance during the 1950's was not unexpected. Over that period day-to-day rate stability decreased considerably. But expectations of greater rate instability would have a different directional impact on positions depending on whether expectations were for upward or downward movements in interest rates, and the 1950's were a period of alternating expectations.

[44] See Charts 1–5 and Section V.

[45] A measure of trading was not tried in the regressions in the Treasury bill sector; the volume of gross new bill issues was utilized instead.

TABLE 5: NET REGRESSION COEFFICIENTS FOR THE VARIABLES MEASURING TRADING PROFITABILITY

Position in U.S. Govt. coupon issues, by maturity class, and period	Volume of trading (in millions of dollars)		Marketable debt [2] (in billions of dollars)		Ratio of debt held by coml. banks to total debt outstanding (X_{10}) (in per cent)
	Preceding quarter (X_6)	Current quarter [1] (X_7)	Current quarter (X_8)	Preceding quarter (X_9)	
	(1)	(2)	(3)	(4)	(5)
Within 1 year:					
Net: 1950's and 1960's...	...	...	† 8.89	...	† 6.66
1950's	...	...	* 11.17	...	...
1960's	...	† 1.30	...	...	* 7.15
Gross long: 1960's	...	† 1.29	...	...	* 7.22
1 to 5 years:					
Net: 1950's and 1960's...	...	...	* 4.52	...	...
1960's	* 2.23	...	...	...	...
Gross long: 1960's	† 2.22	...	...	...	...
Gross short: 1960's	...	...	...	* 8.99	† —8.16
5 to 10 years:					
Gross long: 1960's	...	...	...	† 10.31	...
Gross short: 1960's	...	† 1.04	...	...	* —12.31
After 10 years:					
Net: 1950's	† .95	...	...	...	...
1960's	...	...	† 36.02	...	...
Gross long: 1960's	...	...	† 34.17	...	...
Gross short: 1960's	† —.79	...	...	...	† 9.71

[1] Excludes financing days.
[2] Publicly held.
† Significantly different from zero at the 1 per cent level.
* Significantly different from zero at the 5 per cent level.
NOTE.—These coefficients for the trading variables are as they appear on the final multiple regression equations, Table 13. If any maturity category or period of time is not shown above, no trading variable was found to be significant. The coefficients reflect an impact of $1 million on daily-average positions over the quarter.

with an $11 million rise in these net positions in the 1950's (Table 5, column 3). In the final equation for the 1960's, a $1.0 million rise in the volume of trading (adjusted to exclude financing days) was associated with a $1.3 million dollar rise in net positions (column 2).

In the sporadic cases where trading and debt measures were found to be a significant determinant of positions, the relationships with only one exception surprisingly indicated a more than proportional impact of trading on long positions; a $1 million rise in trading led to more than a $1 million rise in net positions.[46]

For issues maturing in more than 10 years, the coefficients of debt and trading appear out of line. Net and gross long positions in the 1960's are shown to rise roughly $35 million for a $1 billion increase in debt (column 3), far too large to fit in with theoretical expectations or the empirical results in other maturity categories. It may be that this coefficient

picked up a relationship of positions to Treasury financings in the form of advance refundings not accounted for solely by the use of a new issue variable.

It was suggested in an earlier section that profits from trading operations might be negatively related to the share of trading accounted for by investors who deal in odd lots. Moreover, it is possible that dealers could function with smaller positions when the size of single transactions declines, even with a constant volume of trading. In fact it was found that as the share of debt held by commercial banks rose (and presumably the share of odd-lot transactions declined), positions in some cases also increased, as shown in column 5 of Table 5. For net and gross long positions such a relationship was significant only for coupon issues maturing within 1 year. For gross short positions in intermediate-term maturities there was a negative relationship between a rising bank share and such short sales. It is difficult to assess the significance of this relationship because the share of outstanding debt held by banks moves sharply over the business cycle—rising during recessions when securities prices are rising. Hence, it is probable that the bank

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[46] This conclusion was drawn in part by utilizing results from the study of the volume of trading in Section III, which includes estimates of the increase in the volume of trading for a given increase in debt outstanding. In every case an expansion in debt increased dealers' positions by a greater amount than it increased trading.

**TABLE 6: NET REGRESSION COEFFICIENTS FOR
INTEREST CARRY AND FINANCING COST VARIABLES**

Position in U.S. Govt. securities, by maturity class, and period	Interest carry [1] (in basis points)				Financing costs (in basis points)	
	X_{11}	X_{12}	X_{14}	X_{15}	X_{16}	X_{17}
	(1)	(2)	(3)	(4)	(5)	(6)
Treasury bills:						
Net: 1950's and 1960's	...	...	...	* 7.32	...	...
1960's	...	...	8.91	...	...	...
Gross long: 1960's...	...	...	7.81	...	...	...
Gross short: 1960's...	...	...	† −2.10	...	...	...
Coupon issues maturing (in years):						
Within 1:						
Net: 1950's	...	* .52	...	...	† .24	...
Gross short: 1960's...	...	...	...	...		...
1–5:						
Net: 1950's and 1960's	...	† .44	...	...	...	...
1960's	...	† .92	...	...	...	...
Gross long: 1960's...	...	† 1.09	...	...	...	...
5–10:						
Net: 1950's	...	† .27	...	...	...	...
1960's	...	† −.43	...	...	† .50	...
Gross long: 1960's...	...	...	...	...	.19	...
Gross short: 1960's...	...	...	...	...		...
After 10:						
Net: 1960's	† −.71	...	...	...	...	...
Gross long: 1960's...	† −.66	...	...	...	...	† .31
Gross short: 1960's...	...	...	...	...	...	

[1] Interest-carry variables were entered so that a positive coefficient indicates rising positions as positive carry rises or as negative carry declines. A negative coefficient indicates declining positions as positive carry rises or as negative carry declines.
* Significantly different from zero at the 5 per cent level.
† Significantly different from zero at the 1 per cent level.
NOTE.—These coefficients for the interest variables are as they appear in the final multiple regression equations, Table 13. If any maturity category or period of time is not shown above, no interest carry variable was found to be significant. The coefficients reflect an impact of $1 million on daily-average positions over the quarter.

share is simply measuring expected changes in securities prices.

Interest carry. Empirical results relating to interest carry were not completely satisfactory, again at least in part because of data inadequacies. The cost of—or profit from—carrying a position was found to be a significant determinant of dealers' positions in only some cases.

Most important was the Treasury bill sector, where net positions during the 1954–66 period and net and gross long positions during the 1960's declined with increases in negative carry,[47] though the relationship was not always significant at the 5 per cent level (Table 6, columns 3 and 4). The influence of carrying

costs on bill positions was sizable—a rise of 50 basis points in the negative carry led to a decline of $350 million to $450 million in long bill positions.

For coupon issues maturing within 1 year and in 1 to 5 years, long positions were in some cases significantly related to interest carry.[48] As positive carry increased (or negative carry decreased) by 100 basis points, the increase in long positions ranged from $44 million to $109 million (column 2). In the longer-term maturity areas for the period of the 1960's, however, the impact of carrying costs on positions was just the opposite: As positive carry declined and became negative, positions increased. While unexpected and perhaps inexplicable,[49]

[47] The series used included only observations for which the interest carry was significantly negative (financing costs greater than interest earned); observations for which there was a positive or a small negative carry were left out. This series was used because the variable including positive carry was not significant, perhaps as a result of multicollinearity. In any event, it might not be unreasonable to assert that while a high or rising positive carry would be an insignificant factor in position determination, a sizable negative carry would be important in a maturity area where positions are large.

[48] In these cases the series measuring interest carry included positive as well as negative carry.

[49] As negative carrying costs increase, the rise is usually the greatest for long-term issues, as is the size of the negative carry. There is therefore no incentive for dealers to shift into the longer-term maturity areas in order to minimize losses from negative carry. While true of the 1950's, this pattern did not develop during the 1960's. The carry on longer-term securities was more like that on shorter-term issues, as to both level and change.

TABLE 7: NET REGRESSION COEFFICIENTS FOR TREASURY FINANCING VARIABLES

Position in U.S. Govt. securities, by maturity class, and period	Gross new bill issues (X_{18}) (in billions of dollars)	Rights held by public (X_{19}) (in billions of dollars)	New issues sold to the public (in billions of dollars)		
			Total during quarter (X_{20})	During last month of—	
				Preceding quarter (X_{21})	Current quarter (X_{22})
	(1)	(2)	(3)	(4)	(5)
Treasury bills:					
Net: 1950's and 1960's..	† 62.03	...	...	...	...
1950's	† 58.30	...	...	...	...
1960's	* 85.58	...	...	...	...
Gross long: 1960's.....	† 92.55	...	...	...	...
Coupon issues maturing (in years):					
Within 1:					
Net: 1960's	...	...	† 36.91	...	...
Gross long: 1960's.....	...	...	† 35.97	...	...
1–5:					
Net: 1950's and 1960's.	...	* 8.12	...	† 35.65	...
1950's	...	...	9.52	* 27.16	...
Gross short: 1960's.....	...	...	* 10.97	...	...
5–10:					
Net: 1950's and 1960's..	...	...	† 13.26	...	* −14.34
1950's	...	...	* 8.55	...	...
1960's	...	...	* 13.64	...	† −21.17
Gross long: 1960's.....	...	...	† 17.34	...	† −21.32
After 10:					
Net: 1950's and 1960's..	...	...	* 33.95	...	† −46.04
1950's	...	...	† 34.70	...	...
1960's	...	...	* 29.93	...	...
Gross long: 1960's.....	...	...	† 51.48	...	−35.44
Gross short: 1960's.....	...	...	† 16.35	...	...

† Significantly different from zero at the 1 per cent level.
* Significantly different from zero at the 5 per cent level.
NOTE.—These coefficients for the Treasury financing variables are as they appear in the final multiple regression equations, Table 13. If any maturity category or period of time is not shown above, no financing variable was found to be significant. The coefficients reflect an impact of $1 million on daily-average positions over the quarter.

these results were too consistent and too significant to be dismissed.

In most maturity categories there was a significant and positive association between gross short positions and dealers' financing costs on long positions (columns 5 and 6). Because financing costs move with interest rates, this relationship is probably another measure of interest-rate expectations, although it may also reflect a need for dealers to go short (that is, to borrow securities) in order to make sales when long positions are at low levels.

Treasury financings. The empirical results relating dealers' positions to Treasury financings and official operations in the market are not constrained by data inadequacies, as was the case for other independent variables. Interpretation of the results, summarized in Table 7, is not always straightforward, however.

The underwriting function that dealers perform during Treasury financings has often been one of the most important—and at times has been the single most important—determinant of their positions, for all maturities and for both

the 1950's and the 1960's. For bills, the final equations show that dealers hold a $60 million to $90 million higher level of daily-average bill positions for every $1.0 billion rise in gross new issues (Table 7, column 1). This relationship reflects not only the dealers' underwriting of Treasury bill auctions but also the response of dealers to a sharply increased volume of market trading as bills outstanding have risen.

The impact on dealers' positions of Treasury financings in coupon issues is more difficult to assess, since such financings may have both negative and positive effects. In "rights" refundings, dealers sell the newly offered securities over the period following the financing announcement and before the allotments of the new issues are made—usually a period of about 1 week. The immediate impact of the financing is thus to raise gross short positions and to decrease dealers' net positions in the maturity category of the new issue. After the new issues are allotted, dealers' daily-average long (gross and net) positions will be increased by an amount that depends on (1) the size of dealers'

allotments less prior "when-issued" sales and (2) the speed with which the new issues are sold. The impact on positions over an entire quarter will thus depend importantly on the specific date of any financing during the quarter. In such exchanges prior to allotment, dealers' net and gross long positions are also enlarged in the maturity category of the "rights." In cash offerings or cash exchanges, dealers' gross long and net positions in the new issues rise beginning 1 or 2 days after the books close.

Moreover, as the date of a financing approaches, dealers may make adjustments in their holdings of other issues not directly involved in the financing. They may do this either to maintain a balanced position in terms of different maturities—thus calling for sales of outstanding issues in the maturity area of the new issue—or to accommodate investors who are switching into the new issues.

Empirically, such mixed effects on dealers' positions were found. During both the 1950's and 1960's, Treasury financings were a significant determinant of movements in dealers' positions. Dealers' daily-average gross short, gross long, and net positions increased with the volume of new issues (taken by public investors) in the current quarter (Table 7, column 3). When the financing occurred in the last month of the quarter, the positive impact was wiped out, as shown in column 5, apparently mainly because dealers lightened their positions of other securities not involved in the financing.[50] Financings in the last month of the preceding quarter sometimes had a positive impact on dealers' net positions in the current quarter (column 4). The volume of rights was generally not a significant determinant of positions.

In a number of cases in the within-1-year and 1- to 5-year maturity areas financings did not have a significant impact on positions. This result is due, in all likelihood, to the difficulties of measuring a financing impact that is surely significant in actuality. In these maturity areas

financings occurred in almost every quarter of several of the data periods analyzed. While the financings did vary in size, it is reasonable to suppose that dealers' positions were related more to the existence of a financing than to its size. Thus the true relationship could be measured statistically. When financings in these maturity categories were less frequent, there was a significant positive impact on positions.[51]

No great importance should be attached to the relative size of the financing coefficients. In the first place, their size is influenced by the particular timing of the financings within the quarters and by the mix between cash and "rights" exchanges for any one period or maturity area. Secondly, if it is true, as postulated in the preceding paragraph, that dealers' positions are to some degree insensitive to the *size* of financings, then it becomes difficult to interpret the magnitude of the coefficient.

Official market transactions. Besides underwriting Treasury financings, dealers accommodate a large volume of market transactions for the System and for Treasury trust funds. These transactions, as noted, have a short-run position impact involving a decline in long positions with official purchases and a rise in long positions with official sales—and also a longer-run impact as well if such transactions lead to specific expectations about future security prices.

Table 8 summarizes this study's findings on the position impact of official operations. The reader will observe that these official operations appear in the final equations in a number of alternative forms: Treasury and Federal Reserve System separately or lumped together, and as total transactions (purchases plus sales), purchases, sales, or net purchases (purchases less sales). In the shorter-term maturity categories—bills and coupon issues due within 1 year—it was assumed that there would be no distinguishable impact on positions as between Treasury and System operations. Otherwise, these variables generally appear in the final

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[50] This statement is based on the fact that the negative coefficients for net positions resulted from a decline in gross long positions rather than an increase in gross short positions as would result from heavy purchases of "when issued" securities by investors.

[51] This is probably the reason why positions in the 1- to 5-year maturity area for the 1954–66 period were positively related to rights (column 2) rather than to new issues.

equations in the most disaggregated form that permitted significant results. In other words, where Treasury and System operations were not separated for intermediate- and long-term issues, it was because they were either not significant when separated[52] or were not significantly different as to coefficient size.

During the 1950's, official transactions were a significant determinant of dealers' positions only for coupon issues due within 1 year. In this case, a rise of $1.0 million in official net purchases was associated with a $0.15 million decline in daily-average net positions over the quarter (column 5, Table 8). The insignificant position effect of official transactions for other maturity areas during the 1950's probably reflects their limited extent. In the 1960's, however, there was a very sharp rise in official operations in all maturity areas except for coupon issues due within 1 year, and such operations became a significant determinant of dealers'

positions in all sectors of the Government securities market.

In the Treasury bill sector, official transactions led to a decline in dealers' net positions. During the 1954–66 period a rise of $1 million in official transactions on a daily-average basis (column 1) was associated with an $8 million decline in net positions.[53] For the 1960's, official transactions were entered as totals, without adjusting them to a daily-average basis. In this case, a rise of $1.0 million in official transactions led to a decline of $0.21 million in net positions (column 2).[54] The decline

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[52] Inasmuch as Treasury and System transactions have been small relative to total market transactions, it was believed that a lumping together might in some cases provide significant results.

[53] The large size of the coefficient indicates a multiple impact of daily-average official transactions on net bill positions. It signifies that a large transaction by an official account on one day of the quarter will have an impact on dealers' positions that lasts for more than one day. For example, should the System purchase $300 million on one day, dealers' positions might be lowered by $300 million the same day, by $250 million the next day, and so on in a decreasing progression until dealers' positions have regained their "normal" level.

[54] Adjusting this coefficient for the approximate number of trading days in the quarter would transform the coefficient of .21 to 12.0, somewhat larger than the coefficient of 8.0 for the 1954–66 period.

TABLE 8: NET REGRESSION COEFFICIENTS FOR OFFICIAL MARKET OPERATIONS VARIABLES

Position in U.S. Govt. securities, by maturity class, and period	Daily-average total official transactions (in millions of dollars) (X_{23})	Totals for quarter (in millions of dollars)									
		Total official transactions				Federal Reserve transactions			Treasury transactions		
		Purchases and sales (X_{24})	Purchases (X_{25})	Sales (X_{26})	Net purchases (X_{27})	Purchases and sales (X_{28})	Purchases (X_{29})	Sales (X_{30})	Purchases and sales (X_{31})	Purchases (X_{32})	Sales (X_{33})
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Treasury bills:											
Net: 1950's and 1960's..	* −7.81	...	...	...	...	...	...	...	...	...	...
1960's	...	* −.21	...	...	...	...	...	...	...	...	...
Gross long: 1960's.....	...	* −.17	...	...	...	...	...	...	...	...	...
Gross short: 1960's.....	...	† .05	...	...	...	...	...	...	...	...	...
Coupon issues maturing (in years):											
Within 1:											
Net: 1950's and 1960's..	...	...	...	...	* −.11	...	...	...	...	...	...
1950's	...	...	...	...	* −.15	...	...	...	...	...	...
Gross short: 1960's.....	...	...	* .08	* .05	...	...	...	...	...	...	...
1–5:											
Net: 1960's	...	...	−.35	* −1.98	...	...	...	...	...	...	...
Gross long: 1960's.....	...	...	† −.46	* −2.24	...	...	...	...	...	...	...
Gross short: 1960's.....	...	...	...	...	...	...	...	...	...	−.12	...
5–10:											
Net: 1950's and 1960's..	...	† .18	...	...	...	...	...	...	...	...	...
1960's	...	...	...	...	...	...	* .30	...	...	...	...
Gross long: 1960's.....	...	...	...	...	...	...	† .31	...	...	...	...
After 10:											
Net: 1950's and 1960's..	...	...	...	...	...	...	.87	...	...	...	...
1960's	...	...	...	...	...	...	* 1.14	...	...	* .21	* −8.74
Gross long: 1960's.....	...	...	...	...	...	...	* 1.29	...	...	* .16	* −6.23
Gross short: 1960's.....	...	...	...	...	...	...	...	...	...	* −.033	...

* Significantly different from zero at the 5 per cent level.
† Significantly different from zero at the 1 per cent level.
NOTE.—These coefficients for the official market operations variables are as they appear in the final multiple regression equations. Appendix Table 13. If any maturity category or period of time is not shown above, no official operations variable was found to be significant. The coefficients reflect an impact of $1 million on daily-average positions over the quarter.

in net positions was the result of a $0.17 million decline in gross long positions and a $0.05 million rise in gross short positions. The decline in net positions in bills probably reflects the fact that in virtually every quarter during the 1960's purchases of official accounts far exceeded sales, although official net purchases were not significant as an independent variable.[55]

For coupon issues maturing within 1 year, long positions during the 1960's were not significantly affected by official operations. In this regard, it might be noted that only in this coupon maturity category were official sales at all comparable in size with purchases. Gross short positions were so affected, however, rising by $0.08 million with a $1.0 million increase in official purchases (column 3) and rising by $0.05 million with a $1.0 million rise in official sales (column 4). It would appear that official sales, which were concentrated in 1961–62 as part of "operation twist," might have led to expectations of rising yields on these issues, thus causing dealers to hold larger short positions.

Long positions in issues due in 1 to 5 years were negatively related to both official purchases and official sales. A $1 million rise in official purchases caused a $0.35 million to $0.46 million decline in net and gross long positions (column 3), similar to the results for bills and coupon issues due within 1 year. A much larger decline—$2.0 million—in long positions resulted from a $1.0 million rise in official sales (column 4). As for shorter-term coupons, the bulk of official sales, while considerably smaller, were concentrated in 1961–62 and apparently led dealers to expect upward yield pressures on these securities.[56] Gross short positions were negatively related to Treasury purchases (column 10), though not to

System purchases, which were substantially larger.[57]

In the 5- to 10-year maturity area, dealers' net and gross long positions were positively related to System purchases:[58] a $1.0 million rise in purchases causing a $0.3 million rise in positions (column 7). Over the entire 1954–66 period, total official transactions also led to higher net positions (column 2).

Official purchases led as well to higher net and gross long positions in bonds due after 10 years. A $1 million rise in System purchases was associated with an increase of $1.14 million to $1.29 million in positions (column 7) and a similar rise in Treasury purchases with a $0.16 million to $0.21 million rise in positions (column 10). The smaller coefficient for Treasury purchases may imply that System operations have a greater impact on dealers' expectations; but it may also be a reflection of the concentration of Treasury purchases in financing periods when dealers' inventories are weighing on the market and the impact of such purchases might well be different in kind. But in any event it would appear that System and Treasury purchases bolstered dealers' expectations of rising bond prices and/or moderated any expectations that prices might fall. In reaction to this changed expectational environment, dealers wanted to hold larger net and gross long positions of the after-5-year maturity class.

It might be anticipated that such expectations would cause dealers to decrease their gross short positions. But no significant impact of System purchases on short positions was found, although Treasury purchases had the expected negative impact. A $1 million rise in Treas-

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[55] Perhaps net purchases were not sizable enough to be statistically significant. In 1965, for example, official net purchases of bills totaled $4.6 billion and official transactions, $11.4 billion; these figures compare with total transactions of $347 billion in the bill market.

[56] The bulk of official sales were by the Treasury. All official sales of 1- to 5-year maturities totaled $435 million during the 1960-IV–1966-III period. All but $98 million of these sales occurred during 1960–62.

[57] While larger, System purchases were concentrated in the 1961–63 period when official accounts were also selling these issues. Treasury purchases, on the other hand, were concentrated more in the 1965–66 period, when rising interest rates brought the Treasury into the market to support its financing operations. There would seem to be little reason for Treasury operations of this kind to cause a decline in dealers' short positions; in fact, to the degree Treasury operations involved purchases of "when-issued" securities prior to the allotment date, gross short positions would rise.

[58] System purchases accounted for about 60 per cent of total official purchases of 5- to 10-year issues.

ury purchases was associated with a very small decline—\$0.033 million—in gross short positions of after-10-year maturities (column 10). The absence of any significant gross-short-position impact from System purchases in the face of a significant impact from Treasury purchases is similar to the results for 1- to 5-year maturities. But for these after-10-year maturities Treasury purchases during the 1960's were six times larger than System purchases; nevertheless, it seems that System purchases were large enough to have a significantly measurable impact on dealers' long positions.

The System has not sold any securities maturing in more than 5 years, but in a few instances the Treasury has engaged in very small market sales.[59] While it is difficult to judge the meaningfulness of the results due to the small number of observations, these Treasury sales did have a significant negative impact on net and gross long positions. A \$1 million rise in sales was associated with a very sizable decline—\$6 million to \$9 million—in long positions during the 1960–66 period (column 11).

Several important conclusions emerge from this overabundance of results on System and Treasury market transactions. Official operations in the short- and intermediate-term sectors were associated with declines in dealers' long positions whereas in the longer-term maturities such operations were associated with rises in long positions, despite the fact that net purchases predominated in most maturity sectors.[60] We conclude from this that for the shorter-term sectors the relationship was simply one of official net purchases necessarily causing short-lived declines in positions, while official purchases of long-term bonds influenced dealers' expectations of future interest rates in such a manner as to cause the desired levels of dealers' long positions to rise.

Consistent with the rise in long positions would have been a cut by dealers in their gross short positions of after-5-year securities as official buying led to expectations of higher security prices. But such a decline in short positions was not always in evidence. In particular, System purchases had no significant impact on gross short positions. Treasury purchases had a small negative impact on short positions of after-10-year bonds but no effect on bonds due in 5 to 10 years.

As for official sales of securities, there is some evidence that they may possibly lead to sizable declines in dealers' long positions, at least when it appears to the dealer community that a rate objective is involved. This appeared to be the case in the intermediate-term sector where sales in the 1960's had a negative impact on positions twice their size. But before any firm conclusions can be drawn about the position impact of official sales, more evidence is necessary. Moreover, in the within-1-year maturity area, where official sales were largest, there was no significant impact on long positions, though gross short positions did rise.

IMPLICATIONS FOR MARKET PERFORMANCE

This final portion of Section IV attempts to ascertain whether there has been any substantial shift from the 1950's to the 1960's in dealers' willingness to take positions. Specifically, have there been any shifts in position-taking either within the framework of the model just presented or that cannot be "explained" by it? Secondly, have any of the factors in the changed market environment in the 1960's—such as System purchases of coupon issues or greater price and yield stability—caused dealers to reduce their positions, *ceteris paribus?*

As discussed earlier, dealers' net positions have on the average been at substantially higher levels in the 1960's, for all maturity categories except coupon issues due within 1 year. But, again with the exception of short-term coupon issues, the factors affecting the levels of dealers' desired positions would in all cases have induced increases in those positions.

The rise in net positions in Treasury bills from a daily-average level of about \$600 million in the 1950's to one of \$2.3 billion in the

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[59] The Treasury sold after-10-year bonds during six quarters of the 1960's, with total sales aggregating only \$30 million. During the 1950's, Treasury sales were larger than that, but they had no measurable impact on positions.

[60] For coupon issues due within 1 year, sales were slightly larger than purchases.

1960's can be explained essentially by two factors. Based on the equations, the change in reporting basis and the larger number of reporting dealers in the 1960's accounted for an increase of about $1.1 billion in daily-average positions. And secondly, the rise in gross new bill issues from a quarterly average of $21.4 billion in the 1950's to $29.4 billion in the 1960's would have induced a $500 million to $700 million rise in daily-average net positions.[61]

For coupon issues it is more difficult to attribute the higher average net positions in the 1960's to specific independent variables, because in many cases there was a shift between the 1950's and the 1960's in the specific variables that entered the equations. However, a number of observations seem in order.

Dealers' net positions in coupon issues due within 1 year were virtually unchanged from the 1950's to the 1960's—averaging about $342 million a day. These positions held constant, however, in the face of sizable declines in debt held by the public and in the volume of trading, as well as in the volume of new Treasury issues in this maturity area. For example, the drop in publicly held debt from an average $27.8 billion in the 1950's to an average $20.4 billion in the 1960's would, *ceteris paribus,* have caused a $70 million to $120 million decline in average net positions in issues due within 1 year.

Dealers did reduce such positions progressively beginning in 1962, and by early 1965, when trading and debt outstanding in this sector reached a low for the 1960's, dealers' net positions had dropped to about $200 million. With the increased financing activity in this area since late 1965 dealers have held considerably higher positions, averaging $336 million during the first three quarters of 1966.

On the average, dealers held net positions of $268 million in issues due in 1 to 5 years in the 1960's, up from $201 million during the 1950's. The contribution of specific variables to the rise in positions cannot be quantified, but

the increases in financings, trading, and debt outstanding—as well as the mid-1960 change in reporting of positions—certainly played some role.

Among all maturities of coupon issues, in longer-term securities the sharpest increases in positions in percentage terms from the 1950's to the 1960's were: 5- to 10-year positions rose from $55 million to $98 million and after-10-year positions from $31 million to $67 million. One factor for which the contribution to the higher positions can be quantified is the volume of new issues. For both 5- to 10-year and after-10-year bonds the increased volume of new issues in the 1960's accounts for some $6 million to $11 million of the higher net position levels.

Official operations in the market during the 1960's were also a factor contributing to the higher net positions. System purchases of 5- to 10-year issues averaged $98 million per quarter and those of after-10-year issues $19 million per quarter, as compared with virtually no System purchases during the 1950's. Daily-average net long-term positions, based on the equations, were probably some $20 million to $30 million higher as a result. Increased Treasury purchases and decreased Treasury sales in the 1960's may also have contributed to the rise in positions. In addition, the trend toward day-to-day price stability throughout the 1960's until mid-1965 probably contributed something to the higher positions, as did a rise in the volume of trading.

For all maturity areas except short-term coupon issues, then, the independent variables in general moved in such a manner as to induce higher positions in the 1960's compared with those in the 1950's.[62] But how much of a rise

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[61] It is likely that a portion of this rise should really be attributed to the increased stability in day-to-day yields in the 1960's.

[62] The impact that interest-rate expectations had on positions, on the average, in the 1950's and in the 1960's is indeterminable. The 1950's included two full business cycles while the 1960's were largely a period of recovery from recession and renewed expansion at a moderate pace. Of the variables used in this study to measure expectations, average changes during the 1950's and 1960's were remarkably similar. Quarterly changes in net free reserves averaged a negative $27 million in the 1950's and a negative $20 million in the 1960's. Quarterly interest-rate changes were barely positive, on the average, during both periods.

TABLE 9: AVERAGE INTEREST CARRY ON U.S. GOVERNMENT SECURITIES, BY MATURITY

In basis points

Maturity	1950's [1]	1960's [2]
Treasury bills	−50	−27
Coupon issues maturing (in years):		
Within 1	−45	−8
1–5	−20	−10
5–10	−34	−43
After 10	13	−16

[1] 1954-I—1960-I.

[2] 1960-IV—1966-II.

NOTE.—Interest carry uses dealer loan rates in New York on new loans; however, had rates on loans from out-of-town sources been used, the direction of movement in carry would have remained the same.

in positions would be explained by these factors is uncertain, and it is thus impossible to conclude whether any unexplained shift—either upward or downward—in dealers' positions occurred.

Movements in dealers' positions during the 1960's were related in general to the same causative factors as in the 1950's. But in a number of respects the environment in the U.S. Government securities market was altered in the 1960's,[63] and dealers reacted quickly. The greater day-to-day stability of security prices and interest rates, described in Section V, led dealers to increase their net and gross long positions and in some cases gross short positions. This was due to a decreased risk of capital loss on the positions and probably also to dealers' attempts to increase their trading profits at a time when chances for speculative profits were greatly reduced.[64]

The initiation of sizable System operations in coupon issues during the 1960's was also associated with higher net and gross long positions in the long-term maturities, where operations were confined to purchases that apparently led dealers to expect higher security prices. These purchases showed no evidence of causing dealers to reduce their gross short positions. Very small declines in such positions

were associated with Treasury purchases, however, which also rose considerably from the 1950's to the 1960's. And there was limited evidence that official sales of Government securities might have a downward impact on long positions.

Treasury innovations in the debt management area in the 1960's—most notably advance refundings—do not appear to have been associated with any deterioration in dealers' positiontaking. Underwriting of financings by dealers continued to be sizable, and of roughly the same magnitude during both the 1950's and 1960's.

It has sometimes been asserted that the increased competition for short-term funds during the 1960's, with the development of active markets in certificates of deposit and in Federal funds, led to a deterioration in dealers' positive carry (or rise in negative carry). Table 9 indicates that carrying costs on long-term securities did indeed rise in the 1960's. For shorter-term Government securities, however, while dealers' financing costs increased in the 1960's, coupon rates and bill yields rose even more, thus causing a decline in negative carry.[65] And it is in the shorter-term issues where interest carry is an important factor due to the size of these positions.

Moreover, it is difficult to attribute shifts in interest carry to any one factor. The shifts in carrying costs from the 1950's to the 1960's might reflect, for example, cyclical movements in the yield structure. During periods of tight money the term structure of interest rates is flat to backward sloping—that is, short- and intermediate-term rates approach and sometimes rise above long-term rates. The carry on long-term securities held in position thus automatically worsens. But generally in such periods the carry also moves against dealers on short- and intermediate-term issues, which was not the case from the 1950's to the 1960's. Perhaps the divergent movement in carry on short- and long-term securities from the 1950's to the 1960's should be attributed primarily to

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[63] For a discussion of the altered environment see Edward C. Ettin, "Financial and Economic Environment of the 1960's in Relation to the U.S. Government Securities Market," pp. 1-31.

[64] That such profits were reduced is clear from the study by Colby, *op. cit.* A long-term decline in such profit potential might ultimately cause dealers to withdraw completely from the market even though dealers' short-run response is to raise their positions.

[65] A renewed warning must be issued about the inadequacies of the data on interest carry, especially for bills.

monetary and debt management policies. During the early years of the 1960's these policies were aimed at keeping short-term Treasury rates under upward pressure and long-term Treasury rates from rising. Simultaneously, substantial reserves were provided to the banking system—thus helping to keep dealer loan rates low relative to short-term market rates.

In conclusion, this study has found no evidence of any deterioration in dealers' willingness to take positions thus far during the 1960's. Positions in most maturity areas were higher on the average in the 1960's than in the 1950's, and in no cases were they lower; the increases could be traced in broad outline to movements in the factors that significantly affect position-taking. Moreover, the changed market environment in the 1960's—involving greater day-to-day rate stability, System operations in coupon issues, and debt management innovations—resulted in higher, not lower, position levels.   □

V. OTHER INDICATORS

Two other indicators evaluated in this assessment of the performance of the Government securities market were the frequency of large and small daily price changes and the spreads between quoted bid and asked prices. These are discussed below.

FREQUENCY OF LARGE AND SMALL DAILY PRICE CHANGES

Extremely large daily changes in prices have been considered undesirable because they often imply that the market lacks resiliency—that orders were not available to prevent wide price changes that presumably were out of line with true supply and demand conditions. On the other hand, a period of very small daily price changes has been criticized by dealers as eliminating the possibility for them to make short-run profits on technical price swings. In order to compare the 1950's and 1960's with respect to the extent of extreme price fluctuations, frequency distributions of daily price fluctuations in selected maturity groupings of U.S. Government securities were constructed. One class out of each frequency distribution was selected to represent small changes and one to represent large changes, but movements for other classes would have been similar (Charts 1–5, pages 102–06, and Appendix Tables 6 and 7).

In all maturity classes of notes and bonds for which data were prepared, the frequency of small daily price changes increased sharply in the 1960's, and particularly so from mid-1962 to mid-1965. In fact, for long-term bonds the frequency of small changes in 1963–65 was as great or greater than in 1950 before pegging was eliminated. Thus, from 1963 through most of 1965 daily price changes in bonds maturing in 5 to 10 years and after 10 years were 2/32 or less from 75 to 95 per cent of the time. In contrast, such small daily changes during the latter half of the 1950's occurred only 25 to 50 per cent of the time for bonds maturing after 10 years and 30 to 60 per cent of the time for 5- to 10-year issues.

Correspondingly, large daily changes (defined as more than 8/32 for after-10-year issues and 5- to 10-year issues and as more than 6/32 for 1- to 5-year issues) decreased in the 1960's. Whereas from 1956 through 1960 large daily changes in long-term bonds usually occurred on 10 per cent of the days in the quarter and frequently on 20 to 40 per cent of the days, such large daily changes almost disappeared after mid-1962. Of course, toward the end of 1965 the pattern again shifted, with large changes increasing and small ones decreasing.

Daily yield fluctuations in the 3-month Treasury bill showed the same pattern of increased stability in the 1960's. From 1963 through 1965, a daily yield change of 1 basis point or less on 3-month bills occurred from 70 to 92

per cent of the time. In the 1950's the peak frequency of such small changes was 57 per cent. Generally such small changes were seen only 25 to 45 per cent of the time. Similarly, large daily changes in bill yields (greater than 5 basis points) occurred less than 2 per cent of the time from 1962 through 1965, compared with a typical frequency of 20 to 60 per cent from 1958 to 1960 and 6 to 16 per cent in 1956 and 1957.

This pattern of price and yield stability in the 1960's stemmed from a number of changes in the environment.[66] To summarize briefly, stability in the long-term bond markets reflected largely specific expectations about Federal Reserve and Treasury policy and the business situation. "Operation twist" was popularly interpreted as an attempt by the Federal Reserve to prevent a rise in long-term rates. Moreover, moderate demands for credit and the absence of expectations of inflation lent added stability to rates. At the same time, the Treasury's eagerness to extend the maturity of the debt through advance refundings whenever the market situation made this technique seem suitable was expected to temper any decline in rates, as was the continuing business expansion.

In the bill market, the authorities' desire to prevent large outflows of short-term funds for balance of payments reasons kept a floor under bill rates, while their objective of accommodating further credit and business expansion tended to keep bill rates from rising much. The publicity given these objectives tended to set up expectations that helped to make attainment of such objectives possible. Also promoting day-to-day stability in bill rates was the growth of alternative short-term instruments and increased participation in the money market by many investors—both developments that increased the opportunities for arbitrage.

Thus, this indicator of market performance clearly confirms the statements of market participants concerning market stability, but judgments on whether such stability was desirable are complex, depending in part on the impact

that stability has on the behavior of dealers and other investors. For example, there is some evidence that increased stability cut into dealer profits[67]—which is an undesirable development, particularly over a sustained period. On the other hand, dealers apparently responded by holding larger positions, a development that usually implies greater speed in meeting investor orders but that may be risky if positions become exceptionally large relative to dealers' capital.

SPREAD BETWEEN QUOTED BID AND ASKED PRICES

Spreads between bid and asked prices quoted in the U.S. Government securities market are a key factor in the market's functioning. The size of the spreads is both an indicator of the willingness of dealers to make markets and a determinant of the participation of other investors in that market. A healthy market—one with "depth, breadth, and resiliency"—would be characterized by small spreads, but it would be subject to some minimum level that would not preclude dealer profitability.[68] The smallness of the spreads could be taken as signifying dealer willingness to operate on both sides of the market, to take positions, and to trade on the quoted spreads in volume. A widening of spreads, on the other hand, might indicate either dealer withdrawal from both sides of the market in an attempt to hold positions constant in the face of extreme uncertainty or dealer desires to change their net positions sharply in one direction. In the extreme case, the dealers would be performing as brokers, taking orders only on a "work out" basis. Moreover, widening of spreads would increase investors' costs and give impetus to reduced investor participation in the market.

In Charts 1–5 (pp. 102–06) and in Appendix Table 9, spreads are shown for bills and for

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[66] For a discussion of these changes, see Ettin, *op. cit.*

[67] See Colby, *op. cit.*

[68] A reduction in spreads reduces dealers' trading profits unless the volume of trading rises correspondingly. Trading profits may be especially important when other dealer profits are limited by either high carrying costs or steadily rising interest rates.

certain maturity categories of coupon issues. In interpreting these data, which are derived from published quotations, readers should be very cautious because the published quotations overstate the size of the spread for all preferred customers, whose trades take place at "inside" quotations. Nevertheless, this published series provides the only evidence available on trends in spreads.

Dealers contend that spreads in the 1960's have decreased, at least for Treasury bills. They trace such a decline to increasing competition among dealers, to attempts to increase trading activity in a period when speculative operations were largely precluded by the unusual short-term stability in interest rates, and to a rising supply of securities in some maturity areas.

The data confirm the dealers' assertion of declining spreads for Treasury bills but not for other issues. Over most of the period beginning in 1961, the published spread between bid and asked market yields for Treasury bills has been only 2 basis points, though in the latter part of 1965 the spread did rise to 3 basis points. In the mid- to late-1950's, in contrast, the spread fluctuated between 3 and 4 basis points. The typical spread on coupon issues maturing in 6 to 13 months has generally held steady at 2/32 since the early 1950's, despite a decline in the outstanding debt and in secondary market activity in this maturity category. For issues maturing in 3 to 5 years the typical spread has also remained generally steady since the early 1950's, fluctuating around 4/32.

For issues maturing in 5 to 10 years, the spread increased in the late 1950's and early 1960's from a typical 4/32 to 8/32. It remained at the higher level until 1963, when it declined again to 4/32. In part this fluctuation represents the shifting composition of the issues in the 5- to 10-year maturity area toward high-coupon issues, on which spreads have been lower in recent years. Thus, since early 1961 the spread on high-coupon issues alone has remained steady at 4/32. The typical published spread on after-10-year issues rose to 8/32 in 1958 and has remained there.

In general, the movement in spreads between bid and asked prices indicates some deterioration in market performance in long-term issues, at least for small investors, but this began in the late 1950's and not in the 1960's. Perhaps some short-run market improvement is implied by the decline in spreads on Treasury bills. A note of caution must be injected, however, in interpreting the decline in bill spreads as an unmitigated blessing. As one factor in dealer profitability, and an important one since the bulk of all trading is consummated in bills, the low level of spreads on bills at least prior to late 1965 could imply a long-run weakening in the ability of dealers to function. □

VI. APPENDIX TABLES

APPENDIX TABLE 1
DEALERS' GROSS TRANSACTIONS IN U.S. GOVERNMENT SECURITIES, QUARTERLY, 1950–66

Averages of daily figures, in millions of dollars

Quarter	Total	Treasury bills	Coupon issues maturing (in years)—			
			Within 1	1 to 5	5 to 10	After 10
1950– I...	767.4	350.3	193.8	107.1	21.4	94.9
II...	744.7	344.2	150.7	129.7	14.4	105.7
III...	1,203.6	433.2	480.1	144.0	27.2	119.1
IV...	955.8	466.0	281.6	76.8	15.0	116.3
1951– I...	874.4	410.6	182.8	85.7	16.0	179.2
II...	721.7	381.6	201.2	59.1	7.7	72.1
III...	655.1	422.3	140.9	46.2	6.1	39.6
IV...	797.6	518.2	139.3	86.4	5.8	47.8
1952– I...	773.9	477.7	189.7	51.1	6.2	49.1
II...	892.6	523.1	193.3	49.9	43.7	82.5
III...	795.3	452.7	211.8	45.3	57.4	28.3
IV...	958.8	609.4	116.4	130.7	49.5	52.7
1953– I...	857.1	597.6	164.0	46.9	27.7	21.0
II...	824.3	520.9	189.6	43.7	29.3	40.8
III...	826.3	465.3	228.4	80.0	21.3	31.3
IV...	929.1	518.4	199.6	100.7	60.0	50.3
1954– I...	1,348.8	619.7	413.6	150.0	101.4	64.1
II...	1,147.8	609.3	222.5	179.2	78.0	58.8
III...	950.1	528.3	172.5	123.3	90.1	35.9
IV...	1,013.2	535.5	185.1	146.0	110.7	36.0
1955– I...	973.2	490.7	196.4	137.9	80.9	67.4
II...	898.2	529.2	152.2	138.2	56.8	21.7
III...	875.8	473.9	129.8	145.4	90.3	36.5
IV...	1,180.7	588.9	196.9	217.4	146.0	31.7
1956– I...	996.1	588.7	166.8	149.2	69.7	21.6
II...	907.5	544.3	140.7	132.5	71.7	18.3
III...	890.5	515.3	176.1	116.3	68.1	14.7
IV...	1,136.1	642.1	174.6	210.8	89.6	19.0
1957– I...	1,041.7	727.1	183.4	102.3	18.2	10.7
II...	919.0	619.6	162.2	103.6	20.5	13.2
III...	949.9	651.4	171.6	92.7	19.5	14.8
IV...	1,144.9	661.1	190.8	196.5	63.0	33.4
1958– I...	1,285.1	641.3	292.9	196.4	100.6	54.0
II...	1,447.5	620.0	295.7	324.3	163.0	44.6
III...	1,097.4	625.8	215.2	125.4	79.1	51.8
IV...	1,155.2	844.0	149.0	100.1	39.5	22.7
1959– I...	1,483.0	877.6	216.8	269.9	80.4	38.3
II...	1,139.0	780.0	130.1	173.8	33.9	21.1
III...	1,160.5	793.6	145.9	179.1	28.0	13.8
IV...	1,379.7	866.0	164.8	279.0	55.5	14.4
1960– I...	1,326.2	876.9	191.3	222.1	24.7	11.2
II¹..	1,158.0	761.6	141.9	216.4	20.9	17.2
III...	1,105.3	722.6	111.7	193.1	51.2	26.6
IV...	1,482.5	908.7	163.5	313.1	63.2	33.8
1961– I...	1,524.7	932.8	139.0	364.9	58.7	29.3
II...	1,473.8	955.1	188.6	227.4	71.7	30.9
III...	1,533.2	1,095.8	165.6	204.2	45.4	22.1
IV...	1,677.4	1,161.5	176.8	263.9	37.5	37.5
1962– I...	1,775.9	1,266.5	172.5	215.3	75.0	46.6
II...	1,688.9	1,189.2	159.9	196.6	109.1	34.1
III...	1,725.1	1,205.9	194.9	192.4	100.0	31.9
IV...	1,939.8	1,259.7	155.5	296.1	195.8	32.6
1963– I...	1,951.5	1,269.8	178.6	276.8	163.9	62.3
II...	1,668.1	1,169.6	98.3	216.9	132.1	51.1
III...	1,621.8	1,128.2	130.3	171.4	143.3	48.5
IV...	1,662.9	1,230.8	71.1	197.9	125.2	37.8
1964– I...	1,887.4	1,350.8	109.4	248.9	127.9	50.3
II...	1,679.4	1,254.6	79.1	216.2	109.2	20.3
III...	1,640.8	1,169.1	85.6	189.4	145.4	51.2
IV...	1,892.3	1,435.4	69.1	222.4	121.9	43.3
1965– I...	1,960.9	1,435.4	82.2	234.7	116.2	92.3
II...	1,743.6	1,362.0	72.1	175.0	100.6	33.8
III...	1,517.9	1,177.6	72.0	149.8	81.0	37.4
IV...	2,079.3	1,626.1	89.0	219.2	110.3	34.7
1966– I...	2,171.9	1,551.9	136.6	288.7	156.7	37.7
II...	1,877.1	1,481.9	94.0	181.3	90.4	29.2
III...	1,869.9	1,435.1	144.4	180.7	73.1	36.4

¹ Estimates for the second quarter of 1960 are based on Securities Department data through May 13 and on Market Statistics Division data thereafter. See Source.

NOTE.—Transactions include both purchases and sales by dealers, but should exclude allotments of new issues, exchanges, maturities, and repurchase agreements. Until mid-May 1960 securities were to be classified by first call date; thereafter, by final maturity. Averages are based on number of trading days in the quarter.

SOURCE.—Federal Reserve Bank of New York: Securities Department, 1950 through mid-May 1960; Market Statistics Division thereafter.

APPENDIX TABLE 2
ANNUAL RATE OF TURNOVER OF U.S. GOVERNMENT MARKETABLE DEBT, QUARTERLY, 1953–66

Quarter	Treasury bills	Coupon issues maturing (in years)—			
		Within 1	1 to 5	5 to 10	After 10
1953– I....	...	...	...	...	....
II....	6.65	1.13	.539	.480	.430
III....	5.82	1.26	.816	.465	.321
IV....	6.62	1.13	.915	1.158	.531
1954– I....	7.75	2.76	1.368	1.208	.732
II....	7.19	1.76	1.771	.741	.697
III....	6.75	1.45	.981	.828	.483
IV....	6.84	1.61	1.060	.895	.509
1955– I....	6.27	2.30	.921	.542	1.111
II....	6.76	2.13	.880	.355	.403
III....	5.87	1.63	.953	.566	.649
IV....	6.92	1.80	1.534	.969	.556
1956– I....	6.69	1.65	.936	.496	.395
II....	6.52	1.39	.904	.486	.383
III....	6.17	1.73	.849	.470	.308
IV....	6.92	1.52	1.367	.772	.401
1957– I....	7.13	1.69	.566	.194	.226
II....	6.12	1.51	.581	.219	.288
III....	6.19	1.40	.567	.204	.388
IV....	6.17	1.58	1.125	.592	1.155
1958– I....	6.19	2.29	1.223	.798	2.241
II....	6.83	2.37	2.039	1.127	1.586
III....	6.93	1.82	.769	.527	1.654
IV....	7.81	1.25	.559	.295	.734
1959– I....	7.05	1.90	1.350	.676	1.149
II....	5.81	1.22	.823	.315	.590
III....	5.46	1.30	.832	.287	.378
IV....	5.56	1.43	1.254	.569	.437
1960– I....	5.49	1.61	.896	.342	.349
II....	5.22	1.53	.802	.340	.327
III....	5.04	1.50	.762	.671	.368
IV....	5.85	1.95	1.310	.915	.411
1961– I....	5.97	1.51	1.602	.821	.352
II....	6.34	1.76	1.123	.793	.411
III....	6.80	1.45	1.025	.549	.288
IV....	6.74	1.69	1.206	.553	.440
1962– I....	7.22	1.56	1.004	1.079	.542
II....	6.87	1.35	1.020	1.306	.399
III....	7.03	1.61	1.046	1.064	.397
IV....	6.80	1.55	1.539	1.766	.451
1963– I....	6.47	2.04	1.415	1.329	.935
II....	5.98	1.34	1.111	1.025	.703
III....	5.91	1.65	.900	1.122	.664
IV....	6.13	.95	1.067	.956	.501
1964– I....	6.41	1.59	1.280	1.021	.656
II....	6.05	1.17	1.105	.877	.265
III....	5.62	1.46	1.057	1.006	.641
IV....	6.46	1.12	1.199	.901	.562
1965– I....	6.21	1.42	1.270	.848	1.161
II....	6.08	1.26	.958	.750	.419
III....	5.46	1.13	.850	.626	.468
IV....	6.99	1.28	1.252	.909	.439
1966– I....	6.35	2.05	1.590	1.303	.478
II....	6.33	1.49	.978	.772	.372
III....	6.32	2.14	1.005	.650	.465

NOTE.—For coupon issues the annual rate of turnover equals daily-average gross transactions of dealers multiplied by 249 and divided by marketable debt held by the public. Until mid-May 1960 securities are classified by first call; thereafter, by final maturity. For Treasury bills the divisor is amount of bills outstanding.

APPENDIX TABLE 3
16TH LOWEST DAILY LEVEL OF DEALERS' GROSS TRANSACTIONS IN U.S. GOVERNMENT SECURITIES, QUARTERLY, 1953–65

In millions of dollars

Quarter	Treasury bills	Coupon issues maturing (in years)—			
		Within 1	1 to 5	5 to 10	After 10
1953– I...	441.5	122.0	31.4	20.7	15.9
II...	357.6	138.1	21.9	18.0	23.6
III...	313.4	160.7	46.0	10.2	19.3
IV...	378.1	138.5	76.4	35.5	30.3
1954– I...	448.1	265.3	105.5	63.4	49.1
II...	453.3	145.3	127.4	55.0	42.0
III...	393.7	109.7	78.3	52.0	24.3
IV...	371.8	114.2	99.6	70.8	24.5
1955– I...	353.4	106.8	88.7	52.3	27.1
II...	367.5	110.0	88.1	42.0	16.1
III...	305.2	83.0	111.0	64.2	20.0
IV...	401.7	135.6	154.8	110.9	22.4
1956– I...	408.6	111.3	107.3	51.9	16.2
II...	349.7	99.1	95.1	57.5	13.0
III...	347.3	105.6	78.2	42.2	10.1
IV...	442.8	115.8	125.3	68.3	10.2
1957– I...	536.2	95.7	75.0	11.6	7.2
II...	440.7	88.6	69.9	14.3	7.7
III...	453.4	105.1	52.1	11.2	6.5
IV...	482.2	117.5	147.5	39.0	20.3
1958– I...	488.0	194.9	139.6	58.6	21.9
II...	409.9	198.9	220.8	93.4	25.0
III...	420.8	113.7	84.5	40.7	23.7
IV...	599.3	94.8	64.9	31.0	15.3
1959– I...	639.1	133.1	198.1	51.7	24.3
II...	591.6	84.1	118.9	21.3	14.1
III...	574.0	93.4	112.5	19.2	9.0
IV...	626.0	105.8	210.7	36.9	10.7
1960– I...	641.4	137.6	156.3	17.3	7.7
II...	524.9	84.7	142.2	8.9	9.4
III...	553.1	72.5	141.9	27.8	15.6
IV...	715.9	104.2	219.2	43.2	23.3
1961– I...	782.4	103.7	251.7	39.3	18.9
II...	806.7	132.0	149.5	34.8	20.8
III...	938.3	89.7	118.3	26.1	12.4
IV...	943.9	117.9	188.9	22.9	20.4
1962– I...	1,026.8	108.9	150.9	52.7	22.2
II...	978.0	98.8	148.7	86.1	22.9
III...	962.5	109.5	128.3	60.0	23.1
IV...	1,020.5	88.7	235.8	139.1	20.0
1963– I...	1,093.1	73.0	184.8	99.0	27.6
II...	910.0	51.8	163.2	88.3	28.9
III...	892.0	48.7	112.0	82.5	18.2
IV...	1,014.8	41.3	112.8	90.1	23.5
1964– I...	1,098.2	47.9	190.6	90.8	27.3
II...	1,007.5	44.7	158.0	65.8	11.7
III...	963.7	30.4	109.3	83.1	27.1
IV...	1,138.7	40.1	156.3	80.8	27.4
1965– I...	1,245.2	33.9	142.9	70.1	39.6
II...	1,108.0	40.0	124.1	64.5	18.8
III...	924.0	36.7	107.9	58.8	22.9
IV...	1,291.6	62.7	141.5	69.8	23.3

NOTE.—Transactions include purchases and sales by dealers but should exclude allotments of new issues, exchanges, maturities, and repurchase agreements. Until mid-May 1960 securities were to be classified by first call date; thereafter, by final maturity. Averages are based on number of trading days in the quarter.

NOTE.—Data are on a commitment basis and include securities sold by dealers under repurchase agreement since mid-May 1960. From 1950 through the fourth quarter of 1960, however, some dealers may have reported differently. Securities were to be classified by first call through mid-May 1960 and by final maturity thereafter. Averages are based on number of trading days in the quarter.

SOURCE.—Federal Reserve Bank of New York: Securities Department, 1950 through mid-May 1960; Market Statistics Division thereafter.

APPENDIX TABLE 4
DEALERS' NET POSITIONS IN U.S. GOVERNMENT SECURITIES, QUARTERLY, 1950–66

Averages of daily figures, in millions of dollars

Quarter	Total	Treasury bills	Coupon issues maturing (in years)—			
			Within 1	1 to 5	5 to 10	After 10
1950– I...	1,076.0	406.9	383.5	255.3	15.1	15.3
II...	1,192.2	423.4	387.8	364.7	6.6	9.7
III...	1,112.6	491.7	345.7	153.7	–6.0	127.6
IV...	877.7	424.7	261.0	107.3	–8.2	92.7
1951– I...	1,004.2	491.1	231.0	174.2	9.6	98.3
II...	779.5	400.6	292.2	67.9	2.3	16.6
III...	1,191.4	667.3	404.5	75.0	3.0	41.6
IV...	928.3	621.5	214.3	66.4	3.6	22.6
1952– I...	518.3	337.8	132.1	7.1	16.3	25.1
II...	1,185.1	585.1	414.3	59.3	32.7	93.7
III...	932.2	467.2	320.5	73.6	54.5	16.5
IV...	1,052.9	763.1	167.1	97.1	13.2	12.3
1953– I...	932.9	575.5	253.5	41.6	60.5	1.7
II...	984.4	683.9	169.1	63.2	53.8	14.4
III...	1,244.2	691.3	391.6	106.9	27.8	26.7
IV...	1,555.1	811.4	429.8	191.9	70.4	51.7
1954– I...	1,490.5	572.9	486.4	173.8	222.8	34.7
II...	1,613.2	612.3	455.3	309.1	199.8	36.7
III...	1,808.4	785.4	575.5	295.3	134.8	17.4
IV...	1,277.5	350.3	561.8	275.2	92.5	–2.3
1955– I...	761.9	254.8	277.1	177.8	–7.8	60.0
II...	929.0	448.8	232.3	160.4	–2.7	90.2
III...	864.4	537.4	162.0	104.9	–12.8	72.8
IV...	1,132.3	575.6	319.5	129.5	55.0	52.8
1956– I...	1,083.8	460.1	304.9	239.6	61.0	18.1
II...	1,202.9	606.7	258.8	296.1	39.5	1.7
III...	959.9	516.8	251.5	165.5	32.9	–6.8
IV...	802.0	435.3	188.7	160.6	12.9	4.5
1957– I...	1,175.9	620.2	305.5	274.8	–38.0	13.3
II...	1,168.0	614.4	321.9	227.7	3.1	1.0
III...	1,237.5	709.4	414.3	103.8	5.3	4.7
IV...	1,665.0	764.3	499.5	310.6	26.8	63.8
1958– I...	1,932.0	868.4	574.7	266.5	113.2	109.2
II...	2,198.3	949.8	531.5	384.6	178.8	153.7
III...	1,017.9	620.0	188.0	101.5	77.0	31.5
IV...	839.5	466.1	227.9	96.6	49.4	–.5
1959– I...	1,380.8	933.4	297.8	100.9	36.0	12.6
II...	1,267.4	851.2	305.8	64.0	46.0	.4
III...	968.3	555.7	213.4	178.1	25.6	–4.4
IV...	1,048.0	458.7	331.3	233.0	24.0	.9
1960– I...	993.7	515.6	280.8	191.7	3.6	2.1
II...	1,830.1	904.6	379.5	491.7	25.2	29.1
III...	2,747.6	1,683.2	330.8	619.3	102.0	12.1
IV...	2,573.2	1,631.2	281.2	519.7	90.2	50.9
1961– I...	2,600.9	1,703.0	311.0	489.1	54.9	42.7
II...	2,512.0	1,552.6	553.1	340.2	63.3	2.8
III...	2,546.2	1,918.4	394.9	211.6	21.7	–.5
IV...	3,324.4	2,500.1	492.6	304.9	–39.1	65.7
1962– I...	2,726.9	1,909.6	529.6	232.2	22.3	33.1
II...	3,727.5	2,652.9	597.3	307.8	134.6	34.8
III...	2,885.1	2,182.5	461.0	155.1	66.5	20.0
IV...	3,936.2	2,959.9	404.8	397.2	156.0	18.1
1963– I...	3,677.2	2,513.8	477.1	466.2	169.1	50.9
II...	3,557.5	2,500.9	304.5	451.9	77.5	22.5
III...	3,207.2	2,431.0	384.9	318.9	56.2	16.2
IV...	3,386.1	2,729.3	165.7	295.4	83.1	107.5
1964– I...	3,273.9	2,553.4	286.5	347.6	34.8	51.6
II...	2,981.3	2,512.6	223.0	136.1	122.6	–13.1
III...	4,027.5	2,868.4	267.9	381.3	303.0	206.7
IV...	3,418.3	2,597.3	295.0	372.0	60.8	93.0
1965– I...	3,403.7	2,513.7	199.9	154.0	217.6	318.3
II...	3,510.5	2,616.5	210.0	125.8	323.3	234.7
III...	3,529.2	2,873.4	125.7	133.8	197.6	198.5
IV...	2,935.4	2,512.6	210.4	144.4	34.3	33.6
1966– I...	2,181.6	1,949.2	290.0	–53.7	–13.3	9.5
II...	2,197.3	1,730.6	317.5	81.3	56.4	11.5
III...	2,042.9	1,484.9	400.4	115.7	46.3	–4.3

1 The estimates for the second quarter of 1960 are based on Securities Department data through May 13 and Market Statistics Division data thereafter. See Source.

APPENDIX TABLE 5
DEALERS' GROSS LONG AND GROSS SHORT POSITIONS IN U.S. GOVERNMENT SECURITIES, QUARTERLY, 1960-66

Averages of daily figures, in millions of dollars

Quarter	Total	Treasury bills	Gross long positions [1] — Coupon issues maturing (in years) Within 1	1 to 5	5 to 10	After 10	Total	Treasury bills	Gross short positions [2] — Coupon issues maturing (in years) Within 1	1 to 5	5 to 10	After 10
1960-IV	2,840.3	1,734.4	302.4	603.2	118.5	81.8	267.0	103.2	21.2	83.4	28.3	30.9
1961- I	2,956.4	1,807.2	346.5	636.1	105.6	61.0	355.5	104.2	35.4	147.0	50.7	18.3
II	2,928.5	1,686.3	600.5	497.9	115.4	28.4	416.4	133.7	47.4	157.7	52.0	25.6
III	3,039.3	2,053.5	455.4	422.2	80.4	27.7	493.0	135.1	60.4	210.6	58.8	28.2
IV	3,813.9	2,627.1	532.3	507.4	39.7	107.3	489.4	126.9	39.7	202.5	78.8	41.6
1962- I	3,268.1	2,127.6	574.7	390.1	75.2	100.4	541.1	218.0	45.1	157.8	52.9	67.3
II	4,119.7	2,785.0	631.4	444.3	179.0	79.9	392.2	132.0	34.1	136.4	44.5	45.1
III	3,480.1	2,413.8	527.6	328.8	141.4	68.5	594.9	231.3	66.6	173.6	74.9	48.5
IV	4,305.4	3,087.6	426.7	504.1	235.4	51.5	369.1	127.7	21.9	106.8	51.4	33.4
1963- I	4,193.2	2,656.6	498.5	612.2	320.6	105.3	515.9	142.8	21.3	145.9	151.4	54.4
II	3,840.8	2,678.3	323.0	603.6	172.1	63.7	483.3	177.3	18.5	151.7	94.5	41.2
III	3,817.4	2,627.8	410.4	474.3	223.1	81.7	610.2	196.8	25.5	155.3	166.9	65.6
IV	3,946.4	2,873.0	209.5	497.8	240.2	125.9	560.3	143.7	43.8	202.3	152.1	18.4
1964- I	3,897.4	2,706.9	319.4	568.6	206.4	96.1	623.5	153.5	32.9	221.0	171.6	44.5
II	3,565.6	2,673.0	267.3	325.1	269.3	30.7	584.3	160.4	44.3	189.0	146.7	43.8
III	4,613.4	3,038.0	288.8	541.7	472.3	272.3	585.9	169.6	20.9	160.4	169.3	65.6
IV	3,983.2	2,811.6	310.8	576.6	162.2	121.7	564.9	214.3	15.8	204.6	101.4	28.7
1965- I	4,022.3	2,757.7	224.3	366.1	299.9	374.2	618.6	244.0	24.4	212.1	82.3	55.9
II	4,155.7	2,811.9	298.1	369.7	408.3	267.5	645.2	195.4	88.1	243.9	85.0	32.8
III	4,166.3	3,091.8	232.7	358.3	258.5	224.8	637.1	218.4	107.0	224.5	60.9	26.3
IV	3,621.4	2,796.6	294.2	316.8	137.2	76.5	686.0	284.0	83.8	172.4	102.9	42.9
1966- I	3,045.4	2,239.7	376.1	222.6	154.9	52.3	863.8	290.5	86.1	276.3	168.2	42.8
II	2,911.0	2,064.1	380.7	240.0	164.4	61.9	713.7	333.5	63.2	158.7	108.0	50.4
III	2,787.7	1,886.8	484.8	238.3	125.4	52.5	744.9	401.9	84.4	122.6	79.1	56.8

[1] Data are on a commitment basis and include securities sold by dealers under repurchase agreement. Averages are based on the number of trading days in the quarter.

[2] Data are on a commitment basis. Averages are based on the number of trading days in the quarter.

SOURCE.—Market Statistics Division, Federal Reserve Bank of New York.

APPENDIX TABLE 6
FREQUENCY OF LARGE DAILY PRICE (OR YIELD) CHANGES IN SELECTED U.S. GOVERNMENT SECURITIES, QUARTERLY, 1950–66

Percentage of observations

Quarter	3-month Treasury bills (change > 5 basis points)	Coupon issues maturing (in years)—		
		1 to 5 (change > 6/32)	5 to 10 (change > 8/32)	After 10 (change > 8/32)
1950– I		.0	.0	.0
II		.0	.0	.5
III		.0	.0	1.1
IV		.0	.0	1.6
1951– I		1.6	3.3	8.2
II		.0	.8	4.2
III		.0	.0	3.7
IV		1.6	1.6	6.0
1952– I	(1)	.0	.0	1.0
II		.0	.8	4.8
III		.0	.8	9.4
IV		.0	.0	6.6
1953– I		.0	.0	4.9
II		.0	6.3	21.1
III		.0	3.1	4.6
IV		.0	.0	15.5
1954– I		1.6	.0	13.1
II		2.4	4.8	11.9
III		.0	.8	1.6
IV	3.2	.0	.0	.0
1955– I	14.3	1.6	3.2	11.9
II	4.8	.0	.0	1.6
III	4.7	1.6	8.6	8.7
IV	13.3	1.7	3.3	6.7
1956– I	16.4	.0	5.7	7.3
II	12.5	2.3	11.8	14.1
III	14.3	.8	10.3	19.9
IV	6.5	1.6	13.9	21.3
1957– I	16.4	13.1	16.3	34.4
II	6.3	4.0	7.9	18.3
III	10.9	3.9	9.4	16.4
IV	11.3	12.8	26.6	31.5
1958– I	29.0	2.4	4.0	16.9
II	20.7	4.8	7.2	27.0
III	37.6	25.8	35.9	37.6
IV	26.2	7.3	18.8	36.1
1959– I	36.7	5.0	5.8	12.6
II	24.6	.8	5.3	8.4
III	36.9	1.5	4.6	10.7
IV	36.1	5.8	16.3	23.8
1960– I	48.5	17.8	34.7	45.1
II	60.3	30.2	22.2	23.0
III	28.1	13.3	17.2	24.3
IV	28.3	9.1	12.5	24.3
1961– I	14.8	7.3	8.1	14.0
II	10.9	10.2	9.4	11.7
III	1.6	.8	1.6	13.5
IV	4.9	.8	3.3	5.7
1962– I	1.6	3.2	2.4	11.3
II	.0	2.4	9.5	13.6
III	1.6	.0	.0	6.4
IV	1.6	.0	.8	2.4
1963– I	.0	.0	.5	.8
II	.0	.0	.0	.0
III	3.2	.0	.0	1.6
IV	.0	.0	.0	.0
1964– I	.0	.0	.0	.8
II	.0	.0	.0	.0
III	.0	.0	.0	1.6
IV	1.6	1.6	2.5	2.4
1965– I	.0	.0	.0	.0
II	.0	.0	.0	.0
III	.0	.0	.0	.0
IV	1.6	1.6	3.2	9.0
1966– I	9.5	1.6	8.7	21.4
II	12.7	2.4	10.3	21.4
III	29.7	8.6	21.1	34.4

1 Figures not calculated for this period.

NOTE.—The 3-month Treasury bill issue and usually two issues in each of the other maturity classes were used in the calculations. For the specific coupon issues see Appendix Table 8.

SOURCE.—Daily quotation sheets prepared by the Securities Department, Federal Reserve Bank of New York, and later by the Market Statistics Division of that Bank.

APPENDIX TABLE 7
FREQUENCY OF SMALL DAILY PRICE (OR YIELD) CHANGES IN SELECTED U.S. GOVERNMENT SECURITIES, QUARTERLY, 1950–66

Percentage of observations

Quarter	3-month Treasury bills (change 1 basis point or less)	Coupon issues maturing (in years)—		
		1 to 5 (change 1/32 or less)	5 to 10 (change 2/32 or less)	After 10 (change 2/32 or less)
1950– I		96.8	95.1	89.3
II		97.6	92.9	92.6
III		87.3	81.8	80.9
IV		82.8	82.0	81.4
1951– I		81.1	77.1	72.1
II		76.5	78.1	69.3
III		96.8	87.3	60.8
IV		82.0	86.1	60.1
1952– I	(1)	85.5	82.3	59.6
II		92.8	84.1	60.8
III		90.6	81.3	53.9
IV		91.0	85.2	49.2
1953– I		88.5	88.6	49.1
II		71.8	71.9	38.2
III		92.3	86.9	65.4
IV		93.4	86.9	40.1
1954– I		68.0	91.0	48.3
II		70.6	67.5	41.2
III		86.0	85.2	70.4
IV	55.6	74.5	67.3	53.3
1955– I	41.3	56.4	61.9	47.6
II	42.9	71.5	71.4	63.5
III	40.6	63.2	60.1	53.7
IV	41.6	61.7	50.0	57.5
1956– I	37.7	57.4	50.0	52.5
II	32.9	57.1	48.4	44.5
III	33.3	73.0	30.9	31.7
IV	57.3	67.2	49.2	40.1
1957– I	37.7	32.8	36.1	24.6
II	39.6	54.8	61.9	34.1
III	40.6	57.8	53.1	37.6
IV	46.8	39.5	33.1	26.6
1958– I	30.7	51.6	55.7	39.5
II	33.3	42.0	64.2	31.7
III	18.7	13.3	32.8	28.9
IV	36.1	39.3	38.5	29.5
1959– I	35.0	48.3	58.3	49.2
II	24.6	59.3	62.4	61.5
III	27.7	51.5	52.3	44.6
IV	26.3	41.0	33.6	38.5
1960– I	8.1	25.0	18.5	19.4
II	8.0	19.0	34.9	32.5
III	17.2	25.8	43.7	36.8
IV	16.7	29.2	47.5	40.8
1961– I	32.8	29.6	57.3	49.2
II	35.9	44.5	49.2	51.5
III	36.5	52.4	61.9	43.7
IV	54.1	57.4	58.2	53.3
1962– I	50.0	60.5	58.0	41.9
II	58.8	62.7	46.0	34.1
III	61.9	69.0	74.6	61.1
IV	80.3	82.8	69.7	65.5
1963– I	81.9	88.5	76.5	68.8
II	92.0	83.3	80.9	76.2
III	70.3	80.4	82.9	89.9
IV	80.3	82.0	86.1	84.4
1964– I	86.9	78.7	83.6	87.7
II	85.9	76.6	77.3	89.9
III	81.2	87.5	86.0	86.7
IV	77.1	87.7	73.7	72.1
1965– I	78.6	91.0	84.4	86.1
II	82.5	92.1	95.3	95.3
III	73.5	90.6	90.6	86.8
IV	72.1	79.5	59.0	54.1
1966– I	49.2	52.4	43.7	38.1
II	55.6	65.9	49.2	40.5
III	26.6	46.1	35.9	26.6

1 Figures not calculated for this period.

NOTE.—The 3-month Treasury bill issue and usually two issues in each of the other maturity classes were used in calculations. For the specific coupon issues see Appendix Table 8.

SOURCE.—Daily quotation sheets prepared by the Securities Department, Federal Reserve Bank of New York, and later by the Market Statistics Division of that Bank.

APPENDIX TABLE 8

COUPON ISSUES USED FOR CALCULATING FIGURES SHOWN IN APPENDIX TABLES 6 AND 7

Quarter	1- to 5-year maturities					5- to 10-year maturities			After-10-year maturities		
1950–I	2 B 12/52-54	1¾ N 3/54				2⅞ B 3/55-60	2¼ B 9/56-59		2½ B 6/62-67	2½ B 9/67-72	2½ B 12/67-72
II											
III											
IV											
1951–I											
II											
III											
IV											
1952–I											
II											
III											
IV											
1953–I		1¾ N 12/55							3¼ B 6/78-83		
II											
III											
IV											
1954–I	2¾ B 6/58							2½ B 11/61			
II											
III		1⅞ N 2/59									
IV											
1955–I							2½ B 8/63				
II											
III											
IV											
1956–I											
II											
III											
IV											
1957–I	2½ B 11/61					2½ B 6/62-67			3½ B 2/90		
II											
III											
IV											
1958–I		3¾ N 11/62					2⅝ B 2/65				
II											
III											
IV											
1959–I											
II											
III											
IV											
1960–I	2⅝ B 2/65	5 N 8/64					3⅞ B 5/68		3½ B 11/98		
II											
III											
IV											
1961–I											
II											
III											
IV											
1962–I						4 B 8/71		2½ B 12/67-72			
II											
III											
IV											
1963–I	3⅞ B 5/68	3⅝ N 2/67									
II											
III										4¼ B 8/87-92	
IV											
1964–I											
II											
III											
IV											
1965–I											
II											
III											
IV											
1966–I	4 B 2/69										
II											
III											

APPENDIX TABLE 9
SPREAD BETWEEN DEALERS' QUOTED BID AND ASKED PRICES ON U.S. GOVERNMENT SECURITIES, QUARTERLY, 1950–66

Quarter	3-month Treasury bills	Coupon issues maturing—			
		6 to 13 months	In years		
			3 to 5	5 to 10	After 10
	Basis points	Most typical spread, in 32nds			
1950– I......	4	n.a.	2	2	2
II......	4	n.a.	1	2	2
III......	4	n.a.	1	2	2
IV......	6	n.a.	2	2	2
1951– I......	6	n.a.	1	4	2
II......	8	n.a.	3	4	4
III......	4	n.a.	3	4	4
IV......	4	n.a.	2	4	4
1952– I......	8	n.a.	2	4	4
II......	6	n.a.	2	4	4
III......	3	n.a.	2	4	4
IV......	4	2	2	4	4
1953– I......	4	2	4	4	4
II......	5	2	4	4	8
III......	4	2	6	6	8
IV......	3	2	6	6	6
1954– I......	4	2	4	6	6
II......	4	2	3	4	6
III......	4	2	2	4	4
IV......	2	2	2	4	4
1955– I......	3	2	3	4	4
II......	4	2	2	4	4
III......	3	2	2	4	4
IV......	4	2	4	4	4
1956– I......	3	2	4	4	4
II......	4	2	4	4	4
III......	4	2	2	4	4
IV......	4	2	4	4	4
1957– I......	4	2	8	8	8
II......	4	2	4	4	4
III......	3	2	4	4	4
IV......	3	2	4	4	4
1958– I......	4	2	4	8	8
II......	3	2	4	4	8
III......	4	2	4	8	8
IV......	3	2	4	8	8
1959– I......	4	2	6	6	8
II......	4	2	4	6	8
III......	4	2	4	6	8
IV......	4	2	4	6	8
1960– I......	3	4	4	8	8
II......	5	6	4	8	8
III......	3	4	4	8	8
IV......	4	4	4	8	8
1961– I......	3	4	4	8	8
II......	2	2	4	8	8
III......	3	2	4	8	8
IV......	3	2	4	8	8
1962– I......	3	2	4	8	8
II......	2	2	4	8	8
III......	2	2	4	8	8
IV......	2	2	4	8	8
1963– I......	2	2	4	8	8
II......	2	2	2	6	8
III......	2	2	2	6	8
IV......	2	2	2	4	8
1964– I......	2	2	2	4	8
II......	2	2	4	4	8
III......	2	2	4	4	8
IV......	3	2	4	4	8
1965– I......	2	2	4	4	8
II......	2	2	4	4	8
III......	3	2	4	4	8
IV......	3	2	4	4	8
1966– I......	3	2	4	4	8
II......	3	2	4	4	8
III......	3	2	4	4	8

n.a. Not available.

NOTE.—The quarterly series were derived from observations on the 15th of each month (for Treasury bills on the Wednesday closest to the 15th). The typical spread is the one that existed on the 15th of 2 out of the 3 months; or if the spreads were different, it is the middle spread.

SOURCE.—1950 through February 1953, U.S. Treasury, "Prices and Yields of Public Marketable Securities Issued by the U.S. Government and by Federal Agencies"; beginning with March 1953, Board of Governors of the Federal Reserve System, daily quotation sheets.

APPENDIX TABLE 10
LIST OF INDEPENDENT VARIABLES FOR MULTIPLE REGRESSIONS OF TRADING (SECTION III)

Symbol	Problem	Variable	Unit
X_3	All	Federal Reserve and Treasury transactions, quarterly averages of daily figures[1]	Millions of dollars
X_4	All, except 101	Rights to Treasury financings held by public, quarterly totals[1]	Billions of dollars
X_4	101	Rights in all maturity classes to Treasury financings held by public, quarterly totals	Billions of dollars
X_5	All, except 101	New issues sold to public in Treasury financings, quarterly totals[1]	Billions of dollars
X_5	101	Dummy variable, $+1$ if advance refunding in quarter	
X_6	All, except 101	New issues sold in Treasury financings in last month of preceding quarter[1]	Billions of dollars
X_6	101	Net change in bills outstanding from start to end of quarters	Billions of dollars
X_7	All, except 101	New issues sold in Treasury financings in last month of current quarter[1]	Billions of dollars
X_8	All, except 101	Marketable debt held by public, average of end-of-month figures for four dates (three in the quarter and last one of preceding quarter); maturity classification based on first call through April 1960, and on final maturity thereafter[1]	Billions of dollars
X_9	101	Marketable debt outstanding, average of end-of-month figures for four dates (three in the quarter and last one of preceding quarter)[1]	Billions of dollars
X_{10}		Level of interest rates (quarterly averages of monthly averages) on —	Per cent
	101, 201	3-month bills (market rate)	
	301	3- to 5-year Government securities	
	401, 501	Long-term Government securities	
X_{11}	Same as for X_{10}	Change in interest rates in current quarter (weekly average for last week in quarter compared with similar average for preceding quarter)	Per cent
X_{12}	Same as for X_{10}	Change in interest rates in preceding quarter	Per cent
X_{13}	301, 401	Dummy variable, $+1$ in fourth quarter	
X_{14}		Frequency of small daily price changes in Government securities:	Per cent
	101	Percentage of observations in quarter with yield change of 2 basis points or less	
	301	Percentage with change of 1/32 or less	
	401, 501	Percentage with change of 2/32 or less	
X_{15}	All	Free reserves (quarterly averages of monthly averages)	Millions of dollars
X_{16}	All	Number of dealers in series	
X_{17}	All	Cost of financing at New York City banks, quarterly averages	Per cent

[1] Variable uses data for appropriate maturity class in each problem.

NOTE—DESCRIPTION OF MULTIPLE REGRESSION ANALYSES EXPLAINING TRADING

Multiple regressions were calculated with quarterly data for three periods: 1953-II—1965-IV; 1953-II—1960-I; and 1960-III—1965-IV. The shorter periods subdivide the longer period into the 1950's and 1960's and also into periods for which the source of the data is the same.

The dependent variables were Y_1, gross trading in U.S. Government securities (in millions of dollars); Y_2, gross trading in U.S. Government securities minus trading with the Federal Reserve and Treasury (in millions of dollars); Y_3, gross trading in U.S. Government securities with private customers—that is, all customers except the Federal Reserve, Treasury, dealers, and brokers (in millions of dollars);[1] and Y_4, the annual rate of turnover of the marketable U.S. Government debt held by the public (for problem 101, total bills outstanding).

Separate regressions were calculated to explain these dependent variables for each of the following maturity classes of U.S. Government securities: bills,

[1] Calculated for 1960-III-1965-IV only.

and coupon securities with maturities within 1 year, in more than 1 but as long as 5 years, in more than 5 but as long as 10 years, and after 10 years. Problems concerning these maturity classes were labeled 101, 201, 301, 401, and 501, respectively. The independent variables are listed on the opposite page.

The regression program was a stepwise program that enters first the independent variable that causes the greatest reduction in the variance of the dependent variable, with other variables entered in the order of their contribution to the remaining unexplained variance. As a first approximation, regressions were calculated using most of the relevant independent variables. Then additional regressions were run using only those variables that caused a significant reduction in unexplained variance when they were entered or that had a significant (at the 5 per cent level) net regression coefficient when all variables had been added.[2] The major results of these equations are presented in Appendix Table 11. For the subperiods, results are presented both for equations using the same variables as the equation for the entire period and for equations with independent variables that were significant in the given subperiod.

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[2] In a few cases variables that were not significant were included because they made others significant.

APPENDIX TABLE 11
RESULTS OF MULTIPLE REGRESSIONS EXPLAINING TRADING IN U.S. GOVERNMENT SECURITIES

A. U.S. Treasury bills

Dependent variable and period	R² adjusted	Degrees of freedom	Durbin-Watson ratio	Net regression coefficients and standard errors					
				X₉	X₃	X₁₂	X₁₅	X₁₀	X₁₆
Y₁									
1950's and 1960's	.957	46	1.48	* 20.59 (1.09)	* 3.36 (.90)	* 56.12 (18.98)	* .086 (.029)	…	…
1950's	.859	23	1.44	* 19.13 (1.81)	* 4.43 (1.55)	27.19 (17.40)	.037 (.031)	…	…
	.855	25	‡ 1.42	* 18.86 (1.53)	* 5.08 (1.49)	…	…	…	…
1960's	.886	17	‡ 1.61	* 34.25 (5.47)	2.74 (1.11)	147.00 (94.58)	* .476 (.145)	…	…
	.877	18	‡ 1.49	* 38.77 (4.81)	* 2.96 (1.14)	…	* .582 (.133)	…	…
Y₂									
1950's and 1960's	.954	46	1.48	* 20.59 (1.09)	* 2.36 (.90)	* 56.12 (18.98)	* .086 (.029)	…	…
1950's	.857	23	1.44	* 19.13 (1.81)	* 3.43 (1.55)	27.19 (17.40)	.037 (.031)	…	…
	.852	25	‡ 1.42	* 18.86 (1.53)	* 4.08 (1.49)	…	…	…	…
1960's	.874	17	‡ 1.61	* 34.25 (5.47)	1.74 (1.11)	147.00 (94.58)	* .476 (.145)	…	…
	.864	18	‡ 1.49	* 38.77 (4.81)	1.96 (1.14)	…	* .582 (.133)	…	…
Y₃									
1960's	.919	18	‡ 1.89	* 25.84 (3.16)	…	* 126.36 (55.21)	* .299 (.085)	…	…
Y₄									
1950's and 1960's	.409	47	1.39	…	* .016 (.005)	* .519 (.137)	…	* −.511 (.089)	…
1950's	.454	24	‡ 1.55	…	* .042 (.014)	.319 (.174)	…	* −.403 (.109)	…
	.403	25	‡ 1.53	…	.044 (.015)	…	…	* .294 (.095)	…
1960's	.456	18	‡ 1.51	…	* .017 (.007)	* 1.734 (.501)	…	* −.521 (.184)	…
	.652	18	‡ 1.85	…	…	1.161 (.404)	.0022 (.0004)	…	* .415 (.107)

B. Securities other than bills maturing within 1 year

Dependent variable and period	R^2 adjusted	Degrees of freedom	Durbin-Watson ratio	Net regression coefficients and standard errors						
				X_8	X_{10}	X_4	X_{11}	X_{12}	X_{15}	X_5
Y_1										
1950's and 1960's..	.737	46	‡ 1.65	* 4.07 (.74)	* −24.75 (5.73)	* 3.78 (1.05)	* −20.81 (8.79)	...	...	...
1950's	.702	23	‡ 1.59	1.66 (1.06)	−11.66 (6.87)	* 9.76 (1.96)	* −24.31 (9.30)	...	...	...
1960's	.735	24	‡ 1.57	...	...	10.98 (1.68)	* −25.07 (8.55)	* −27.93 (9.84)	...	...
1960's	.873	17	‡ § 2.62	* 4.39 (1.12)	* −30.21 (9.80)	* 2.14 (.71)	13.03 (21.49)	...	...	...
	.878	18	‡ 2.58	* 4.60 (1.04)	* −27.66 (8.69)	* 2.00 (.67)	...	...	...	...
Y_2										
1950's and 1960's..	.741	46	‡ 1.68	* 3.97 (.73)	* −24.47 (5.64)	* 3.79 (1.03)	* −22.83 (8.65)	...	...	...
1950's	.715	23	‡ 1.68	1.67 (1.04)	−11.99 (6.72)	* 9.59 (1.91)	* −26.37 (9.11)	...	...	...
1960's	.738	24	‡ 1.61	...	...	10.88 (1.67)	* −27.21 (8.50)	* −26.88 (9.79)	...	...
1960's	.865	17	‡ § 2.54	* 3.61 (1.07)	* −30.43 (9.38)	* 2.42 (.68)	17.72 (20.57)	...	...	...
	.867	18	‡ 2.48	* 3.90 (1.01)	* −26.96 (8.41)	* 2.24 (.64)	...	...	...	...
Y_3										
1960's	.774	19	‡ 1.82	...	...	* 1.47 (.54)	...	...	* .098 (.013)	...
Y_4										
1950's and 1960's..	.424	48	1.45	...	* −.186 (.043)	* .032 (.009)	...	...	...	...
1950's	.380	25	1.17	...	−.112 (.068)	* .056 (.019)	...	...	...	...
1960's	.518	19	‡ 2.44	...	* −.248 (.066)	* .022 (.007)	...	...	...	...

For notes, see p. 148.

APPENDIX TABLE 11—Continued

C. Securities maturing in 1 to 5 years

Dependent variable and period	R^2 adjusted	Degrees of freedom	Durbin-Watson ratio	Net regression coefficients and standard errors						
				X_8	X_{15}	X_{13}	X_7	X_5	X_{12}	X_4
Y_1										
1950's and 1960's..	.552	44	‡1.83	* 3.60 (.70)	* .043 (.021)	* 30.51 (15.15)	* −11.74 (5.94)	6.36 (3.42)	−39.72 (20.33)	...
1950's	.510	21	‡2.04	* 4.08 (1.12)	.005 (.031)	* 61.85 (23.47)	−.85 (9.52)	* 9.97 (4.32)	* −97.04 (30.10)	...
	.552	23	‡2.03	* 4.02 (.90)	...	* 63.19 (20.64)	...	* 10.11 (3.81)	* −99.80 (24.06)	...
1960's	.291	15	1.73	1.39 (2.67)	.086 (.066)	22.68 (22.60)	−8.09 (9.10)	3.92 (7.74)	−48.49 (58.34)	...
	.498	18	‡1.59	...	* .119 (.033)	* 52.06 (18.67)	...	...	...	* 3.41 (1.35)
Y_2										
1950's and 1960's..	.545	44	‡1.87	* 3.49 (.69)	.039 (.021)	* 31.27 (14.98)	* −11.62 (5.87)	6.32 (3.38)	* −40.65 (20.10)	...
1950's	.505	21	‡2.05	* 4.06 (1.12)	.006 (.031)	* 61.00 (23.46)	−1.05 (9.52)	* 9.96 (4.32)	* −94.97 (30.09)	...
	.547	23	‡2.05	* 3.99 (.90)	...	* 62.64 (20.64)	...	* 10.13 (3.81)	* −98.36 (24.07)	...
1960's	.276	15	1.73	1.76 (2.69)	.074 (.067)	24.44 (21.75)	−8.16 (9.15)	3.88 (7.78)	−49.85 (58.70)	...
	.481	18	‡1.58	...	* .112 (.034)	* 54.39 (18.91)	...	...	...	* 3.49 (1.36)
Y_3										
1960's	.592	18	1.26	...	* .086 (.022)	* 45.09 (12.11)	...	...	...	* 2.52 (.87)
Y_4										
1950's and 1960's..	.261	47	1.92	...	* .00029 (.00012)	.205 (.088)	...	...	−.259 (.121)	...
1950's	.292	24	‡2.15	...	.00017 (.00018)	.294 (.146)	...	...	−.476 (.184)	...
	.450	24	‡1.99	...	...	* .401 (.131)	...	* .068 (.024)	* −.671 (.146)	...
1960's	.115	18	‡1.60	...	.00026 (.00019)	.155 (.096)	...	...	−.116 (.251)	...
	.252	19	‡1.37	...	...	* .252 (.094)	...	...	...	* .016 (.007)

D. Securities maturing in 5 to 10 years

Dependent variable and period	R^2 adjusted	Degrees of freedom	Durbin-Watson ratio	Net regression coefficients and standard errors								
				X_8	X_5	X_{16}	X_{13}	X_3	X_{12}	X_{10}	X_{15}	X_6
Y_1												
1950's and 1960's..	.719	45	1.50	* 2.84 (.45)	* 5.92 (1.30)	* 7.82 (2.18)	* 24.24 (7.51)	4.69 (1.75)	...	...	...	...
1950's	.723	22	‡ 2.13	* 3.05 (.55)	* 5.87 (1.50)	* 10.09 (4.77)	* 21.14 (8.68)	6.10 (3.03)	...	...	...	...
	.815	21	‡ 1.81	* 2.25 (.42)	* 3.90 (1.37)	...	* 25.20 (7.38)	* 19.34 (4.69)	* -58.52 (20.03)	...	...	* -16.53 (4.67)
1960's	.490	16	.92	* 3.94 (1.60)	5.78 (3.08)	-2.16 (9.85)	27.10 (16.13)	2.09 (3.51)	...	...	...	...
	.615	19	1.24	* 7.83 (1.47)	...	...	...	...	...	...	* .122 (.042)	...
Y_2												
1950's and 1960's..	.705	45	1.50	* 2.84 (.45)	* 5.92 (1.30)	* 7.82 (2.18)	* 24.24 (7.51)	* 3.69 (1.75)	...	...	...	...
1950's	.715	22	‡ 2.13	* 3.05 (.55)	* 5.87 (1.50)	* 10.09 (4.77)	* 21.14 (8.68)	* 5.10 (3.03)	...	...	...	...
	.809	21	‡ 1.81	* 2.25 (.42)	* 3.90 (1.37)	...	* 25.20 (7.38)	* 18.34 (4.69)	* -58.52 (20.03)	...	...	* -16.53 (4.67)
1960's	.473	16	.92	* 3.94 (1.60)	5.78 (3.08)	-2.16 (9.85)	27.10 (16.13)	1.09 (3.51)	...	...	...	...
	.585	19	1.21	* 7.46 (1.50)	...	...	...	...	...	...	* .114 (.043)	...
Y_3												
1960's	.511	19	‡ 1.30	* 4.13 (.93)	...	...	...	...	...	...	* .068 (.026)	...
Y_1												
1950's and 1960's..	.600	46	1.41	...	* .058 (.012)	* .068 (.020)	* .235 (.070)	* .037 (.016)	...	...	...	...
1950's	.691	23	‡ 1.92	...	* .058 (.012)	* .088 (.036)	* .221 (.071)	* .055 (.024)	...	...	...	...
	.750	22	‡ 2.08	...	* .047 (.012)	...	* .264 (.067)	* .045 (.021)	* -.413 (.184)	* -.145 (.061)	...	...
1960's	None significant											

For notes, see p. 148.

APPENDIX TABLE 11—Continued

E. Securities maturing after 10 years

Dependent variable and period	R^2 adjusted	Degrees of freedom	Durbin-Watson ratio	X_5	X_7	X_3	X_{16}	X_{10}	X_{15}	X_6	X_8	X_{12}
								Net regression coefficients and standard errors				
Y_1												
1950's and 1960's..	.679	44	1.19	*13.39 (2.30)	*−14.83 (2.91)	*2.61 (.92)	2.86 (1.02)	−7.58 (2.85)	*.0113 (.0046)	……	……	……
1950's …………	.776	21	‡1.90	*12.03 (2.92)	−7.35 (7.67)	*8.37 (3.03)	2.13 (2.37)	.086 (4.96)	.022 (.006)	……	……	……
	.857	21	‡2.00	*12.27 (2.39)	……	*6.50 (2.53)	……	……	.016 (.004)	*17.51 (6.44)	*.695 (.294)	*−18.37 (7.28)
1960's …………	.690	15	‡2.04	*14.81 (3.13)	*−16.30 (3.80)	1.76 (1.02)	1.84 (3.31)	−19.92 (27.90)	−.020 (.016)	……	……	……
	.666	18	‡1.53	*14.77 (2.97)	−16.59 (3.34)	2.08 (.949)	……	……	……	……	……	……
Y_2												
1950's and 1960's..	.578	46	1.05	*13.47 (2.50)	15.79 (3.15)	*1.87 (.92)	……	……	*.0185 (.0044)	……	……	……
1950's …………	.772	23	‡1.86	*11.52 (2.84)	−7.78 (7.50)	*8.07 (2.92)	……	……	.024 (.005)	*17.51 (6.44)	*.695 (.294)	*−18.37 (7.28)
	.850	21	‡2.00	*12.27 (2.39)	……	*5.50 (2.53)	……	……	.016 (.004)	……	……	……
1960's …………	.675	17	‡1.98	*14.91 (2.74)	−16.14 (3.09)	.931 (.878)	……	……	−.016 (.008)	……	……	……
	.618	18	‡1.53	*14.77 (2.97)	−16.59 (3.34)	1.08 (.949)	……	……	……	……	……	……
Y_3												
1960's …………	.590	18	1.24	*7.39 (1.69)	*−8.12 (1.90)	.970 (.539)	……	……	……	……	……	……
Y_4												
1950's and 1960's..	.340	46	.547	*.339 (.074)	*−.346 (.095)	……	*−.085 (.029)	……	*.00033 (.00014)	……	……	……
1950's …………	.600	23	1.23	*.445 (.108)	.080 (.283)	……	*−.216 (.069)	……	*−.0007 (.0002)	……	……	……
	.715	23	1.20	.491 (.099)	……	……	……	……	.0002 (.0001)	*1.015 (.231)	……	……
1960's …………	.585	17	1.37	*.228 (.045)	*−.242 (.053)	……	−.022 (.045)	……	−.0003 (.0001)	……	……	……
	.647	18	1.25	*.190 (.041)	*−.204 (.046)	.033 (.013)	……	……	−.0003 (.0002)	……	……	*−.647 (.292)

* Significantly different from zero at the 5 per cent level.
‡ No positive serial correlation. (The hypothesis of serial correlation is rejected at the 1 per cent significance level according to the Theil and Nagar table.)
§ Probable negative serial correlation.

APPENDIX TABLE 12
LIST OF INDEPENDENT VARIABLES FOR MULTIPLE REGRESSIONS OF DEALERS' POSITIONS

Symbol	Variable	Unit
	Change in—	
X_1	The discount rate	Basis points
X_2	Free reserves (based on quarterly averages of monthly averages), excluding all such quarterly changes of less than $50 million	Millions of dollars
X_3	Interest rates in preceding quarter (based on weekly averages for last week in quarter, except for 5- to 10-year maturity yields, which were estimated from a constant maturity yield series). Yield series are for 3-month bills, and for 9- to 12-month, 3- to 5-year, 5- to 10-year, and after-10-year maturities of coupon issues[1]	Basis points
X_4	Frequency of small daily changes in prices of Government securities— percentage of trading days in quarter with a yield change of 1 basis point or less for Treasury bills and with a price change of $\frac{1}{32}$ or less for 1- to 5-year issues and of $\frac{2}{32}$ or less for 5- to 10-year and after-10-year issues[1]	Per cent
X_5	Uncertainty—measured by the number of turning points in the level of daily yields, each weighted by the size of the turnaround, that is, the summation over the quarter of the absolute sizes of turning points. Calculated for 3-month bills and for bonds with after-10-year maturities[1]	
	Volume of—	
X_6	Trading (daily-average gross transactions in U.S. Government securities) during preceding quarter[1]	Millions of dollars
X_7	Trading (daily-average gross transactions in U.S. Government securities) excluding financing periods (for cash financings, from the day after the books open through the payment date; and for rights exchanges, from the day after the announcement date through the payment date)[1]	Millions of dollars
X_8	Marketable debt held by the public, average of end-of-month data for four dates (three in the quarter and last one of preceding quarter); maturity classification based on first call through April 1960 and on final maturity thereafter[1]	Billions of dollars
X_9	Marketable debt held by the public during the preceding quarter; average of end-of-month data for four dates (three in the quarter and last one of preceding quarter); maturity classification based on first call through April 1960 and on final maturity thereafter[1]	Billions of dollars
X_{10}	Ratio of U.S. Government marketable debt held by commercial banks to total marketable debt outstanding, classified by final maturity; ratio as of the end of preceding quarter. For issues maturing after 10 years, the ratio is based on commercial banks' holdings plus holdings of debt by other large financial institutions[1]	Per cent
	Interest carry on dealers' long positions; estimated by subtracting dealers' financing costs from market yields (based on quarterly averages) or coupon rates (average of coupon rates observed in midquarter). Availability of several alternative series on financing costs made it possible to form a number of variables on measuring interest carry. A positive number indicates positive carry and a negative number, negative carry. The variables used were:	Per cent
X_{11}	Average coupon rates and an average of financing rates in New York City and "out of town"[1]	Basis points
X_{12}	Average coupon rates and financing rates posted on new loans in New York City[1]	Basis points
X_{13}	Market yields and average financing costs in New York City[1]	Basis points
X_{14}	Market yields and an average of financing costs in New York City and "out of town"; entered only negative carry values[1]	Basis points
X_{15}	Market yields and "out of town" financing costs; entered only negative carry values[1]	Basis points

APPENDIX TABLE 12 — Continued

Symbol	Variable	Unit
	Dealer financing rates—	
X_{16}	Posted on new loans in New York City, quarterly averages	Basis points
X_{17}	Averages of rates for New York City and "out of town"	Basis points
X_{18}	Gross new bill issues, quarterly totals	Billions of dollars
X_{19}	Rights to Treasury financings held by public, quarterly totals[1]	Billions of dollars
	New issues sold in Treasury financings to public:	
X_{20}	Quarterly totals[1]	Billions of dollars
X_{21}	Last month of preceding quarter[1]	Billions of dollars
X_{22}	Last month of current quarter[1]	Billions of dollars
	Official (Federal Reserve and Treasury) transactions with dealers:	
X_{23}	Transactions, quarterly averages of daily data[1]	Millions of dollars
X_{24}	Transactions, quarterly totals[1]	Millions of dollars
X_{25}	Purchases from dealers, quarterly totals[1]	Millions of dollars
X_{26}	Sales to dealers, quarterly totals[1]	Millions of dollars
X_{27}	Net purchases ($+$) or sales ($-$) with dealers, quarterly totals[1]	Millions of dollars
	Federal Reserve transactions with dealers:	
X_{28}	Transactions, quarterly totals[1]	Millions of dollars
X_{29}	Purchases from dealers, quarterly totals[1]	Millions of dollars
X_{30}	Sales to dealers, quarterly totals[1]	Millions of dollars
	Treasury transactions with dealers:	
X_{31}	Transactions, quarterly totals[1]	Millions of dollars
X_{32}	Purchases from dealers, quarterly totals[1]	Millions of dollars
X_{33}	Sales to dealers, quarterly totals[1]	Millions of dollars
X_{34}	Dummy variable $+1$ in all quarters 1960-II—1966-III to measure the effect of the increase in the number of reporting dealers and other less important revisions in the dealer position series	
	Dummy variable for seasonal:	
X_{35}	$+1$ in first quarters	
X_{36}	$+1$ in second quarters	
X_{37}	$+1$ in third quarters	

[1] Variable uses data for appropriate maturity class in each regression.

APPENDIX TABLE 13

RESULTS OF MULTIPLE REGRESSIONS EXPLAINING DEALERS' POSITIONS IN U.S. GOVERNMENT SECURITIES

A. U.S. Treasury bills

Dependent variable and period	R^2	$\bar{R}^2$	Durbin-Watson ratio	Constant	Net regression coefficients and standard errors												
					X_{34}	X_2	X_3	X_1	X_5	X_{15}	X_{14}	X_{18}	X_{23}	X_{24}	X_{35}	X_{36}	X_{37}
Net positions:																	
1950's and 1960's..	.94	.93	1.62	−787.99	†1,101.23 (114.32) ‖	* .51 (.24)	...	†9.63 (2.45)	...	* 7.32 (2.87)	...	†62.03 (17.78)	* −7.81 (3.76)	...	−156.74 (104.82)	−40.06 (102.46)	42.56 (103.27)
1950's	.59	.39	1.50	−1,332.17	‖	.28 (.15)	...	3.12 (2.71)	...	−1.68 (2.70)	...	†83.12 (24.24)	−2.64 (5.60)	...	1.29 (86.39)	* 230.89 (88.01)	137.59 (81.71)
	.54	.49	‡1.32	−623.95	...	...	†−1.68 (.41)	...	...	...	...	†58.30 (17.38)	...	...	...	...	...
1960's	.82	.73	1.48	1,318.66	‖	−.06 (.71)	...	†17.03 (5.68)	...	4.06 (7.48)	...	15.06 (37.08)	−5.34 (4.85)	...	* −435.96 (151.00)	−346.45 (188.91)	−164.89 (153.35)
	.75	.62	1.43	985.05	...	1.60 (.91)	...	...	−3.06 (2.22)	...	8.91 (4.64)	* 85.58 (37.16)	...	* −.21 (.09)	†−520.38 (178.20)	−108.79 (218.94)	−144.65 (181.80)
Gross long positions:																	
1960's	.75	.67	1.27	732.12	...	* 1.57 (.73)	...	...	−2.65 (1.85)	...	7.81 (3.78)	†92.55 (28.69)	* −.17 (.07)	...	†−397.33 (139.52)	...	...
Gross short positions:																	
1960's	.85	.80	‡1.85	22.29	†−.27 (.09)	...	...	...	...	†−2.10 (.35)	...	...	...	* .05 (.01)	* 46.55 (21.49)	−24.43 (22.44)	11.57 (20.80)

B. Securities other than bills maturing within 1 year

Dependent variable and period	R^2	$\bar{R}^2$	Durbin-Watson ratio	Constant	Net regression coefficients and standard errors									
					X_1	X_7	X_8	X_{10}	X_{12}	X_{16}	X_{20}	X_{25}	X_{28}	X_{27}
Net positions:														
1950's and 1960's..	.63	.60	‡1.71	−24.94	†−1.33 (.40)	...	†8.89 (2.00)	†6.66 (1.60)	...	...	...	...	...	* −.11 (.04)
1950's	.71	.65	‡1.56	42.51	†−1.68 (.53)	...	7.46 (4.90)	* 5.09 (2.26)	...	...	...	...	...	−.12 (.06)
	.71	.65	1.42	79.85	†−1.55 (.53)	...	11.17 (4.41)	...	* .52 (.23)	...	...	...	...	* −.15 (.06)
1960's	.67	.61	‡1.88	−120.43	.38 (1.02)	...	†16.30 (5.06)	4.59 (5.27)	...	...	...	...	...	−.05 (.07)
	.80	.77	‡2.34	−24.75	...	†1.30 (.41)	...	†7.15 (3.00)	...	...	†36.91 (10.51)	...	...	...
Gross long positions:														
1960's	.84	.81	‡2.54	22.61	...	†1.29 (.37)	...	* 7.22 (2.66)	...	...	†35.97 (9.32)	...	...	...
Gross short positions:														
1960's	.46	.38	‡1.62	−56.21	...	...	...	...	...	†.24 (.06)	...	* .08 (.03)	* .05 (.02)	...

For notes, see p. 153.

APPENDIX TABLE 13 — Continued

C. Securities maturing in 1 to 5 years

Dependent variable and period	R^2	$\bar{R}^2$	Durbin-Watson ratio	Constant	Net regression coefficients and standard errors																	
					X_1	X_2	X_3	X_4	X_6	X_8	X_9	X_{10}	X_{12}	X_{20}	X_{21}	X_{19}	X_{25}	X_{26}	X_{32}	X_{35}	X_{36}	X_{37}
Net positions:																						
1950's and 1960's	.57	.52	‡1.81	22.70	…	†.31 (.08)	…	…	…	…	…	…	†.44 (.14)	…	*35.65 (12.18)	*8.12 (3.05)	…	…	…	…	…	…
1950's	.39	.26	‡2.25	234.95	…	†.20 (.07)	…	…	…	…	…	…	.08 (.18)	…	29.42 (15.35)	¶	…	…	…	…	…	…
	.68	.63	‡1.82	182.38	†−1.91 (.31)	…	…	…	…	…	…	…	…	9.52 (4.86)	*27.16 (11.56)	…	…	…	…	…	…	…
1960's	.54	.42	‡1.78	−198.59	…	.34 (.29)	−2.52 (.95)	…	…	9.27 (8.15)	…	…	.47 (.29)	…	23.16 (22.51)	6.80 (4.03)	…	…	…	…	…	…
	.79	.68	2.10	29.06	…	…	…	…	*−2.23 (.78)	…	…	…	†.92 (.27)	…	…	…	*−.35 (.17)	*−1.98 (.89)	…	−179.26 (79.10)	*−182.41 (72.47)	−53.85 (55.15)
Gross long positions:																						
1960's	.70	.57	§2.55	230.69	…	…	…	…	†2.22 (.73)	…	…	…	†1.09 (.25)	…	…	…	†−.46 (.15)	*−2.24 (.83)	…	*−187.43 (70.65)	−159.81 (71.31)	−42.91 (55.11)
Gross short positions:																						
1960's	.77	.69	1.74	−69.84	…	…	†1.78 (.36)	†2.18 (.64)	…	…	*8.99 (3.41)	†−8.16 (2.32)	…	*10.97 (3.92)	…	…	…	…	−.12 (.06)	…	…	…

D. Securities maturing in 5 to 10 years

Dependent variable and period	R^2	$\bar{R}^2$	Durbin-Watson ratio	Constant	Net regression coefficients and standard errors														
					X_2	X_3	$X_4{}'$	X_7	X_9	X_{10}	X_{12}	X_{16}	X_{20}	X_{22}	X_{24}	X_{29}	X_{35}	X_{36}	X_{37}
Net positions:																			
1950's and 1960's	.59	.55	1.51	−30.89	…	*−.40 (.26)	*1.26 (.51)	…	…	…	…	…	*13.26 (3.86)	…	…	…	…	…	…
1950's	.64	.54	1.27	−12.68	…	−.29 (.28)	.91 (.70)	…	…	…	.27 (.09)	…	*11.27 (4.44)	1.39 (8.19)	…	…	…	…	…
	.69	.65	1.19	55.53	.10 (.05)	…	…	…	…	…	…	…	*8.55 (3.84)	…	…	…	…	…	…
1960's	.68	.59	1.25	−75.11	…	−1.38 (.77)	*2.09 (.84)	…	…	…	…	…	*15.27 (6.43)	*−24.91 (8.86)	.12 (.10)	…	…	…	…
	.80	.73	‡1.81	−109.65	…	†−2.05 (.65)	†2.23 (.65)	…	…	…	†−.43 (.15)	…	*13.64 (5.30)	†21.17 (7.22)	…	*.30 (.11)	…	…	…
Gross long positions:																			
1960's (a)	.87	.82	§2.51	−247.67	…	−1.19 (.61)	†3.05 (.61)	…	…	…	…	†.50 (.11)	†17.34 (4.94)	−21.32 (6.77)	.18 (.07)	†.31 (.10)	…	…	…
(b)	.82	.77	‡2.09	−139.82	…	*−1.56 (.70)	…	…	†10.31 (1.75)	…	…	…	†22.89 (5.25)	−21.56 (7.59)	.16 (.12)	*.27 (.10)	…	…	…
Gross short positions:																			
1960's	.61	.43	1.73	366.26	*−.25 (.11)	…	…	†1.04 (.27)	…*−12.31 (4.97)	…	…	.19 (.10)	…	…	…	…	−10.78 (23.99)	−26.97 (25.05)	13.91 (22.31)

For notes, see p. 153.

E. Securities maturing after 10 years

Dependent variable and period	R_2	$\bar{R}_2$	Durbin-Watson ratio	Constant	X_1	X_3	X_4	X_6	X_8	X_{10}	X_{11}	X_{17}	X_{20}	X_{22}	X_{29}	X_{32}	X_{33}	X_{35}	X_{36}	X_{37}
													Net regression coefficients and standard errors							
Net positions:																				
1950's and 1960's	.48	.42	1.03	-33.19	* -.56 (.27)	...	† 1.30 (.43)	...	...	...	...	...	* 33.95 (12.92)	-46.04 (16.23)	.87 (.51)	...	...	...	...	...
1950's	.60	.50	1.34	-14.90	† -.65 (.19)	...	.89 (.50)	...	...	...	...	...	22.69 (11.94)	46.20 (26.66)	1.34 (1.11)	...	...	...	...	...
	.64	.59	1.08	-7.43	* -.43 (.16)	...	...	† .95 (.32)	...	...	...	...	† 34.70 (9.72)	...	...	...	...	...	...	...
1960's	.52	.39	1.02	-60.53	-.08 (.91)	...	1.53 (.78)	...	...	...	...	...	39.44 (21.48)	* -74.87 (32.58)	1.25 (1.86)	...	...	...	...	...
	.85	.77 §	2.43	-785.60	...	* -3.12 (1.11)	† 1.72 (.53)	...	† 36.02 (8.92)	...	† -.71 (.15)	...	* 29.93 (11.73)	...	* 1.14 (.52)	* .21 (.08)	* -8.74 (3.25)	...	...	...
Gross long positions:																				
1960's	.91	.85 §	2.24	-713.98	...	* -2.46 (.99)	† 1.70 (.45)	...	† 34.17 (7.56)	...	† -.66 (.13)	...	† 51.48 (11.26)	-35.44 (17.83)	* 1.29 (.45)	* .16 (.07)	* -6.23 (2.77)	...	...	...
Gross short positions:																				
1960's	.84	.72 §	2.73	-366.71	* .31 (.11)	...	† .49 (.13)	† -.79 (.19)	...	† 9.71 (1.88)	...	† .31 (.05)	† 16.35 (2.95)	...	...	* -.033 (.015)	...	-.67 (6.15)	† 22.69 (5.98)	-2.50 (5.66)

† Significantly different from zero at the 1 per cent level.
* Significantly different from zero at the 5 per cent level.
‖ Not appropriate for the subperiods.
‡ No positive serial correlation. (Theil and Nagar table, 1 per cent significance level for rejecting null hypothesis of residual independence.)
¶ Did not exist during the 1950's.
§ Probable negative serial correlation.