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The Term Structure of Interest Rates

Author(s): J. M. Culbertson

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## THE TERM STRUCTURE OF INTEREST RATES

By J. M. CULBERTSON\*

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This paper develops a theory of the maturity structure of interest rates applicable in particular to developments in markets for U. S. government debt in modern times. It applies the theory to broad changes in the rate structure since 1920, and examines some of its implications for economic stabilization policies.

The theory of the term structure of interest rates, although it has not figured in the renowned controversies over the theory of "the interest rate," has concerned both students of credit control and active participants in debt markets. Among the earlier economists who sought to explain the interest rate structure, J. B. Say<sup>1</sup> and Henry Sidgwick<sup>2</sup> made sensible contributions that could have served as a basis for further development of a realistic theory. However, relatively little attention was paid to this area of theory until the end of the 1920's, at which time there appeared several important works dealing with it.

Karin Koch's *A Study of Interest Rates*<sup>3</sup> pointed out the significance of the behavior of the rate structure for monetary policy

\* This paper was written while the author was a member of the staff of the Board of Governors of the Federal Reserve System. The views expressed are personal views of the author and in no way reflect the position of the Board. The writer wishes to express appreciation to colleagues for comments on a draft of this paper. The paper is based upon a doctoral dissertation submitted at the University of Michigan in 1956, "A Theory of the Term Structure of Interest Rates."

1. *A Treatise on Political Economy* (Philadelphia, 1867), pp. 344-47.

2. *The Principles of Political Economy* (3d. ed.; New York and London, 1901), pp. 251-81.

3. London, 1929.

and engaged in a detailed discussion of institutional and theoretical considerations affecting the structure of rates. Irving Fisher's *The Theory of Interest*<sup>4</sup> developed the relationship between short-term and long-term rates of interest under conditions of perfect foresight that later became the basis of the expectational theory of the term structure. However, his realistically oriented discussion emphasized the importance of institutional factors and the inapplicability of any precise theoretical formulation. His observations on the behavior of the rate structure suggest that short-term and long-term rates tend to move together, with short-term rates moving over a wider range.<sup>5</sup> Winfield W. Riefler's comprehensive study, *Money Rates and Money Markets in the United States*,<sup>6</sup> generally supported the same conclusion. The author pointed up the compartmentalization of debt markets; however, the general relationship assumed to exist was one of competition among debts of different maturity on the basis of relative yields. The data compiled by the author for the 1920's on average market yields on typical short-term and long-term private debt showed a general correspondence in direction and timing of movements, with short-term yields moving over a wider amplitude.<sup>7</sup>

Keynes in the *Treatise on Money*<sup>8</sup> accepted the Riefler findings and sought to support them with data on British experience. He went on to argue that changes in short-term rates, which could be brought about by central bank action, were effectively communicated to long-term markets, and that it was mainly through this channel that monetary policy was effective.<sup>9</sup> In the *General Theory*, however, in recognition of the reluctance of long-term rates to decline in the 1930's, he abandoned this doctrine. He sought to explain the long-term rate of interest as a "highly conventional" or a "highly psychological phenomenon," and emphasized the importance of expected future levels of long-term rates.<sup>1</sup> Apart from the main stream of development is Hawtrey's argument that changes in short-term rates caused by central bank action have little effect upon long-term rates, and that it is directly through the action of short-term rates upon the economy that monetary policy is effective.<sup>2</sup>

4. New York, 1930.

5. See pp. 313-14, and chap. IX (particularly pp. 209-10) on these points.

6. New York, 1930.

7. See particularly pp. 7-9 and 116-23.

8. London, 1930.

9. See particularly II, 352-64.

1. New York, 1936, pp. 202-4.

2. *A Century of Bank Rate* (London, 1938), pp. 184-95.

The doctrine on the term structure of rates most influential recently among English and American theorists, which we will term the expectational theory, was based upon the theoretical consideration of the implications of confidently held expectations and was made credible by the experience of the 1930's. As developed by John R. Hicks<sup>3</sup> and Friedrich A. Lutz,<sup>4</sup> the theory argues that the interest rate on a long-term debt tends to equal the average of short-term rates expected over the duration of the long-term debt.<sup>5</sup>

The influence of the expectational theory seems to have been confined mainly to academic economists. The view most common among those close to debt markets seems to be the older one, that interest rates generally move up and down together because of overlapping among debt markets. Some also have emphasized the role of "arbitrage" of specialists in debt markets in bringing about such behavior.<sup>6</sup>

Different theories of the rate structure necessarily imply different views as to the effectiveness of monetary policy and the manner in which it should be conducted. The expectational theory, since it makes long-term rates of interest depend upon the long-run expectations of the public, has naturally supported a pessimistic view as to the effectiveness of monetary policy. It has led some to conclude that if the monetary authority wants to affect long-term interest rates, it should attempt to do so directly by buying and selling long-

3. *Value and Capital*, (2d. ed.; Oxford, 1946), chap. XI.

4. "The Structure of Interest Rates," this *Journal*, LV (Nov. 1940), 36-63.

5. This is not the same expectational relationship as that emphasized by Keynes in the *General Theory*. It assumes operations based upon long-run expectations regarding short-term rates, while Keynes's approach is based upon short-run expectations regarding long-term rates. Keynes was aware of the other way of formulating the problem, mentioning it before setting it aside in both the *Treatise* (II, 352-53) and the *General Theory* (pp. 168-69)

6. For a discussion of this see the *Report of the Ad Hoc Subcommittee on Open Market Operations of the Federal Open Market Committee* and the *Comments by the Federal Reserve Bank of New York. Hearings Before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report*, 83d Congress, Second Session (1954), pp. 257-331.

Among other recent contributions to the theory of the rate structure is an unpublished manuscript by W. Braddock Hickman, which points out some shortcomings of the expectational theory as an explanation of the actual behavior of the rate structure and develops anew the importance of institutional factors governing the interconnections among debt markets. "The Term Structure of Interest Rates, An Exploratory Analysis," mimeographed preliminary draft, 1942, Financial Research Program, National Bureau of Economic Research. An unpublished doctoral dissertation by Mona E. Dingle also emphasizes the importance of such institutional considerations, and provides a thorough historical review of factors affecting the interest rate structure in the United States. "The Structure of Interest Rates; A Study of Market Influences," University of California, 1951.

term debt,<sup>7</sup> though the theory itself would not dispose one to be optimistic regarding the efficacy even of such actions.

A good deal of recent debate over monetary policies reflects our uncertainties regarding broader questions of economic fact and theory: What behavior of the term structure of rates has, in fact, been "normal" in recent times, and what should we expect for the future? Have long-term rates been "sticky" or unresponsive to current conditions? If not, why has our recent experience been different from that of the 1930's? Do we have any standards that permit us to indicate how behavior of the interest rate structure different from that of recent years would have been more helpful to economic stability? This paper does not undertake to answer all of these questions, but it offers a first approximation to a realistic theory of the behavior of the term structure of rates. Such a theory must be the starting point of any attempt to answer them.

We find the expectational theory unsatisfactory on theoretical grounds and inconsistent with the behavior of the rate structure in the postwar period. We turn to a theory more closely akin to those of the 1920's in emphasizing the interconnection among debt markets, but attempt to develop more systematically than has been done in the past the role of expectations, liquidity differences among debts of different maturities, and changes in the maturity structure of debt available. This approach seems to explain satisfactorily the behavior of the term structure recently and during the 1920's, as well as the aberrant experience of the 1930's.

The theory of the term structure developed in this paper can be summarized briefly in the following manner: Rates on short-term and long-term U. S. government securities, which are tied to rates on related private debt, characteristically move simultaneously in the same direction in the short run (over periods of weeks and months), with short-term rates changing over the wider range. The general coincidence of movement in rates reflects basically the simultaneous impact in various credit markets of changes in general credit conditions resulting from changes in business conditions and monetary policy, and substitutability between short-term and long-term debt on the part of both borrowers and lenders. However, this substitutability is limited in extent, and when the maturity structure of debt supplied to the economy undergoes a substantial short-run change, either because of Treasury debt management operations or actions of private borrowers, this is reflected in the

7. This is one of the conclusions that Lutz drew from his analysis (see *op. cit.*, p. 60).

rate structure. Yields on short-term debt average lower than those on long-term debt because of the advantage of the superior liquidity of such debt to the holder and the liquidity disadvantage of issuing such debt to private borrowers. The amount of the liquidity premiums reflected in the term structure can vary with changes in the maturity structure of outstanding debt and with other factors affecting marginal preferences for liquidity in investment assets. Behavior based upon interest rate expectations is important mainly as a factor determining very short-run movements in long-term rates. Such behavior is based mainly on near-term expectations, and is ordinarily of little importance in determining average rate levels, and relationships, over considerable periods of time. This theory is summarized in the following section, and then explored in greater detail.

### I. THE ELEMENTS OF TERM STRUCTURE THEORY

The decisions of borrowers and of lenders as to the maturity of the debt that they create or hold, and the factors underlying them, determine the relative market valuation of debts of different maturities, in conjunction with government monetary and debt management policies. Four major factors underlying the market's relative valuation of short-term and long-term debt are described in this section, and explored somewhat further in later sections. These are: (1) the liquidity difference between long-term and short-term debt; (2) the attractiveness of debts of different maturities on the basis of expected future changes in debt prices; (3) short-run effects of changes in the maturity structure of supply of debt coupled with rigidities in the maturity structure of demand for it; and (4) differences in lending costs related to debt maturity.

Short-term debt is more liquid than long-term debt. This fact compels some lenders to choose short-term debt, and induces others to prefer it. If there are limitations on the ability or willingness of debtors to do their borrowing by short-term debt, this factor can thus result in a marginal lender preference for, and lower yields on, short-term debt. In fact, it is clear that the ability of private borrowers to finance their activities by short-term borrowing is subject to limitations. Average yields on short-term debt lower than those on long-term debt can be explained, therefore, as representing the market's marginal evaluation of the superior liquidity of existing short-term debt. This liquidity premium should be affected by changes in the maturity structure of debt supplied to lenders, in lender attitudes toward liquidity, and in other factors affecting the liquidity balance in the economy.

To turn to the second factor, expectations of lenders and borrowers regarding future changes in interest rates, where these exist, evidently must affect inducements to hold and to issue debt of different maturities. However, the behavior of most borrowers and lenders is not ordinarily governed by such expectations. The effect upon the rate structure of those patterns of speculative (i.e., expectationally governed) behavior that do exist depends upon the nature of their planning periods, characteristic timing of operations, and other such details, as well as upon the interrelationship among individual patterns of activity. Thus, both the relative importance as a price-determining factor and the characteristic effect of speculative activity are matters that finally must be settled by reference to the facts regarding the particular market during the particular period. In general, however, in debt markets such behavior is more prominent in the market for debt that is more unstable in price, that is, long-term debt, and it is predominantly based upon near-term expectations, rather than upon those related to the more distant future. These considerations do not support the view that long-term rates should tend to equal the average of short-term rates expected over the period to maturity of the long-term debt, or the view that "market expectations" can logically be inferred from the actual structure of interest rates.

In short-run analysis, or in explanation of actual interest rates, changes in the maturity structure of supply of debt, coupled with imperfect elasticity of demand for particular types of debt, must affect the term structure of rates, creating a structure different from that which would exist with the same pattern of available debt if a longer period of time were allowed for adjustment. It is clear that the mobility of funds among debt of different maturities is limited by a variety of factors, and it is a matter of record that there have been considerable shifts in the maturity structure of debt outstanding. This factor, then, must be credited with a role in explaining actual term structure developments. Enumeration of those influences that would be significant within a framework of long-run equilibrium analysis is not sufficient.

Finally, costs of acquiring and administering debt may bear some systematic relationship to its maturity. In so far as they do, this would have to be a part of the theory of the term structure of rates. Differences in lenders' costs of evaluating, acquiring, administering, and liquidating debt of different types affect their net returns, and should be reflected in the normal market structure of (gross) interest rates. Some interest rate differentials evidently are

to be explained mainly on this basis, for example that between certain U. S. bonds and U. S.-guaranteed mortgages.

However, such costs evidently are mainly related to other characteristics of debt than its maturity as such. Investigative, costs would be larger per dollar-year of debt for unknown, small and infrequent borrowers, but would not depend directly on the maturity of the debt itself. Administrative costs of maintaining a debt would be related to the type of debt — for example, whether there are instalment payments to be processed — but not significantly to its maturity. Costs per dollar-year of acquiring and terminating debt would be related to the average period that it was held, which in turn would tend to be related to its maturity; however, for high-grade open market debt such costs would not be large enough to enter significantly into a discussion of the term structure of rates. For some comparisons of particular debts of different maturity, the major explanation of yield difference may be differences in lending costs, but systematic differences in yield among debts differing in maturity but similar in other respects evidently are not to be explained in any considerable part on this basis. Therefore, the cost factor is not considered further in this paper, but the other three factors listed above are discussed at greater length.

## II. THE ROLE OF DEBT LIQUIDITY DIFFERENCES IN THE RATE STRUCTURE

The liquidity of a debt may be defined as its ability to be turned into cash on short notice on definite and favorable terms. "Liquidity" must not be based upon any specific expectations regarding future debt prices or market conditions, but rather on the general characteristics of the asset. If reference is made to specific price expectations, which must be proved right or wrong in individual cases, then what is involved is not analysis of liquidity, but rather "speculative" analysis, which it is useful to distinguish and to discuss separately.

The bases of the superior liquidity of debt that is short-term are two: (1) the period until the debt liquidates itself at maturity is shorter, and (2) fluctuations in prices of short-term debt are characteristically smaller than those of long-term debt, and thus the price at which the debt can be sold is more certain. Considerations other than the maturity of particular debts also affect their liquidity; but where these other factors are equal, debt of shorter maturity is the more liquid.

*Lender behavior and liquidity premiums.* The lender with per-

fect foresight would be unconcerned with liquidity. He would know for each future point in time what assets he would hold and what cash requirements would arise; no worrisome "ifs" would plague his calculations. The lender not blessed with omniscience, however, generally desires liquidity in his debt holdings for the protection and financial flexibility that it confers. The holder of a sufficient volume of liquid debt will not have to fear large liquidation losses if forced to meet unexpectedly large external cash demands. Also, he can count on being able to raise cash to take advantage of unforeseen profit opportunities without incurring offsetting losses in liquidating debt holdings.

No investor has perfect foresight, and it is doubtful that many act as if they thought that they did. However, for some investors, such as active speculators in debt markets, liquidity is a quite minor consideration in choices. For some others, such as life insurance companies, the proportion of investment assets that needs to be in liquid form is very small. However, most investors must be sensitive to liquidity considerations when considering the disposition of a significant portion of their debt-invested funds.

The possible cash needs with which lenders are concerned arise from a variety of situations: the bank's concern is with withdrawals of deposits; businesses provide reserves for taxes and contingencies; individuals may have in mind a variety of possible opportunities and calamities in considering the need of ready availability of their savings. The concern of many financial institutions with their ability to meet possible liquidation needs is reinforced by a variety of legal and customary requirements intended to insure that they will hold assets of adequate liquidity.

Particular future cash needs differ in (1) the degree to which their timing is certain, ranging from definite liabilities to pay given taxes on a certain day to completely uncertain contingencies, and in (2) the nearness or remoteness of the time at which they will arise or are most likely to arise. Those cash needs that are definite in timing may call for the holding of debt of a specific maturity, debt that has a liquidity of the particular "quality" that matches the cash need. The Treasury tax anticipation bill held against definite tax liabilities is an example of such a situation. If all cash needs were so definite, a generalized concept of liquidity might not be a very useful one; liquidity of each variety might have to be considered by itself — although the various liquidities would in any case have some degree of substitutability. However, in fact a large part of the possible cash needs against which assets are held are not definite in

timing. To these needs that may arise at some unknown time in the future, a generalized concept of debt liquidity is appropriate. The existence of some cash needs that are definite and relate to the near future and a large volume of needs that are indefinite but may have to be met in the near future creates a demand for liquidity in general, a preference for debt that can be liquidated on short notice on relatively certain terms.

Such general liquidity preference is a matter of degree, and the extent to which it exists is not a matter of logic, but of institutional arrangements, economic conditions, and national temperament. A people with a gambling disposition would tend to put less emphasis upon liquidity; a more stable economy or one in which more personal contingencies were provided for by insurance or government programs would have less need for liquidity in investment assets. Further, the emphasis that is placed upon liquidity may sometimes change over relatively short periods of time as a result of new conditions or new experience. Many Americans took a much greater interest in liquidity in 1933 than they did in 1928.

Even though many investors have a preference for liquidity in their holdings of debt and other assets, it would not necessarily command a premium at the margin if there were no limitations on the ability and readiness of the economy to provide liquidity in its investment assets. In fact, however, the degree of liquidity provided in the asset stock is restricted.<sup>8</sup> The volume of most highly liquid assets — currency, bank deposits, short-term government securities, savings bonds — is controlled by the government. Limitations on the ability of private borrowers to provide liquid debt are discussed below.

*Borrower behavior and liquidity premiums.* A borrower with perfect foresight and the credit standing required to be able to borrow on debt of any maturity would naturally choose the maturity that would minimize his borrowing costs. If short-term debt tended to bear lower yields than long-term debt because of lenders' preference for liquidity, such borrowers would tend to do their borrowing on the basis of short-term debt to the point at which lenders' liquidity demands were satiated, liquidity in debt was deprived of marginal significance, and debt yields included no liquidity premiums.

Most actual borrowers, however, are not in a position to behave

8. What is directly relevant to the determination of liquidity premiums, of course, is the liquidity of available assets as perceived by investors. They may be guilty of systematic errors, sometimes perceiving assets as more liquid than they are and vice versa, and this must be kept in mind in explaining actual liquidity premiums.

in this manner. They are not possessed of perfect foresight, and in most cases do not wish to take a speculative position in debt markets. Also, they must, in quite the same way as lenders, be concerned with the adequacy of their liquidity positions, and this restricts their ability to assume short-term obligations.

From the viewpoint of the effect on his liquidity position, the debtor should borrow for the longest maturity possible, within the limit of his need for funds. The further in the future the cash need involved in repayment is placed, the more favorable is the liquidity position of the debtor. However, reasonable debtor behavior does not involve seeking the most favorable liquidity position possible, but rather one that balances the costs of maintaining a liquid position with the dangers and possible costs of not maintaining one. Thus, the general rule in business borrowing is to relate the maturity of the debt to the period of time that the funds are needed for a particular purpose, or the type of physical assets to be purchased with the funds.

For a business to finance plant construction by short-term borrowing impairs its liquidity position. If short-term credit to refund its maturing obligations were ever unavailable, it would be placed in an untenable position. The immediate interests of the lender could be well enough protected under such an arrangement. The short-term debt would be liquid, and his position could be secure for the same reason that the borrower's is insecure: he could always decline to renew the credit at maturity if the deal began to look risky. However, most lenders take upon themselves some responsibility for the continued financial health of their borrowers, and are unwilling to make a loan that may be ruinous to the borrower even though their own interests are adequately protected. Thus, though there are exceptions and there is a significant area within which practice is flexible, lenders as much as borrowers generally insist upon a maturity of debt that is related to the purpose of borrowing. Given the structure of uses of borrowed funds, and the predominant role of fixed investment, the application of this rule limits the ability of private borrowers to procure their funds by supplying the economy with liquid short-term debt. Thus, changes in the relative proportions of long- and short-term private debt outstanding are largely associated with shifts in importance among activities characteristically financed by different types of credit — changes in business inventory holdings, in fixed investment expenditures, developments in securities speculation — rather than with changes in the characteristic maturity of the debt used to finance given activities.

Some other factors affect the liquidity structure of existing debt. Intermediary financial institutions can offer to their creditors debt more liquid than that which they themselves hold. By careful management of portfolio maturities, by relying on the law of large numbers to regularize withdrawals and upon funds provided by growth as a potential reserve, they can borrow on shorter term than they lend. Thus, changes in the degree to which the services of such institutions are utilized may affect the liquidity situation. As a rule, such changes would proceed slowly, but in the event of widespread failures or closings of such institutions this would not be the case. Another factor that would affect the liquidity of debt supplied would be changes in economic and financial conditions affecting default risks. An increase in estimated default risks would adversely affect the liquidity of debt subject to such risks. Changes in government loan-guarantee or asset-price-support programs also would affect the liquidity situation.

A final determinant of the average liquidity of outstanding debt, one that is not only variable in the short run but also subject to control, is the maturity structure of the debt of the U. S. government. The government is not subject to the limitations that apply to other borrowers and, limited only by administrative problems (and fears of violating accepted canons of "sound finance"), it can alter at will the maturity structure of its outstanding debt. Such action can be a very powerful force to produce desired changes, or to offset undesired changes, in the maturity structure of other debt, or in other factors affecting the liquidity situation of the economy.

*The role of liquidity premiums in the U. S. term structure.* The above analysis suggests that in the absence of offsetting forces yields on short-term debt would be expected to average lower than those on long-term debt because of liquidity premiums. The rate differentials arising out of liquidity differences (which are not the whole of actual rate differentials) should tend to be widened, for example, during periods in which the proportion of outstanding debt that is short term is unusually small or in which other factors operate to increase demands for liquidity or to reduce the availability of liquid investment assets. U. S. experience supports this view, as is illustrated below. Yields on short-term U. S. government debt have averaged well below those on such long-term debt during the period since 1920, and this differential was particularly great during the 1930's, when a number of factors were operating to make short-term debt especially scarce and liquidity especially prized.

## III. THE ROLE OF SPECULATIVE ACTIVITY IN THE TERM STRUCTURE

Speculative activity in debt markets may be defined for present purposes as that based upon particular expectations regarding the future behavior of debt prices and yields. The term "speculative" is used descriptively, with no derogatory implications intended. Under conditions of perfect foresight, such behavior evidently would determine the maturity structure of interest rates, as, indeed, it would determine price interrelationships among investment assets of all types. Under more realistic assumptions, however, the predominance of and the nature of speculation in particular markets is a matter that must be determined on the facts of the case; no direct link between the price structure at a particular time and assumed expected future prices can be asserted *a priori* to exist.

The description of the speculative activity present in a given market can be a complex matter. Consider some of the factors that must be taken into account: Speculative planning of an individual must be described in terms of the particular alternative assets among which choices are made, the time periods over which comparisons are made, and the scale of potential operations. All of these can differ for different speculators, and for a given speculator at different times. Also, the expectations of individual speculators are not ordinarily unanimous or self-consistent. For these reasons, the net effect of speculative activity is not usually something that is clear and definite, but is rather the net result of individual patterns of operation that are diverse and in many cases inconsistent.

The scale of speculative activity is limited by the resources of speculators, and by the factors that prevent many market participants from behaving as speculators. Thus, it cannot simply be taken as *the* determinant of price, but rather its net effect must be weighed against the other motives and forces simultaneously governing the purchases and sales of nonspeculators. Speculative activity dominates some markets, and is insignificant in others; the question of its role in a given market is one that must be faced directly. Further, speculation may govern some price-time relationships within a market and not others; it may be the marginal factor determining prices at one time but not at another.

*The terms of reference of speculative activity in debt.* Two distinctive features of debt have shaped theorizing about interest rates and expectations: (1) it is a contract (salable, in the case of open market debt) with a definite duration, and (2) attention ordinarily focuses on the computed yield of the contract if held to maturity. These characteristics have led some writers to assume that specula-

tive operations involving debts of different maturities must be based upon a comparison of yields to maturity. Therefore, it is assumed that a speculator considering buying a 20-year bond or a 90-day bill would base his choice on a comparison of the yield to maturity of the bond with the expected average bill yield over the same period, thus, perforce basing his choice on a 20-year planning period. He would thus be assuming implicitly that if bills were purchased in the first instance they would then be held through the 20-year period. But this would, in fact, be an irrational way of formulating the choice. At the least, the speculator must take account of the fact that if he buys the bills he will have a chance of recommitting his funds elsewhere at their maturity on the basis of a known rate of return for the period that they were held; the buyer of 3-month bills is not obligated to keep replacing them for twenty years because he made a choice at the outset between buying them and buying a 20-year bond.

The broader objection to this approach is that it assumes that the planning period of speculative operations is determined by the life of the longest investment asset being considered. Such an assumption is both unreasonable and contrary to common practice. A 20-year bond can be bought with the expectation of selling it at a profit within two days. A 90-day futures contract may be bought (or sold) with the expectation of closing the deal profitably within a week.

Prices of debt, as is illustrated in a following section, fluctuate appreciably from day to day, and from month to month. The speculator who can correctly anticipate these changes can earn a large annual rate of return from his funds. Even the investor who is basically not a speculator must sometimes be tempted to try to anticipate such short-period price changes. No one takes pleasure in finding a price of 98 on something that he bought the week before at 99. Why then should the speculator ignore these short-period movements, look far into the uncertain future, and bet on a long-period change in debt prices that is certain to produce a time-rate of return that is virtually insignificant?

Thus, it is to be expected that speculation in debt markets will be primarily based upon short planning periods, because near-term expectations are usually better formulated than those related to the more distant future, and because maximum time-rates of return are obtained by making use of short-period price fluctuations. The planning period of speculative operations is necessarily related to the amplitude of price movements of the asset involved. The time-

rate of return that can be earned by operations based on a particular planning period must be sufficient to justify the investment of funds, skill, and effort. Because debt prices fluctuate within a relatively narrow range, and because average prices and yields over longer periods vary by even less, speculative operations in debt markets, even more than in some others, should be based upon short planning periods. The evidence of investor interests provided by the choice of subject matter of the financial press and market letters strongly suggests that, in fact, their preoccupation is with the near-term future.

*Nonspeculative investment in debt.* Is there such a thing as non-speculative investment, or is there only investment that is wisely or foolishly speculative? Economists sometimes are disposed to argue that all decisions may be treated as if based upon expectations; at least, that certain expectations are necessarily "implicit" in the decisions. Thus, it is argued that the buyer of a 20-year bond is showing, at least implicitly, his conviction that short-term rates over the coming 20 years will average lower than the yield on his bond. Is this an acceptable line of analysis? There seem to be two types of difficulty with it.

In the first place, if we are to ignore the investor's limitations and his actual decision-making process and impute to him behavior consistent with perfect foresight, then something more — and something different — is "implicit" in his choice than the comparison indicated above. His choice of the bond implies that he considers it the most profitable investment in the whole economy. The relevant time period, however, is the immediate future, not the coming twenty years. The ideal investor maximizes the rate of return to his funds over each day and hour.

If, however, we leave this sterile-looking approach and try to consider our investor realistically, we must recognize a shift in our terms of reference. The problem becomes a factual one of what is the investor's actual decision-making process — among what alternatives does he really choose, and upon what basis — in view of his limitations, objectives, and external constraints. In this kind of analysis, it is misleading to see as "logically implicit" in the investor's decision a choice other than the choice actually made, and then to proceed to analyze the decision on the basis of this inferred choice. If we grant that what is at issue is the actual decision-making process of the investor, this could involve any of a large number of patterns of speculative activity. But it also could involve decisions that are, in fact, nonspeculative. Indeed, this is probably the predominant type of debt market behavior.

Investment governed by expectations regarding future interest rates is a gamble, just as is speculative behavior in other markets. If expectations usually prove to be correct, the speculation will be profitable; if they usually prove to be wrong, it will produce results less favorable than would have been earned by nonspeculative decisions, and may produce losses. For many investors, including the more important financial institutions, it is not irrational to so operate as to avoid this gamble. Actual investors, indeed, are rational enough to know that their foresight is not perfect, and that they would be foolish to act as if it were. Further, nonspeculative behavior is in many cases understood to be required by the position of the investor, and is demanded by custom and law.

Nonspeculative investment behavior involves making choices on some basis that is independent of any particular expectations regarding the future course of debt prices and interest rates. This can be done in a number of possible ways. A common one is to select a portfolio maturity structure suited to the liquidity needs of the investor and justified on an earnings basis by average past experience, and then hold to this portfolio structure through whatever short-run shifts may occur in expectations or interest rates. The behavior of most financial institutions is of this general character, with investment concentrated in long-term debt except in so far as liquidity needs require the holding of short-term debt. The maintenance of a relatively constant portfolio structure insures the institution that its earnings will not vary extremely, and will not turn out disastrously lower (or embarrassingly larger) than those of competitors.

Choices among debts of different maturity on the basis of a direct comparison of their relative yields to maturity is also nonspeculative behavior, since it does not involve planning over any future period. Behavior of this type also seems to be important in debt markets.<sup>9</sup>

*Maturity yields and holding-period yields.* If speculators do not ordinarily operate over a planning period equal to the period to

9. Some discussions have emphasized "arbitrage" of dealers and professional investors as an important factor affecting the behavior of the term structure and the performance of debt markets. However, the expression seems to be used by different people to refer to several types of speculative and nonspeculative behavior (none of which is arbitrage in the strict meaning of that word). Although the operations of dealers (and other active traders) are extremely important in determining day-to-day movements in debt prices and the stability or instability of the market, it seems that the type of broad changes in the rate structure on which this paper focuses must be attributed mainly to more basic forces.

maturity of the debt involved, then their choices cannot be based upon a comparison of debt "yields," as these are ordinarily defined. These measure the rate of return from holding the debt over only one time span, that until maturity (or in some cases until first call, in the case of callable bonds). The speculator using some other time span as his planning period should, rather, make his choice on the basis of a comparison of analogous "holding-period yields," which measure the rates of return that would be earned on each debt if it were sold at the price expected to prevail at the end of the planning period.

In retrospect, also, a holding-period yield can be computed that measures the rate of return earned on a debt during the period over which it actually was held, including, of course, capital gains and losses as well as interest accruals during the holding period. Such holding-period yields can be computed for all varieties of debt, for holding periods of any duration, for any period of history. Study of the behavior of actual holding-period yields permits the drawing of some important conclusions about speculation in debt markets, for it indicates in clear terms the nature of the opportunities for successful speculation that were not taken. It indicates the extent to which speculation of the market was imperfect, because speculative activity was insufficient in scope or incorrect in form and did not succeed in bringing to equality the rates of return earned on different debts.

Holding-period yields can be computed analogously to maturity yields. The holding-period yield can be defined as that annual rate of return at which the discounted value of interest payments and the sale price of the debt is equal to the initial price. For holding periods of less than a year, a compounding period equal to the holding period could be assumed; however, we will follow the convention that is applied to bond yields and assume no compounding within the year. Thus, we define the holding-period yield as the rate of return for the holding period times the number of such periods in a year. For example, if a 3 per cent bond were purchased for \$100, held for one week, and sold for \$100.50 plus accrued interest of \$0.6, the dollar yield would be \$.56, just over 1/2 per cent, for the one-week holding period, or an annual rate of 29 per cent.

The characteristic behavior of actual holding-period yields, debt prices, and maturity yields in relation to debt maturity is an important part of the background against which speculative operations in debt markets take place. As a matter of arithmetic, the change in the price of a debt required to cause a given change in its maturity

yield is directly related to its term to maturity. For example, to cause a 3 per cent bond to fall from a maturity yield of 3 per cent to one of 2.8 per cent requires an increase in price of \$.04 if its term to maturity is three months, \$.20 if it is one year, and \$4.79 if it is forty years. Therefore, if debts of different maturities characteristically underwent changes of the same amplitude in maturity yields, the price changes involved for long-term debt would be a large multiple of those for short-term debt — say, on the order of 100 times as large. And if debts of longer maturity did undergo such larger price fluctuations, their holding-period yields evidently would fluctuate over a similarly wider range. Or, to state the relationship in the opposite manner, if holding-period yields for short holding periods for debt of all maturities were held to equality, or to the same range of fluctuation, then maturity yields on long-term debts would change over a range only a small fraction as large as that applying to short-term debt.

*The effectiveness of debt speculation.* If debt markets were fully speculated on the basis of perfect foresight (that is, if the rate structure were the self-consistent reflection of a single, and correct, pattern of expectations) then holding-period yields on debts of all maturities should be equal for any and all holding periods. This is rather a farfetched condition, of course, as is apparent if one stops to consider its implications for a debt structure including a wide range of maturities. If debt markets were dominated by speculative activity based upon approximately unanimous expectations and upon a single predominant planning period, discrepancies over the planning period in actual holding-period yields for debts of different maturities would reflect errors in the expectations. In fact, there is no basis for assuming as a general rule — though it may sometimes occur — a near unanimity of expectations and planning periods. However, examination of the behavior of past holding-period yields on debts of different maturities may still tell us something, albeit only something negative, about the effectiveness with which debt markets were speculated.

The behavior of some such actual holding-period yields is examined below. It appears that holding-period yields for short holding periods of long- and short-term debt have diverged widely, in a manner that seems to have been characteristically repeated during up and down swings in interest rates and that does not seem to be explainable on the basis of prevalence of particular errors of expectations. This appears to indicate that debt markets are not dominated by expectationally oriented behavior in such manner that broad

changes in the term structure of interest rates can generally be interpreted as reflecting changes in market expectations. The prevalence of such a pattern of behavior of holding-period yields suggests that the explanation of broad movements in the term structure of rates must be sought principally in factors other than behavior governed by interest rate expectations.<sup>1</sup>

#### IV. CHANGES IN THE MATURITY STRUCTURE OF DEMAND FOR FUNDS

It is generally recognized that changes occur over time in the maturity structure of demand for funds. Such changes are important in day-to-day market developments, occurring in an irregular manner that depends upon such factors as the timing of new security issues. They occur also over longer periods of time, in part on the basis of more regular factors, as is indicated below. Once it is admitted that such changes in the maturity structure of demand for funds do occur, and that the maturity structure of debt holdings is not a matter of indifference to lenders — that funds are not perfectly mobile among debts differing in maturity — it is clear that such changes must be one factor influencing the maturity structure of interest rates existing at any moment. In part this influence is to be related to factors discussed above. That is, changes in the maturity structure of demand for funds and in the structure of outstanding debt affect marginal liquidity premiums and marginal lending costs applicable to debts of different maturities; also they could affect the market impact, at the margin, of speculative operations. However, in addition to these factors, rigidities in the structure of supply, or impediments to perfect mobility of funds among debts of different maturity can, in themselves, be important determinants of the actual interest rate structure.

Short-run changes can occur not only in the maturity structure of demand for funds, but also in the structure of supply. Such changes would be mainly in response to the factors discussed above, shifts in liquidity estimates and preferences, in relative lending costs, and in lender expectations and patterns of speculative activity. Some other factors, such as changes in the pattern of financial institutions on account of legal, political, or sociological factors, would affect the structure of supply of funds but are not discussed here

1. However, it is undeniable that over short periods of time, periods measured in days or weeks, expectations, and even amorphous psychological reactions, can be a powerful force affecting interest rates. Expectational factors undoubtedly played an important role in the sharp peaking of long-term rates in May 1953, and in several short-run movements in yields of intermediate-term and long-term Treasury securities in 1956.

because they would not ordinarily be important in the short run. Changes in monetary policy or other developments affecting the relative role of commercial bank funds (mainly short-term and intermediate-term) in the total supply could cause a short-run shift in the structure of supply of funds.

To return, then, to the causes of such shifts in the maturity structure of demand for funds as would affect the term structure of rates (other than on a day-to-day basis), these appear to be caused mainly by shifts in the purposes of borrowing, and by Treasury debt management operations. It was argued above that the maturity of private borrowing is generally closely related to its purpose. Thus, shifts in business and financial developments tend to be reflected in changes in the maturity structure of borrowing. Business inventory developments and securities speculation are reflected in changes in short-term borrowing; changes in automobile sales affect extensions of the intermediate-term credit commonly used in this area; changes in sales of new houses, in business fixed investment, in state and local government construction are reflected in demands for new long-term credit.

There are a variety of impediments to mobility of funds in debt markets: legal restrictions on some types of borrowing and on debt holdings of institutional investors, desire of investors for portfolio diversification, customary investment standards applied to financial institutions, lags in establishment or revision of financial institutions, specialization of investors on technical grounds, impediments to geographical movement of funds in cases requiring judgment or administrative activity, etc. The burden of making the shift in the allocation of loan funds required by a change in the structure of demand for funds may fall principally upon one group of lenders which bridges the major markets involved. In shifts in the balance of demands between short-term and other markets, the commercial banks necessarily play a crucial role.

In both of the two postwar recessions, the banks made important shifts in the allocation of their funds, replacing declining business loans with government securities. This maintained the volume of bank credit in use and the money supply, and helped to limit the recessions and to provide a financial climate that encouraged recovery. Following 1929, an unusual combination of circumstances brought a remarkable shift in the maturity structure of demand for funds away from the short-term end, as is indicated below. The impact of this shift, and its implications for the liquidity position of creditors, is a major factor in the explanation of the abnormal

term structure of the early 1930's. Some of the major changes that have taken place in the maturity structure of demand for funds, and their implications, are discussed below.

#### V. YIELDS ON SHORT-TERM AND LONG-TERM U. S. GOVERNMENT SECURITIES: 1920-1957

The past behavior of the maturity structure of yields on U. S. government debt is examined below to see how it can be described and how it is to be interpreted in terms of the above discussion. This investigation deals with changes in the term structure over periods of months rather than with day-to-day and week-to-week movements. The latter should be explainable also in terms of the same framework of analysis, but haphazard variations in the structure of demand for and supply of funds and day-to-day changes in market sentiment and expectations should be more important than over longer periods.

The term structure of rates for the period since 1920 is examined as a whole with reference successively to several aspects of its behavior. First, the broad relationship between changes in long-term and short-term interest rates is described. Second, characteristic behavior of holding-period yields from short-term and long-term debt is examined. Finally, periods during which shifts in the maturity structure of demands for funds were of particular importance are considered.

*The general behavior of the term structure.* Some general observations applying to the behavior of yields (monthly averages) on Treasury bills in relation to those on long-term bonds may be gathered from a chart showing their movements over a considerable period of time.<sup>2</sup> The short-term rates were characteristically below the long-term rates. They were above them only for two relatively short periods, both of which coincided with peak levels of interest rates generally. Thus, experience seems clearly consistent with the view that in modern times the superior liquidity of short-term debt has had marginal significance. Short-run movements in yields on short-term and long-term debt have generally been simultaneous and in the same direction. Movements in short-term rates have been much the wider in amplitude, both in absolute and relative terms. There is no evidence of a lead-lag relationship. Short-term rates were generally closest to long-term rates, or above them, at times when both were relatively high. While this was the general

2. See that in the *Federal Reserve Chart Book, Historical Supplement*, 1956, pp. 38-39.

character of the relative behavior of short-term and long-term rates, there clearly were some important developments that were not in conformity with this pattern.

It may help to define more closely the nature of the relationship between changes in long-term and short-term rates if data for some periods during which they moved characteristically together are arrayed in a scatter diagram. This will indicate the nature of the interrelationship that existed during these periods of consonant movement, and disclose whether it is the same in one as in another such period. It will also indicate the nature of the shifts that took place in intervals between such periods.

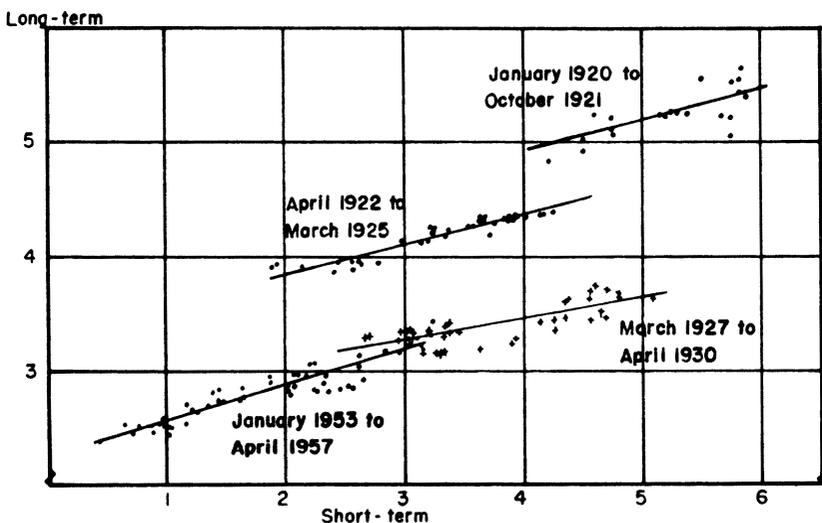


CHART I

RELATION BETWEEN YIELDS ON LONG-TERM AND SHORT-TERM  
U. S. GOVERNMENT SECURITIES, SELECTED PERIODS  
Monthly average yields, per cent per year

Note. Long-term yields shown are those included as "bonds: long-term, old series" on the chart mentioned in the text; they apply to bonds mostly due or callable in 10-20 years. Short-term yields shown are those on 3-6 month certificates and notes for periods through 1930 and average issuing yields of Treasury bills in 1953-57.

Chart I indicates that long-term and short-term rates were subject to fairly close short-run relationships during a number of periods since 1920, relationships that shifted during some intervening periods. The short-run relationships indicated for most of these periods

have roughly the same slope (though the 1927-30 period shows less responsiveness of long-term rates than the others), but there were

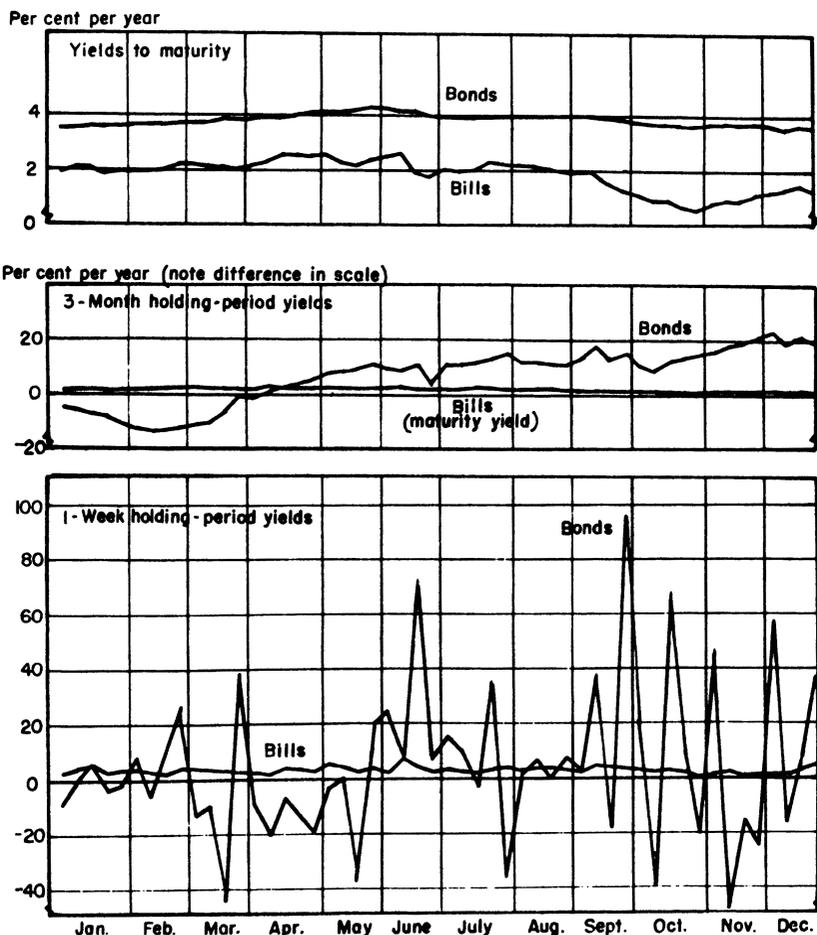


CHART II

MATURITY YIELDS AND 3-MONTH AND 1-WEEK HOLDING-PERIOD YIELDS  
FOR BONDS AND BILLS: 1953  
(Weekly)

Note. Bills are longest issue outstanding of Treasury bills. Bonds are Treasury 12/67-72's. Holding-period yields are annual rates of return including capital gain or loss for indicated holding periods beginning with dates shown.

shifts during the 1920's that brought long-term rates lower relative to short-terms. It is interesting to note that in very broad terms

the relationship for the period beginning with 1953 is consistent with that for the latter 1920's, though the relative amplitude of movement of long-term rates is greater in the recent period.

The least-squares relationship plotted for the earliest period, including 1920 and most of 1921, is as follows: long-term rate =  $3.9 + .27$  short-term rate. That for the most recent period, 1953 through April 1957, is as follows: long-term rate =  $2.3 + .31$  short-term rate. These relationships are consistent with the observations suggested above. They indicate that short-term rates are more volatile than long-term rates, showing fluctuations between three and four times as large in absolute terms. While short-term rates are below long-term rates at interest rate levels such have existed in recent years, the relationships would suggest that if the pressure of demand on available loan funds became sufficiently great they would tend to rise above them, as they did on some occasions during the 1920's. According to the relationship given for the recent period, the level to which rates would have to rise before long-term and short-term rates would be equal would be about 3.3 per cent. At the other extreme, according to the same relationship, the minimum level to which long-term rates would fall in the short run in the event that short-term rates were reduced to zero would be about 2.3 per cent.

*The behavior of holding-period yields and the role of speculative activity.* The year 1953, which included a rather sharp rise and subsequent decline in interest rates, is taken as a basis for illustrations of the behavior of holding-period yields. Chart II shows maturity yields on a long-term bond and on Treasury bills during 1953, and shows the annual rate of return, including capital gains and losses, earned by holding these securities for 3-month and for 1-week periods throughout the year.<sup>3</sup>

The chart illustrates that such holding-period yields fluctuated over a much wider range than maturity yields, that holding-period yields on long-term debt fluctuated over a much wider range than those on short-term debt, and that the shorter the period of time over which holding-period yields are computed the wider was the range of fluctuation. While existence of these general relationships is common knowledge, it is useful to have a definite measure of the

3. No allowance has been made for transactions costs in computing holding-period yields; thus these somewhat overstate the actual rate of return that could be earned, particularly for short holding periods that would involve frequent turnover of debt holdings. However, transactions costs on U. S. securities are very low, ordinarily running less than 1/10 per cent on a purchase and sale, and the general conclusions drawn would not be affected by allowing for them.

extent of the differences among holding-period yields, and between holding-period yields and maturity yields.

Thus, while maturity yields on the bonds shown ranged between 2.75 and 3.13 per cent, yield rates for 3-month holding periods ranged between minus 13 and plus 23 per cent, and yields for 1-week holding periods ranged between 97 per cent and minus 48 per cent. Holding-period yields on the bonds were generally negative during the early months of the year, when yields were rising and bond prices were falling; they were generally positive and quite large during the remainder of the year, when falling yields predominated and capital gains were earned by bondholders. In the case of yields for 1-week holding periods, the erratic changes in bond prices overshadowed the broader movements, and such yields showed extreme fluctuations.

Thus, it appears that during periods in which the level of interest rates is changing — which includes most of the postwar period to date — yields for short holding periods on long-term debt characteristically differ greatly from those on short-term debt; evidence of anything approaching perfect speculation is absent. Holding-period yields for long-term debt fluctuate over a much wider range than those for short-term debt, and thus long-term debt offers the more tempting target for speculative activity.

This pattern of behavior of holding-period yields illustrates some of the difficulties in the way of an attempt to explain the behavior of the rate structure in terms of expectations. What sort of expectations, one must ask, could possibly have produced this result? Was the extended 1952-53 rise in interest rates, indeed, a matter of continuing surprise to investors, and the decline from mid-1953 to mid-1954, and the subsequent rise? A group of speculators so uniformly wrong in their expectations would not seem a good bet to remain in business. The traditional expectational theory, of course, assumed the very long, rather than the short, planning — or holding — period. But how many investors in a position to behave on the basis of expectations would be content to hold bonds in a month, say, when they were losing money on them at the rate of 25 per cent a year because they believed that over the coming twenty years bill yields would average a bit lower than the maturity yield on their bonds? If the movements in long-term rates were caused by changes in the public's long-run expectations regarding short-term rates, then is it a coincidence that these conformed so closely with changes in current economic conditions and monetary policy? The conclusion to which one seems forced to turn is that speculative activity, dominant though it can be in very short-run

movements, does not determine the broad course of interest rates or of interest-rate interrelationships.

*Changes in the maturity structure of demand for funds.* Short-run changes in the maturity structure of private demand for funds have reflected mainly the impact of changes in the economic and financial situation upon the pre-existing pattern of demands for credit. The volume of commercial loans of banks has always been closely responsive to ups and downs in business. In some part, perhaps, it has reflected shifts in the optimism or pessimism of banks and in the credit standards that they applied to prospective borrowers. However, its primary cause has been changes in the demand for business loans associated mainly with changes in business expenditures for inventories and fixed capital. Commercial and agricultural loans of weekly reporting member banks declined about 18 per cent in the 1949 recession and 12 per cent in the 1953 recession (excluding changes in holdings of Commodity Credit Corporation obligations), although neither of these periods was attended by liquidity panic or by any pressure on banks to liquidate their assets. In fact, the marked decline in loans was accompanied by reductions in interest rates, and banks simultaneously were adding to their holdings of U. S. securities in order to keep their funds employed.

Similarly, changes in the volume of stock market credit have been related to the broad behavior of stock prices, and in more recent times, to changes in margin requirements, and have reflected mainly changes on the side of demand for funds. Also, short-run changes in consumer credit have been closely related to changes in sales of consumer durable goods, and demand for such credit.

Long-term debt generally has shown much less responsiveness to changes in business conditions, as is indicated by Chart III. This difference in behavior has not reflected merely the fact that the slower turnover of long-term debt implies a lesser maximum rate of decline; rather, it has resulted from greater stability in the demand for new funds. Thus, the volume of outstanding long-term debt continued to rise (on an end-of-year basis) through the 1921 recession, and in the postwar period its continued growth has not been significantly interrupted by moderate recessions.<sup>4</sup> This suggests that one factor explaining the wider swings in short-term rates associated with economic fluctuations is the fact that the related changes in demand for short-term funds are greater than in those

4. The 1951 decline in "other debt" shown in Chart III reflected a very large, and partially temporary, shift in U. S. government debt from bonds and notes to certificates and bills.

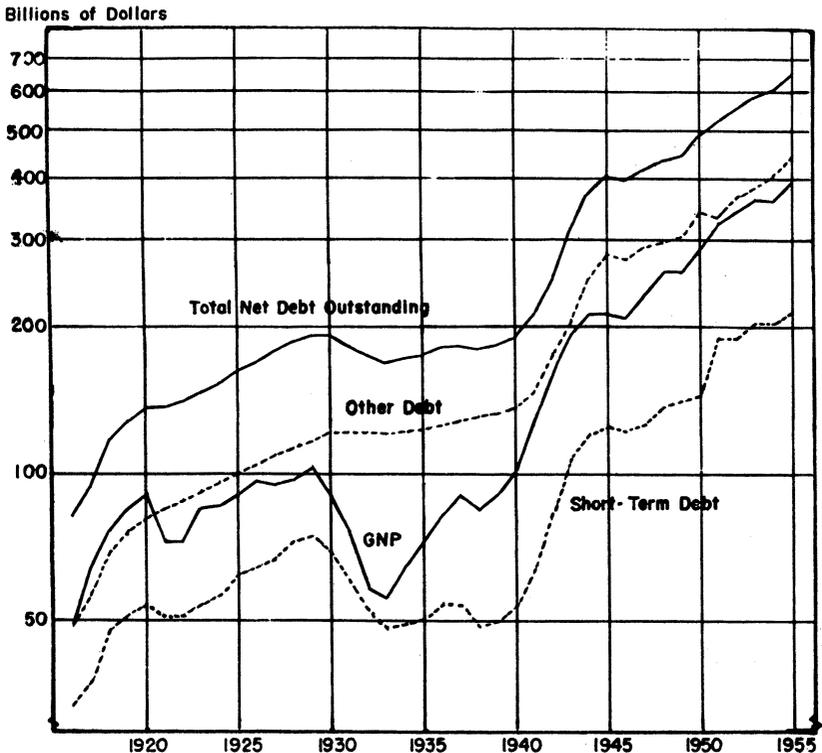


CHART III

NET DEBT OUTSTANDING IN THE UNITED STATES, SHORT-TERM AND OTHER  
Ratio scale: 1916-1955

Note. Debt data are as of the end of the year indicated, except that state and local debt is as of June 30; gross national product data are annual totals. Net debt excludes that issued by and held within (1) the federal government and its corporations and agencies (not including Federal Reserve Banks), (2) state and local governments as a group, and (3) affiliated corporate systems under a single management. The classification of debt is generally on the basis of original maturity. Debt classified as short-term includes Treasury bills and certificate of indebtedness, corporate debt of original maturity less than one year, and all nonmortgage debt of individuals and unincorporated business. "Other" debt includes federal and corporate debt not included as short-term, mortgage debt, and all state and local debt. Except for the breakdown of federal debt, concepts and data are those of the Department of Commerce; see *Survey of Current Business*, Oct. 1950, pp. 9-15, May 1956, pp. 6-14.

for long-term funds. It also suggests that a drop in the supply of short-term debt during an economic decline could be such as to affect the liquidity position of lenders and the interest rate structure. Such

a development seems to have been an important factor in the failure of long-term rates to accompany the sharply declining short-term rates during the early 1930's, and in the unfavorable liquidity conditions of that period.

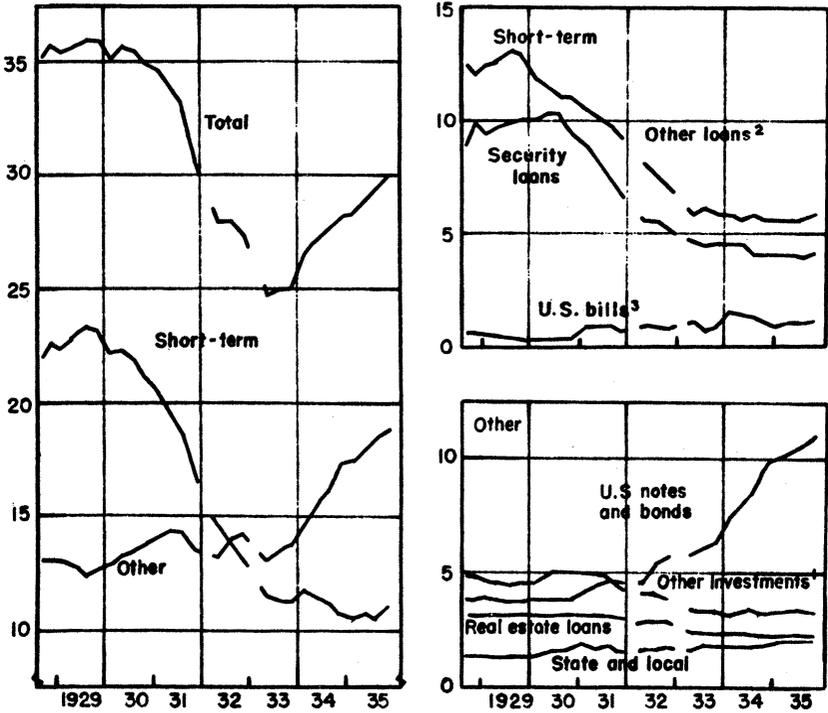


CHART IV

MEMBER BANK LOANS AND INVESTMENTS: 1928-1935  
(Billions of dollars)

<sup>1</sup> Includes U. S.-nonguaranteed and corporate bonds, notes, and debentures, corporate stocks, and foreign securities.

<sup>2</sup> Includes all loans other than real estate loans and those on securities.

<sup>3</sup> Includes certificates of indebtedness.

Note. The definitions of short-term and other debt, definitions that are far from ideal, are indicated by the charts in the right hand panel. Data are as of call report dates; they are from *Banking and Monetary Statistics*, Board of Governors, Federal Reserve System, 1943, pp. 72-77.

Private short-term borrowing began a rapid and extended decline after 1929, both security loans — which were particularly important in the liquidity position of banks and other lenders — and business and consumer loans. The volume of private long-term borrowing reacted to the financial crash by increasing sharply. From

the end of 1929 to the end of 1930, debt other than short-term ("other debt" as defined in Chart III) increased \$5 billion, or 5 per cent, reflecting in part a shift in corporate fund-raising from stocks to bonds. It was not until 1933 that private long-term debt outstanding dropped below its 1929 level, which contrasts sharply with the behavior of short-term borrowing. Total outstanding debt other than short-term never did show any considerable decline during the 1930's, as the Treasury financed the bulk of its deficit in the bond market and thus offset what reduction did take place in private debt. From 1931 through 1939 (fiscal years), the Treasury issued \$23.2 billion of bonds for cash and in refundings and the outstanding amount rose \$13.3 billion (excluding savings bonds); from 1920 through 1929, the Treasury had issued a total of only \$3.2 billion in bonds and the volume outstanding had declined \$4.1 billion. Debt management policy during the depression did not offset the shift in the maturity structure of private debt that made short-term debt, particularly liquid very short-term debt, abnormally scarce, while illiquid long-term debt continued in very large quantity.

The shift in the maturity structure of outstanding debt necessarily was reflected in commercial bank assets, and in bank liquidity positions. Practically the entire decline in loans and investments of member banks was in security loans and in other loans (excluding real estate), as may be seen from Chart IV. Such loans fell by more than one-half from 1929 to 1933, while other assets rose somewhat. The situation that faced banks, then, was this: Reserve positions after early 1930 (except during the short periods of bank runs) were easier than they had been in years, and by 1932 abnormal excess reserve balances began to accumulate. However, the liquidity position of banks had been dealt a heavy blow by the collapse in holdings of short-term credit, particularly call loans. Therefore, while they were willing to make secure short-term loans at very low yields, and in some cases at no yield at all, there was a limit to the rate at which they were willing to expand their holdings of less liquid debt. After the early 1930's, a large volume of bank reserves remained unused and was not made the basis for expansion in bank credit in use and in the money supply.<sup>5</sup>

5. It is sometimes argued that the banks were in an extremely liquid position after about 1933 because of their very large holdings of excess reserves, which undoubtedly are some sort of a liquid asset. However, there are two reservations to be made against this position. (1) It is questionable that bankers considered excess reserves as dollar-for-dollar substitutes for liquid earning assets. Some of their traditional ways of looking at things would not dispose them to be content with an asset position consisting, say, of long-term bonds and

This imbalance between the maturity structure of demand for and supply of funds coincided with events that tended to raise demands for liquidity in investment assets: the disappointment of expectations in the 1929 crash, continued declines in prices of many investment assets, the spreading wave of defaults abroad and at home. Under these extremely unfavorable conditions, the mobility of funds was not sufficient to convert "easy money" in markets for liquid short-term debt into generally easy credit conditions, or to maintain a normal relation between short-term and long-term rates. Yields on short-term Treasury securities were abnormally low because banks had ample funds that they were willing to invest in liquid short-term debt, and the supply of such debt was very limited. Long-term yields declined belatedly because demands for such funds continued large, savings declined, and banks because of liquidity considerations had to limit the rate at which they were willing to move into such debt. The wide differential between short-term and long-term rates can be interpreted as consisting mainly of an unusual liquidity premium associated with the peculiar conditions of the times.

Bond yields dropped somewhat in late 1929 and eased off further through mid-1931, finally about regaining the lows reached in 1928 — at which time short-term rates, of course, had been much higher. Then bond yields were pushed up sharply by the financial crisis of late 1931 and did not get back down to the earlier levels again until 1934. Thereafter, they declined irregularly until 1941, eventually reaching levels that probably were not out of line with the depressed short-term rates (assuming the sort of relationship indicated by the scatter diagrams above).

What is truly singular about the behavior of the rate structure during the 1930's is the fact that long-term rates did not show larger declines during the earlier part of the period. It was four years before long-term rates began to show a full response to the remarkable drop in short-term rates in 1930. An effective program

excess reserves. (2) There is a danger of double-counting the excess reserves. In so far as they are doing service as a liquid asset, they are not really "excess" in the sense of being available to support acquisition of additional earning assets. Thus, if a higher level of bank credit would have been desirable, perhaps what was needed was a still larger volume of excess reserves — though this hardly seems the best way of going about the matter. (If excess reserves in this period are to be regarded as partially serving as liquid assets, the banks' reaction to the 1936-37 decline in excess reserves was not so unreasonable as is commonly supposed). In the text discussion, we are focusing attention on the liquidity of banks' *earning assets*, and asking what prevented their excess reserves from being used to support expansion of bank credit.

for economic stabilization cannot tolerate such a lag. The Keynesian argument that declines in long-term rates are impeded, beyond a certain point, by expectations that rates will again rise to "normal" levels, entailing capital losses to holders of such debt,<sup>6</sup> clearly was increasingly applicable after, say, about 1936, as long-term rates continued to set new record lows. However, this factor was not sufficient to prevent continued declines during this period. The argument is not particularly applicable to the earlier 1930's, when rates were not low by the standards of the late 1920's, and in relation to current short-term rates were obviously peculiarly high.

What would have been an effective government financial policy during this period (neglecting the impediments to action represented by existing conceptions of "sound finance" and by the gold standard)? Such a policy would not have permitted so large a decline in commercial bank credit and the money supply, and would have provided an effective bridge between the easy conditions created in short-term markets and those in long-term markets. This could have been done by making available a larger volume of commercial bank reserves earlier in the period, and by a properly conceived debt management policy. The Treasury should have issued short-term debt in such volume as to meet all needs of commercial banks (at positive yields, rather than the zero and negative yields that developed). This would have given banks a suitable asset to acquire in order to use the reserves that were made available to them, thus sustaining the money supply and the liquidity condition of the economy generally. It also would have strengthened the liquidity position of the banks themselves against the adversities that developed. As the counterpart of this action, the Treasury should have made drastically smaller offerings to the intermediate-term and long-term sectors of the market. This would have left more investment funds to seek employment in private debt, driving yields down (since Treasury offerings were a major factor keeping them up) and presenting more favorable financing terms to private borrowers. This would have meant rising bond prices, which would also have improved the balance-sheet position of investors. With such a policy, the "pushing on a string" doctrine of monetary policy should not have had an occasion to develop. Prompt creation following 1929 of financial conditions more favorable to recovery might have done much to prevent the subsequent descent into the depths of financial chaos and depression.

The behavior of the maturity structure of debt in the moderate

6. *General Theory*, pp. 202-4.

recessions of the postwar period has been quite different from that following 1929, and from that of the 1921 and 1937 contractions. Substantial reductions in commercial loans of banks occurred during both of the postwar recessions; however, the importance of these relative to the total volume of bank credit was much less than in prewar experience. Other types of short- and intermediate-term credit did not show the same sort of cyclical responsiveness to these moderate recessions, mainly continuing upward or holding stable in response to factors more specifically related to individual areas. Stock market credit declined somewhat in 1949 (comparisons on a monthly basis) but rose in 1953-54; consumer credit rose in 1949, but leveled off in 1953-54; agricultural loans of banks increased in both periods, a sharp rise in 1953 reflecting a change in the manner of financing the activities of the Commodity Credit Corporation. So far in the postwar period, thus, the impact of recession on the structure of debt has been different from that of prewar years, as a result of basic changes in the structure of debt and in the response of the economy to setbacks in demand.

The implications of a given shift in the structure of private debt also would be different now than in the prewar period. War finance created a large volume of liquid short-term U. S. government debt, and this has displaced short-term private debt as the cornerstone of the liquidity position of banks and other financial institutions. With liquidity desires now mainly focused on government debt, changes in call loans and in other short-term private debt do not have the same significance that they once had.

This review of the behavior of the structure of rates on U. S. government securities, thus, supports the generalizations made in the introduction: Short-term rates have averaged lower and have moved over a wider range than, but generally together with, long-term rates. The behavior of the rate structure does not seem explainable in terms of long-run expectations, though near-term expectations can temporarily govern the behavior of rates. The fundamental factors underlying the general coincidence of short-run movements in short-term and long-term rates seem to be the fact that debts of different maturities are to some degree substitutes for both borrowers and lenders (on the basis of their relative yields to maturity), and the fact that demands for funds of all types tend to be affected to some degree by changes in business conditions. Long-term yields move within the narrower range because the debt price changes and speculative implications of a given yield change are greater for long-term debt, and because demand for long-term funds

is less responsive to business fluctuations. Short-run changes in the maturity structure of debt supplied can produce corresponding changes in yields.

## VI. SOME IMPLICATIONS FOR CREDIT POLICY

This interpretation of the behavior of the rate structure, taken together with the facts of our postwar experience, has implications for the conduct of monetary policy and its role in the over-all economic stabilization program quite at variance with those of the expectational theory. Some of these implications are summarized below.

1. Direct government action in debt markets is not ordinarily necessary to produce roughly simultaneous upward and downward movements of long-term and short-term interest rates in response to changes in business conditions and in monetary policy (assuming debt management policies of at least some minimum degree of appropriateness.) Such behavior has been characteristic of interest rates in recent years. More broadly, the period since 1920 generally has been characterized by such congruous movements of long-term and short-term rates except for some apparently structural shifts in the relationship between long-term and short-term rates during the 1920's, the abnormal rate structure of the earlier 1930's, and some short periods of panic reactions in debt markets during the 1930's.

2. The regular behavior of the term structure and even some of its moderate departures from regular behavior seem to reflect supply and demand forces that can claim to be relevant to the term structure and perhaps to have some adaptive significance for the economy. Some theorists have assumed that the natural behavior of the term structure has little economic meaning or function. Explanations of the term structure on the basis of psychological or long-run expectational factors naturally tend to lead to such a view.

Any attempt at close administrative control over the rate structure, therefore, ought to be based upon a rather clear understanding of what objectives are sought, what private forces are being overridden, and what will be the effect of overriding them. For example, if a short-run movement in long-term yields were being caused by an irregularity in the flow of private security issues, government buying or selling to smooth out yields might be at the expense of encouraging fluctuation in the rate of private long-term borrowing. Is it clear that this would promote stability? Or, government action to offset the effects of an anticipatory movement in long-term yields

based upon correctly informed speculative activity might have the twofold result of delaying an appropriate adjustment in yields and contributing directly to the profits of the speculators.

3. Our experience has been that, except under the special conditions of the 1930's, debt markets have been generally free of panic reaction and excessive and self-feeding instability — though in the early postwar period many feared that such behavior would develop. Our recent experience reinforces the view that debt markets have the necessary adaptability and resilience to adjust effectively to changes in economic conditions and in active anticyclical monetary and debt management policies.

4. Among the factors that can cause changes in the term structure of rates are shifts in the liquidity premiums reflected in the rate structure. These may result from changes in the maturity structure of available debt, from other factors affecting the liquidity structure of the stock of investment assets, or from changes in investor attitudes toward liquidity. Properly interpreted, thus, the behavior of the interest rate structure can be one indication of the liquidity situation of the economy, which, together with other evidence, can help to guide the conduct of monetary and debt management policies in maintaining liquidity conditions suited to the needs of economic stabilization. In particular, abnormally low yields on liquid short-term debt during a depression may be an indication that the economy is starved for liquidity, and abnormally high yields on such debt during prosperity may indicate that the supply of liquidity instruments is excessive for the conditions of the times.

5. If used actively in a co-ordinated manner, monetary and debt management policies can play an essential role in dealing with both inflationary and deflationary problems, by enforcing an appropriate behavior of interest rates, through their impact upon conditions in debt markets, and through their influence upon the liquidity position of the economy.

J. M. CULBERTSON.

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