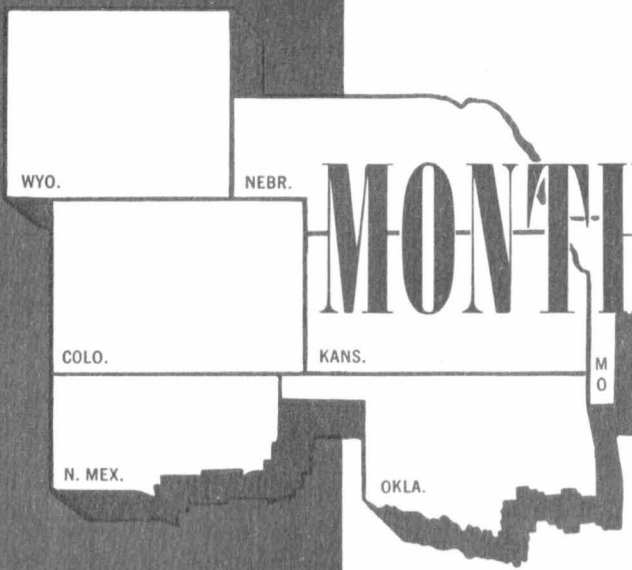


December 1960



MONTHLY REVIEW

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Taxes and the Term Structure of Yields

THE TERM STRUCTURE of yields on outstanding U. S. Treasury securities—that is, the relationships that prevail between the maturity dates of issues and their yields—is an important aspect of the analysis of the market for Government debt. It is a significant factor for investors to consider in choosing various issues and it is important to the Treasury in managing the debt. The term structure of yields also is significant to economic and financial analysts as an indicator of conditions in the money and capital markets.

It is not surprising, then, that the yield-maturity relationship has been the subject of much careful study. This article is designed to clarify somewhat the meaning of data used in the analysis of the term structure of rates by considering the influence of Federal income tax provisions on the market yields of outstanding Treasury securities, particularly those in the 1- to 5-year maturity range.

The Yield Curve

The maturity pattern of yields on Treasury debt is most often represented graphically. On a chart that measures percentage yield on the vertical axis and number of years to maturity on the horizontal, a point is plotted to represent the yield (computed on the basis of the current market quotation) and term of each outstanding issue. When all of the relevant points have been plotted, it is customary to fit a freehand curve to the data (see Chart 1). This “yield curve” is designed to summarize the available information by showing the general shape of the scatter of points.

In the preparation of such a chart, care must be taken to minimize the influence of

factors other than term to maturity on market rates of interest. The chart must include only issues that are highly similar—preferably identical—in all respects save their maturity dates. For this reason, it is customary to treat callable issues separately and to exclude issues on which interest income is not fully taxable.

Wide Variations in Intermediate-Term Area

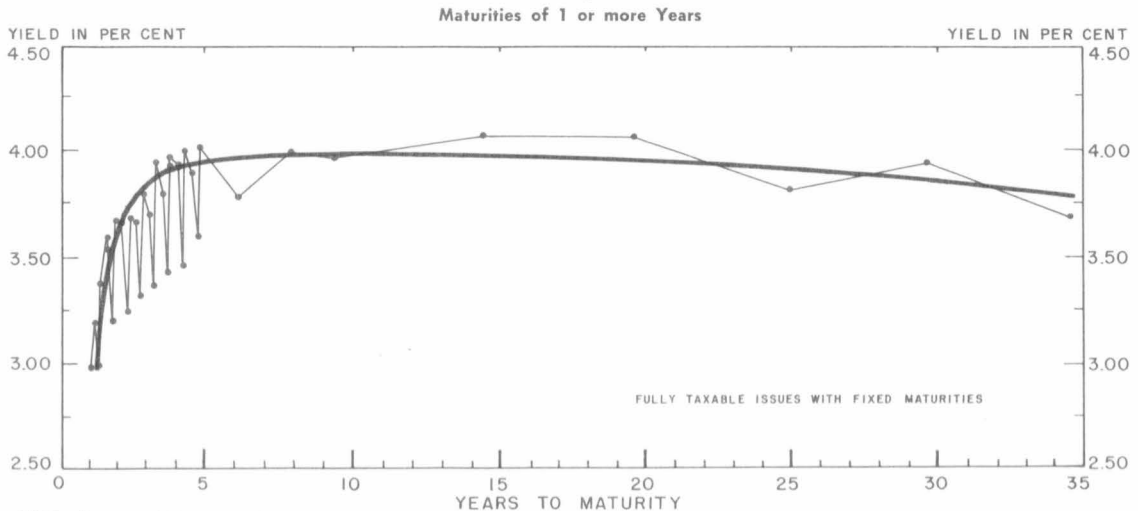
In line with these considerations, the plotted points in Chart 1 show the market yields to maturity on only fully taxable, fixed-maturity Treasury securities (direct or fully guaranteed issues) outstanding on June 30 of this year. The colored line shows the freehand yield curve through the points as published in the August 1960 *Treasury Bulletin*.¹

The sawtooth line connecting the points emphasizes the extent of the spreads in yields obtainable on securities whose maturities do not differ greatly, particularly in the 1- to 5-year area. The differentials that existed on June 30 were representative, in the sense that the same general pattern has persisted continuously before and since that date. For the most part, these extreme variations in yields on issues of roughly comparable maturities can be explained on the ground that their aftertax yields to investors subject to the Federal income tax are not uniquely correlated with their pretax, or market, yields.

The balance of this article is devoted to showing how income tax considerations can

¹ Because the yield data used here are based on asked prices, whereas the data in the *Treasury Bulletin* are based on bid quotations, the curve shown here is somewhat lower than that found in the *Bulletin*.

Chart 1
Yields of Marketable Treasury Securities, June 30, 1960



NOTE: Yield quotations from C. F. Childs and Company.

be invoked to explain the wide variations in market yields, particularly in the 1- to 5-year area.

Discounted Issues and the Capital Gains Tax

The coupon, or nominal, rate of interest on a Government security is the percentage that its regular interest payments bear to its par (maturity) value. When the general level of interest rates is higher than the nominal rate on a particular issue, the issue will trade at a discount from par sufficient to provide a buyer with a gain in value to maturity great enough to make his over-all percentage return comparable to what he can earn on similar issues with higher nominal rates. Conversely, issues with nominal rates above the market trade at premiums over par.

Market yields such as those shown in Chart 1 are determined on the basis of mathematical formulas that take into account both the regular interest payments and the gain in value to maturity of discounted issues. Similarly, the decline to maturity in the value of issues priced above par enters into the determina-

tion of market yields on high-coupon issues. So long as these computed yields to maturity form the relevant basis for comparison by investors, the market pricing process will tend to establish discounts and premiums sufficient to bring the computed market yields into close relationship with one another for issues with roughly comparable maturities.

However, for investors subject to Federal income taxation, net income derived from buying a discounted issue and holding it to maturity may differ importantly from the net income obtained by buying an issue at or above par. For most investors except securities dealers, holdings of Government securities other than noninterest-bearing obligations issued on a discount basis (such as Treasury bills) are classified as capital assets. When such securities are held for more than 6 months, any gain in their value is classified as a long-term capital gain. Under Federal income tax statutes, net long-term capital gains in excess of net short-term capital losses experienced during a given tax year are taxed at a rate equal to only one half the

rate of tax on ordinary income, or 25 per cent, whichever is lower. In contrast, interest payments are taxed at the full rate applicable to ordinary income. This means that the investor's aftertax share of a one dollar appreciation in the value of a security, when it is taxed at the preferential rate for long-term capital gains, is greater than his aftertax share of one dollar of interest income.

Lower Market Yields on Discounted Issues

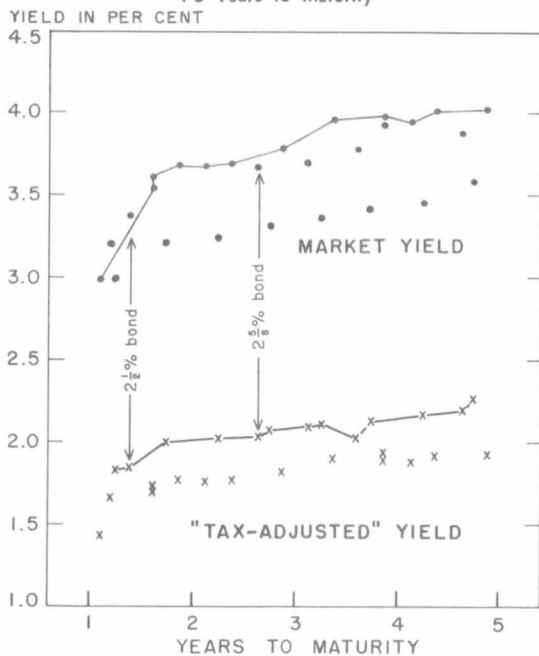
If all investors were subject to the same marginal income tax rates (i.e., were in the same tax bracket), and all anticipated being taxed at the lower long-term capital gains rate on the appreciation in value of securities bought at a discount, market forces could be expected to establish a fairly smooth pattern of tax-adjusted yields. This would imply an ir-

regular pattern of market yields, with low-coupon discounted issues quoted at market yields below those prevailing on higher-coupon issues of comparable maturity.

That the special treatment accorded income on discounted issues does in fact account for variations in market yields can be seen by examining Chart 2, which shows in greater detail the pattern of yields on issues with 1 to 5 years to maturity. The colored dots in the upper section of Chart 2 show the market yields on issues that were trading at discounts on June 30, while the black dots represent issues quoted at or above par. It can be seen that the discounted issues generally carried lower market yields than did issues of similar maturity trading at or above par. This indicates that taxable investors did, in fact, attach a greater value to the income derived from the gain in value of these issues as they reach maturity. But it need not imply that market forces brought about a smooth pattern of "tax-adjusted" yields, i.e., aftertax yields computed on the assumption that the gains to maturity are taxed at the preferential rate.

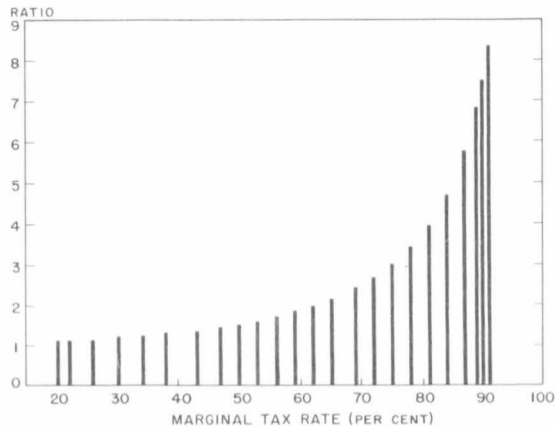
For one thing, tax-adjusted yields are not the same for investors who are not subject to the same marginal tax rates. This point has some importance. For investors in low tax brackets, the tax advantage of net long-term capital gains income relative to interest income is less pronounced than it is for high-bracket taxpayers. This is illustrated by Chart 3, which shows, for the various marginal rates under the Federal income tax, the aftertax value of \$1 capital gains taxed at the preferential rate relative to the aftertax value of \$1 ordinary income. For example, an individual investor in the lowest (20 per cent) tax bracket can keep \$.80 of every \$1 of interest income and \$.90 of every \$1 of net long-term capital gains. In this case, \$1 of capital gain taxed at the preferential rate is worth, on an aftertax basis, $\$1.00(.90/.80) = \$1.12\frac{1}{2}$ of interest income. At the opposite extreme, the

Chart 2
Yields On Marketable Treasury Securities, June 30, 1960
 1-5 Years to Maturity



NOTE: Yield quotations from C. F. Childs and Company.

Chart 3
**Ratio of Aftertax Value of \$1 Long-Term
 Capital Gains Income to Aftertax
 Value of \$1 Ordinary Income**
 For Various Marginal Tax Rates



individual investor in the highest (91 per cent) bracket finds that \$1 of long-term capital gains taxed at the maximum 25 per cent rate is the equivalent, after taxes, of \$8.33 $\frac{1}{3}$ of ordinary income.

It is therefore not possible to speak in terms of any "representative" relationship among tax-adjusted yields for taxpayers in general. Market forces arising out of the decisions of tax-conscious investors, although they may tend to lower the market yields of discounted issues because of the premium attached to capital gains income, nevertheless produce an ambiguous pattern of rates which represents only some kind of consensus. However, the great importance of corporations (including commercial banks) among the active participants in the Government securities markets leads to the presumption that whatever consensus is arrived at will reflect in large measure the viewpoint of corporate taxpayers.

Tax-Adjusted Yields for Corporations

As a service to their corporate customers, Government securities dealers regularly quote yields on a tax-adjusted basis for corporations.

These yields are computed on the assumption that regular interest payments are taxed at the 52 per cent rate applicable to corporation net income in excess of \$25,000, and that the gains to maturity of discounted issues with more than 6 months to run are taxed at the maximum rate of 25 per cent applicable to long-term capital gains. In Chart 2, the tax-adjusted yields for corporations on Treasury issues with 1 to 5 years to maturity as of June 30, 1960, are shown by the scatter of x's that lie directly below the dots which represent computed market yields for the same issues.

Just as the pattern of pretax, or market, yields is highly irregular, so is the scatter of tax-adjusted yields to corporations. The highest tax-adjusted yields were generally obtainable on issues trading at discounts, shown by the colored x's.

Clearly it cannot be said that the consensus of taxpaying investors, insofar as it was dominated by the corporate view, was such as to produce a uniformly rising pattern of tax-adjusted yields in the 1- to 5-year maturity area. Evidently there were forces that kept tax-adjusted yields on issues trading at or above par from rising to levels comparable with such yields on discounted issues.

Segmentation of the Market

A plausible explanation of the diverse patterns of yields on both the market and the tax-adjusted basis is that there are really *two* markets for Government securities when some issues trade at a discount, because not all investors (for example, those not subject to taxes) attach a premium to capital gains. Note that in Chart 2, the black line drawn to connect all of the black dots which show computed market yields on nondiscounted issues traces a reasonably smooth progression of market yields from one maturity to another. The issues included on the black line, together with those few discounted securities represented by colored dots that lie close to the

line, would comprise the relevant market for those investors who do not attach special importance to capital gains income.

Other investors, to whom capital gains are more attractive than interest income, are willing to buy and hold certain discounted issues at prices that keep their market yields well below those shown along the black line. These gains-conscious investors would choose from among the issues with the highest tax-adjusted yields, shown by the x's that are connected by the colored line in the lower part of Chart 2.

Viewing the yield data in this way lends support to the hypothesis that the market for Government debt is segmented when some issues trade at a substantial discount. The two patterns, indicated by the black and colored lines, both show a reasonably smooth progression of yields from one maturity to another. All issues fall into at least one of the patterns—deep-discounted issues, whose tax-adjusted yields are highest relative to their market yields, are in line only on a tax-adjusted basis. Some issues trading at more moderate discounts are also in line only on a tax-adjusted basis. However, at least two moderately discounted bonds (shown by the arrows) are attractive on either basis. Finally, two discounted issues, one with nearly 4 years to maturity and the other with slightly more than a year to run, are clearly more attractive on a market-yield basis than on a tax-adjusted basis. Both of the latter issues were priced on June 30 at very small discounts from par.

Limited Relevance of Tax-Adjusted Yields

The precise yield relationships that emerge in such a segmented market will depend on the relative strengths of the two investor viewpoints. In general, the more predominant is the tax-adjusted view, the lower will be the market yields on discounted issues relative to issues trading at or above par, and the higher will be the tax-adjusted yields on nondiscounted issues relative to those on is-

suages trading below par. If the tax-adjusted viewpoint were sufficiently strong to dominate the entire market, yields on all issues would fall into line on a tax-adjusted basis.

The tax-adjusted view is not likely to dominate the market, however. Investors not subject to Federal income taxation, including state and local government units, pension funds, charitable and religious organizations, and credit unions, would concentrate on issues carrying high market yields. In addition, taxable investors who did not anticipate recording net taxable income in future years would not attach a premium to capital gains and would therefore make their investment choices on the basis of comparative market yields. This latter group might include many savings and loan associations and mutual savings banks, which often do not experience net income subject to Federal income taxes.

In addition, several factors not taken into consideration in the computation of tax-adjusted yields may bear importantly on the decisions of taxable investors. The most significant qualification to be made is that the tax-adjusted yields are accurate predictions of aftertax yields only on the assumption that the preferential capital gains rate is certain to apply to income arising out of the increased value of securities now selling at discounts. However, it is possible that the years in which the gains on presently discounted securities are realized will not be years when net long-term capital gains exceed net short-term losses. It will be recalled that an investor is required to deduct his net short-term losses from his net long-term gains to arrive at the amount of long-term gains subject to the preferential tax. Therefore, the tax-adjusted figure applies only if an issue purchased presently at a discount is sold or redeemed in a year when the investor experiences net long-term gains in excess of net short-term losses.

Should the gains be realized in a year in which the investor experiences capital losses

in excess of his long-term capital gains, the actual aftertax yield will differ from the computed tax-adjusted yield. The nature of the difference cannot be specified without considering the circumstances of the investor.

For banks, long-term capital gains income has no advantage over interest income if it is realized in a year when losses exceed gains. This is because banks can deduct net securities losses from ordinary income without limit. Offsetting realized gains against realized losses raises the amount of income taxable at the ordinary rate, so that the "effective rate" on long-term gains is the same as that applied to ordinary income. For this reason, many banks systematically attempt to record long-term gains only in years when they exceed securities losses.

But banks cannot generally be certain whether a given future year will be a "gains year" or a "loss year," so that the choice of the relevant yields to be considered in making portfolio selections is not clear-cut—if a bank's management buys securities with high tax-adjusted yields, it presumably looks forward to the distinct possibility of being able to benefit from the preferential treatment of net long-term gains. But another bank, identical to the first in all objective respects, might choose an adjacent issue with a higher pretax yield and a lower tax-adjusted yield with the expectation that the gains that accrue on discounted issues will be realized in a loss year.

The problem is more complicated in the case of most other investors, because they are allowed only limited deduction of net capital losses. Net capital losses of most individual investors can be offset against ordinary income in any year only up to a maximum of \$1,000, while most nonbank corporations are not allowed any deduction of net capital losses from ordinary income. Although unused net losses may be carried forward for as many as 5 years, the restricted deductibility may nonetheless make it particularly advan-

tageous for nonbank investors to record capital gains in years when heavy losses are experienced; when capital gains can be offset against unused capital losses, the effective rate of tax on the gains is zero. The contemplation of this possibility adds to the attraction of capital gains income, and thereby heightens the attraction of discounted issues to most taxable nonbank investors. This contrasts sharply with the case of commercial banks.

Concluding Remarks

Obviously, this complex dependence of the actual aftertax yields on imperfectly predictable events greatly complicates the considerations entering into choices of taxable investors among discounted issues and those trading at or above par. When activity in the market is heavily influenced by preferences for capital gains income on the part of taxpaying investors (particularly commercial banks), one would expect the spreads between computed market yields on high- and low-coupon issues with similar maturities to be accentuated, bringing tax-adjusted yields into closer relationship with one another. Similarly, when investment decisions are heavily influenced by the view that no special benefits will attach to capital gains income, it can be expected that the pattern of market yields on various issues will tend to be smoother, with tax-adjusted yields showing the greater variations.

As long as significant numbers of investors view the value of income from appreciation of discounted issues differently—some favoring it over interest payments and others weighing it equally with interest income—the market is likely to be segmented into two parts. Under such circumstances, there are likely to be two yield curves, one showing relatively smooth patterns of market yields to maturity on nondiscounted issues and the other displaying a fairly smooth pattern of tax-adjusted yields on most discounted securities.

Corporate Participation

in the Government Securities Market

CORPORATE MANAGEMENT of short-term liquid assets, at least over the past decade, has involved holding cash balances that would meet the requirements of the firm and using other liquid earning assets to absorb the ebb and flow of funds through corporate accounts, thus supplementing corporate earnings. Assets which have been used for this purpose have been short-term Treasury securities, loans to sales finance companies, time certificates of deposit at commercial banks, and loans to Government security dealers on repurchase agreements. Of these assets, Treasury securities have been of greatest importance. At times, corporate liquid asset management has been described as showing an increasing interest in holding short-term earning assets, either as an absolute amount or as a proportion of total liquid assets. The relative amounts of cash and Treasury securities held also have been described as involving a secular trend and as varying through the several phases of the business cycle.

The liquid asset management of corporations has evoked the interest of a variety of observers of economic developments. Analysts of credit markets have given close study to corporate holdings of Treasury securities, probably for two principal reasons. First, conditions which might alter these holdings substantially would have significant effects upon market rates of interest and the prices of securities. Second, unusually large accumulations of such investments might foreshadow a marked growth of corporate outlays for plant,

equipment, and inventory, while exceptionally small holdings might retard these outlays until liquid asset positions had been restored to more acceptable levels.

The interest of students of central banking and financial institutions in corporate management of liquid assets also has been stimulated by its implications for monetary policy and credit control. One line of analysis which has been advanced states that the composition of corporate liquid asset holdings is sensitive to changes in market rates of interest. As interest rates on Treasury bills increase, corporations are said to reduce their holdings of cash and increase their investment in bills and to reverse the position when rates decline. When a monetary policy of restriction on the growth of total bank credit is in effect, banks meet growing demands for loans by selling short-term Treasury securities, which reduces deposits and raises excess reserves, thereby allowing the demands to be accommodated. These sales depress the prices and raise the yields on Treasury bills, attracting corporate and other investors into the market. The cash that is relinquished when securities are bought is said to be "idle" in the sense that those who reduce their cash balances do not reduce their current expenditures correspondingly. Consequently, the process as a whole is thought to transfer idle balances to those who will use them actively, and the turnover of money is increased, offsetting in part the restriction on the growth of total demand which monetary policy was designed to exert.

These groups of interests raise a number of problems for analysis, at the heart of which is the identification and evaluation of the forces associated with changes in corporate ownership of cash and Treasury securities. Other types of liquid assets serve the same purposes as Treasury securities, but their position among corporate assets has been less important. The interest of credit market analysts outlined above pertains particularly to corporate activity but the hypothesis that relates cash holdings to interest rates involves the behavior of all holders of cash balances, and corporations represent only one of the major segments. Therefore, any findings either in support of or in contradiction to the hypothesis cannot be generalized as applying to the whole economy.

The ensuing discussion first will examine changes in corporate cash and Treasury security holdings over recent years to determine whether the magnitude and timing of their fluctuations confirm the assumptions which have been made about them. The next section will seek to isolate the major forces which are associated with fluctuations in the distribution of corporate liquid assets. The final section will interpret the results in the light of the problems outlined above.

Chart 1
Cash Balances of Corporations

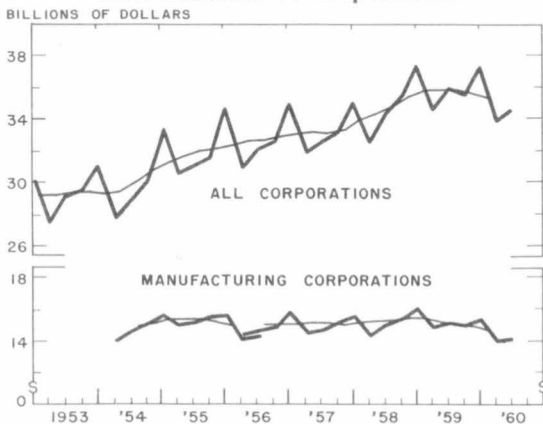
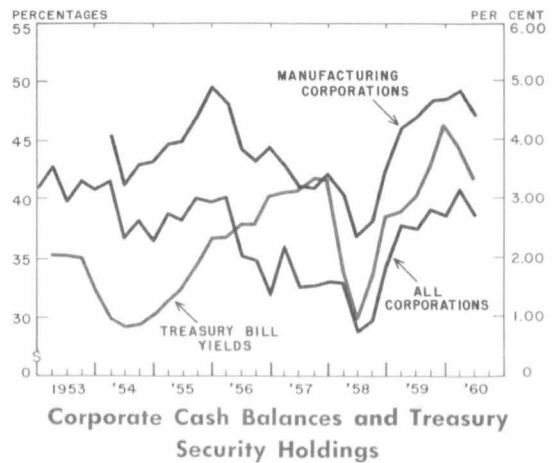


Chart 2
Treasury Security Holdings as a Percentage of Securities and Cash Held



Some of the hypotheses about corporate cash balances and Treasury security holdings can be tested in a preliminary way by a straightforward examination of data for recent years. Chart 1 displays the data for the cash balances of all U. S. corporations other than banks and insurance companies and for U. S. manufacturing corporations. Since both of the series are marked by strong seasonal patterns, a 4-quarter moving average is drawn through each to eliminate the seasonal influence and thus to reveal trend and cyclical components.

The adjusted data for all U. S. corporations exhibit a clearly defined upward trend from 1953 to midyear 1959, while the adjusted data for manufacturing companies were approximately stable or tending downward slightly. The minor cyclical movement observed in the data for all corporations generally coincided with periods of expanding business volume. There were only two instances of declines in the adjusted balances of all corporations, one of \$100 million in 1957 and the other of \$500 million in 1959-60. The seasonally adjusted series for manufacturing companies shows a mild cycle characterized by increases ranging

Changes In Cash and Treasury Securities Owned

In billions of dollars

Period	All Corporations		Manufacturing Corporations		Nonmanufacturing Corporations	
	Treasury Securities	Cash	Treasury Securities	Cash	Treasury Securities	Cash
June '54-Dec. '55	+6.2	+4.5	+5.0	+1.0	+1.2	+3.5
Dec. '55-June '58	-9.1	-0.2	-6.5	-0.6	-2.6	+0.4
June '58-Dec. '59	+9.6	+2.8	+5.6	-0.1	+4.0	+2.9

from \$400 million to \$500 million and a decline of about \$800 million.

Since the most conspicuous changes in corporate cash balances are the seasonal movements, these fluctuations were examined for evidence that their amplitude was related to periods of high and low interest rates. The investigation did not uncover any indication of such a relationship.

As corporate cash balances are relatively stable through the business cycle, it is evident that variations in total corporate liquid assets must be reflected in other assets. Chart 2 presents one of these—Treasury securities—as a percentage of total cash and Treasury securities held by all corporations and by manufacturing corporations together with quarterly averages of the rates on newly issued 91-day Treasury bills. A proportion was used rather than the absolute level of security holdings because it was desired to relate the rising volume of cash balances held by all corporations to their security investments.

Over the period as a whole, neither of the series displays any clear evidence of a secular shift from cash to Treasury securities. Since all corporations held the same proportion of securities at the end of 1959 as they held in 1955, it is evident that the absolute level of their portfolios grew in proportion to their cash balances. Both series show a rising proportion of securities from 1954 to 1955, a declining proportion from the last quarter of 1955 to the second quarter of 1958, and a rising proportion again from 1958 to the end of 1959.

The fact that manufacturing corporations held a much greater proportion of securities than all corporations means that securities are much less important in the portfolios of non-manufacturing corporations. The accompanying table also indicates the extent to which each of the corporate groups employed cash and Treasury securities in making their adjustments to seasonal and cyclical swings during 1954-59.

Two possible interpretations might be given to this disparity in the operations of the two corporate groups. One is that manufacturing operations have characteristics that permit a closer scheduling of receipts and disbursements than can be achieved by corporations in general. The other is that the typical manufacturing firm possesses greater total assets than the average of all companies and its cash resources therefore are large enough to justify transferring excesses to the securities market. If the influence of some of the communications companies were deducted from the non-manufacturing group, it is probable that the remainder would show a still lower volume of Treasury securities and smaller changes through the business cycle.

Factors Affecting Distribution of Liquid Assets

It is apparent from the above discussion that variations in corporate investment in Treasury securities are not produced to any measurable degree by shifts out of cash balances but are related to variations in total liquid assets that accompany seasonal and cyclical movements of business activity. It is

therefore necessary to consider next the changes which lead to variations in these requirements.

One of the better-known aspects of corporate financial management is the fact that many firms follow a practice of altering their investment in Treasury securities as changes occur in their Federal income tax liabilities. That these requirements are not fully covered by all companies is evidenced by the bulge in business borrowing from banks at the quarterly income tax payment dates. The companies that do follow the practice appear to have a number of reasons for their choice. One that is applicable to the motor vehicle companies and other equipment producers which have sales credit affiliates is that the parent and the affiliate are counted as a single borrower at banks. Since banking laws generally limit the amount of loans to one borrower, the credit line is left by the parent for the use of the affiliate. It is also possible that bank lines are reserved for requirements that are of longer duration than those growing out of tax payments.

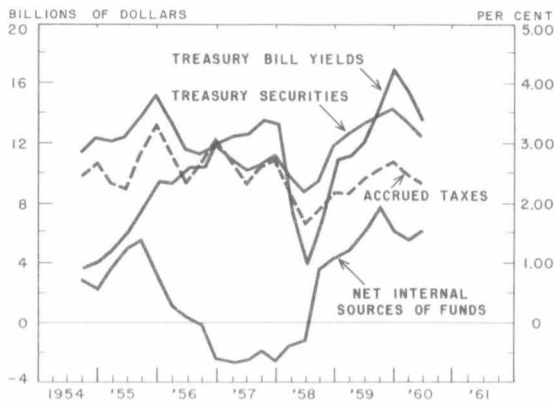
Corporate accruals of Federal income tax liabilities fluctuate as a result of changes in corporate profits and tax payments, if legal tax rates are constant. In relation to the business cycle, corporate profits typically expand rapidly in the early stages of recovery and then show little further growth or may decline as general activity continues upward to new levels. This pattern results from the rapid rise of productivity in the early stages of recovery when costs are advancing more slowly. As gains in productivity become more difficult to realize, costs encroach on profits. Tax payments lag behind changes in corporate income tax liabilities, although the acceleration of these payments over the period since 1950 as a result of changes in tax laws has shortened the interval and tended to reduce the volume of corporate accrued income taxes. These interrelationships produced a

peak in accrued taxes in 1955, after which an irregular decline occurred until the second quarter of 1958. Accruals again advanced until the fourth quarter of 1959 but failed to reach the level of 1955 because of the acceleration of tax payments.

A second relationship which modifies the liquidity requirement of firms is the difference in cyclical timing between the expansion of profits and the growth of business investment. The early increase in corporate profits, previously described, leads to a marked increase in retained earnings as corporate dividends are raised more slowly. On the other hand, business capital expansion programs follow a somewhat different pattern in relation to business cycles. Inventory usually responds quickly to the growth of sales but outlays for plant and equipment reach their peak late in the prosperity phase. Depreciation allowances — a second internal source of funds — show a secular increase as a result of the expansion of aggregate corporate investment in plant and equipment.

In the interval between the growth of depreciation and retained earnings and the disbursements of funds for new capital, cash balances would accumulate unless other short-term assets were available or unless debts could be liquidated. The relationship between net internal sources of funds of manufacturing corporations and their liquid asset holdings is attributable largely to the absence of short-term debts among the largest of the corporate investors. Cases in point are the motor vehicle, primary metal, chemical, and petroleum industries. In such cases, there is no good alternative to acquiring short-term assets whenever cash flows expand more rapidly than disbursements for capital. During the stage of declining business volume, retained earnings contract as does investment in plant and equipment but depreciation allowances and liquidation of inventories lead to net additions to corporate liquid assets.

Chart 3
Selected Items Related to Treasury Security
Holdings of Manufacturing Corporations



In order to indicate the general interrelationships of these variables and Treasury security holdings, Chart 3 presents the data for manufacturing corporations. A similar display could not be prepared for all corporations because the data on retained earnings, depreciation, and investment in inventories, plant and equipment were not available. Values for the line which is designated "net internal sources" were obtained by cumulating the differences between depreciation and retained earnings as one term and changes in inventory plus outlays for plant and equipment as the other. The plant and equipment outlays were those of the Department of Commerce rather than the values shown in the *Quarterly Financial Report of Corporations*, since the latter would be affected by accounting practices in treating capital lost through damage or destruction, and in charging a part of these outlays to current expense. The net internal sources term was cumulated successively from 1954 onward since both Treasury security holdings and accrued taxes are cumulative terms. Alternatively, the internal sources variable without cumulation could have been related to quarterly changes in security holdings and accrued taxes but this procedure would have

obscured the cyclical characteristics of the three series which are of primary interest.

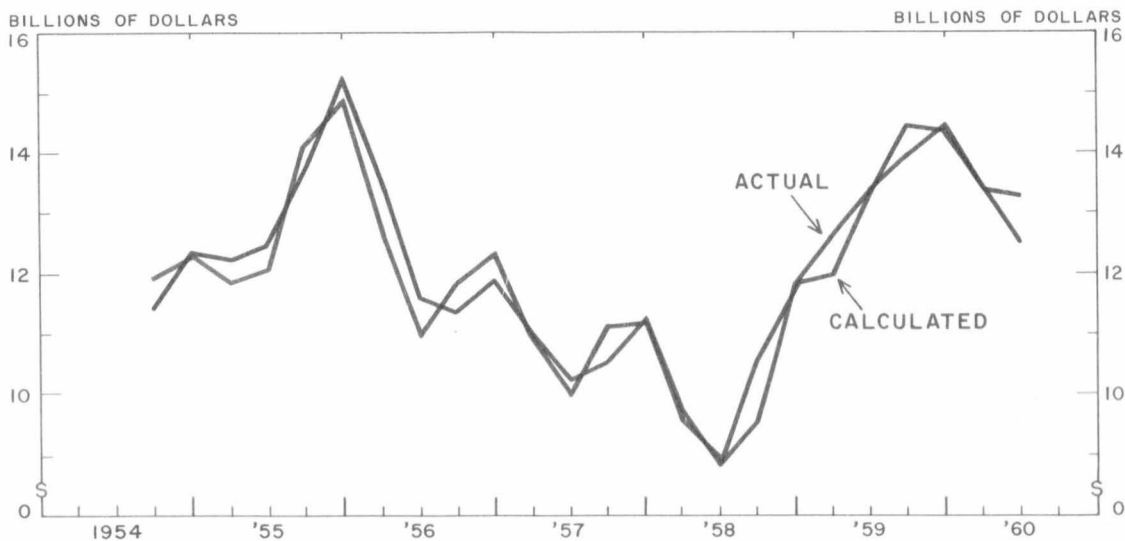
A general cyclical conformance of the compound term and the Treasury security holdings of manufacturing companies is apparent in Chart 3, but the former turned down one quarter earlier in both 1955 and 1959 than the securities series and began to rise two quarters earlier at the 1957-58 low point.

Inspection of the chart suggests that the Treasury security holdings of manufacturing corporations were strongly affected in the period studied by variations in accrued Federal income tax liabilities and net internal sources of funds, but the influence of variations of interest rates is not clear. In order to combine these three factors into a single estimate of changes in security holdings, a multiple regression analysis was applied to the data. It was also the purpose of the analysis to try to determine more exactly the role which interest rates played in accounting for the changes in security holdings, particularly since their behavior is central to several current analyses of the effectiveness of monetary policy. The estimates produced by the analysis are shown in Chart 4 and the statistical characteristics are set forth in the appendix. Since the estimates conform rather closely to the original data, it is evident that the three variables combined account for most of the fluctuations in the Treasury security holdings of manufacturing corporations.

Summation of the Evidence

The regression analysis indicated that most of the fluctuations in the Treasury security holdings of manufacturing corporations from 1954 to 1960 were accounted for by the combined influence of changes in accrued Federal income taxes and in the cumulative difference between internal sources of funds and real investment. If an estimate of Treasury securities had been made on the basis of accrued taxes alone, 39 per cent of the variance in the

Chart 4
Treasury Securities of Manufacturing Corporations



securities series would have been explained. The addition of the net internal sources variable explained 86 per cent of the remaining variance. If the procedure had been reversed, approximately the same result would have been obtained. Therefore the two series were equally important in accounting for variations in Treasury securities. Use of the two variables together explained 91 per cent of the variance in Treasury securities. The amount of remaining variance which is explained by interest rates was 11 per cent, indicating that interest rate movements were of relatively minor significance in explaining the policies of manufacturing corporations in the aggregate.

Yet there are reasons why the influence of interest rates upon the composition of corporate liquid assets cannot be dismissed. The disparate behavior of all corporations and of manufacturing corporations in the relative proportion of cash plus Treasury securities held in the form of securities suggests the possibility that the size of the firm may have a significant influence upon the kind of liquid

assets held. If this should be the case, then the influence of interest rate movements may be exerted primarily on smaller firms which are at the margin in terms of whether they hold cash or securities. This interpretation would be consistent with the results of the regression analysis, since the behavior of the smaller firms would be largely overshadowed by the actions of larger firms whose liquid assets are much greater.

But such an interpretation also means that firms with substantial liquid asset holdings would have found it advantageous to minimize their cash holdings in order to hold earning assets at all rates of interest that existed during the period reviewed. Therefore, their holdings of Treasury securities should exhibit no cyclical response to rates.

A different possible relationship between corporate cash management and interest rates is that high rates may lead to improvements in internal controls and procedures that yield their benefit over longer periods of time, making it possible for a rising volume of business to be conducted without proportionate in-

creases in cash. Changes of this kind would be of a secular character and would only mean that the growth of the money supply appropriate to growth of total output could be lower than otherwise.

From these observations, it follows that corporations appear to be among the less significant groups which furnish cash balances to the market in response to rising interest rates. It is possible therefore that any general shifts in the ownership of deposits as a result of rate movements would be exhibited more clearly by other institutions and by individuals.

STATISTICAL APPENDIX

The regression analysis employed the following variables:

- X₁ = Treasury securities held by manufacturing corporations expressed in tens of millions of dollars.
- X₂ = accrued Federal income tax liabilities of these companies expressed in tens of millions of dollars.
- X₃ = cumulative difference between depreciation and

retained earnings as a source of funds and changes in inventory and outlays on plant and equipment as the demand for funds, expressed in millions of dollars.

X₄ = average rate on 91-day Treasury bills.

The analysis gave the following results:

$$X_1 = 288.94 + 0.7924X_2 + 0.0353X_3 + 17.59X_4.$$

Standard error of the equation = 28.6

Standard error of b₂ = .0768

Standard error of b₃ = .0031

Standard error of b₄ = 11.53

R1.234 = 0.96

r12.34 = 0.92

r13.24 = 0.93

r14.23 = 0.33

The equation met the Durbin-Watson test for serial correlation at the 1 per cent level of significance, but evidence of seasonality in the residuals led to further tests. When tax payments (X₅) and changes in cash balances (X₆) were added, the evidence of seasonality was eliminated. Since the addition of these two variables increased the coefficient of multiple correlation only to 0.985, the discussion was confined to the case of the three independent variables.

BANKING IN THE TENTH DISTRICT

District and States	Loans				Deposits			
	Reserve City Member Banks		Country Member Banks		Reserve City Member Banks		Country Member Banks	
	October 1960 Percentage Change From							
	Sept. 1960	Oct. 1959	Sept. 1960	Oct. 1959	Sept. 1960	Oct. 1959	Sept. 1960	Oct. 1959
Tenth F. R. Dist.	+1	+2	†	+12	+3	+3	+2	+5
Colorado	†	+4	-1	+13	+3	+4	+1	+6
Kansas	+5	+6	†	+18	+3	+1	+1	+7
Missouri*	+3	+7	†	+8	+4	+4	+4	+3
Nebraska	†	-6	+2	+10	+5	+2	+5	+4
New Mexico*	**	**	+4	+13	**	**	†	+4
Oklahoma*	+1	-2	-3	+9	+1	+3	+1	+4
Wyoming	**	**	-1	+9	**	**	+5	+4

*Tenth District portion only.
†Less than 0.5 per cent.

**No reserve cities in this state.

PRICE INDEXES, UNITED STATES

Index	Oct. 1960	Sept. 1960	Oct. 1959
Consumer Price Index (1947-49=100)	127.3	126.8	125.5
Wholesale Price Index (1947-49=100)	119.7	119.2	119.1
Prices Rec'd by Farmers (1910-14=100)	240	237	235
Prices Paid by Farmers (1910-14=100)	297	298	296

TENTH DISTRICT BUSINESS INDICATORS

District and Principal Metropolitan Areas	Value of Check Payments		Value of Department Store Sales	
	Percentage change—1960 from 1959			
	Oct.	Year to date	Oct.	Year to date
Tenth F. R. District	+2	+3	-1	0
Denver	+10	+8	+1	+2
Wichita	-4	-4	-15	-14
Kansas City	0	+3	-4	+2
Omaha	-1	+2	+18	+7
Oklahoma City	-5	+1	-4	0
Tulsa	0	0	-4	-3

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