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WHY LIQUIDITY PREFERENCE EXISTS

IT IS CLEAR from the analysis of the data used by Hickman and Meiselman and the evidence presented here (the historical data going back to 1920 in the next chapter and the comparisons of predicted and actual bill rates), that the expectations hypothesis alone does not explain the term structure of interest rates. The existence of upward bias in the estimates of future short-term rates suggests that at least one other variable is relevant—liquidity preference. Liquidity preference can be regarded as a force that causes forward rates to be biased and high estimates of short-term rates. Its effects can be measured by the difference between the mean value of forward and expected rates; i.e., by the difference between actual forward rates and the yields that short-term securities would have to have for the expectations hypothesis to yield unbiased estimates of future short-term rates. This raises the questions why does liquidity preference exist and how does it affect the term structure of interest rates?

Keynes, who introduced the term to economics, used liquidity preference to describe a preference of the market, abstracting from differences in yield, for assets that are immune to capital losses produced by interest rate changes. If uncertainity as to the future course of interest rates exists, then the market has a choice of taking risks with respect to capital values, income streams, or some combination of both. On balance, the evidence indicates that the market prefers to take risks of income stream changes. That is, the market prefers money to securities if differences in pecuniary yields are ignored.[1] Consequently, equalizing yield differentials exist be-

[1] See J. M. Keynes, *The General Theory of Employment, Interest and Money*, New York, 1936, pp. 168 ff. This view may also be found in Hicks, *Value and Capital*, p. 151.

tween money and securities that offset differences in relative vulnerability to capital losses through interest rate changes. Since the risk of capital losses attributable to holding securities is directly related to term to maturity, security yields ought also to vary directly with term to maturity. Just as the "interest rate" equilibrates the net return to holding money and "securities," the term structure of interest rates equilibrates the net return to holding securities of varying terms to maturity and money. The shorter the term to maturity of a security, the smaller is its vulnerability to capital loss, and hence the greater its liquidity and the smaller the yield differential between that security and money. Therefore, liquidity preference constitutes, by implication, a theory of the term structure of interest rates. It is a theory, not of the level of interest, but of interest differentials. Linked with risk avoidance, it implies a positively sloped yield curve.[2]

Short maturities, in addition to being less vulnerable to capital losses attributable to interest rate changes, have lower costs of conversion to cash than long maturities. Since the cost of converting securities to cash increases with term to maturity, the liquidity of securities, in this specialized sense, decreases with term to maturity. Consequently, the market ought to prefer short- to long-term securities. Like risk avoidance, transactions costs imply a rising yield curve as a function of term to maturity. Given the existence of this inverse relationship, is it strong enough to account for the normal difference in yields between long- and short-term governments? Over the three latest reference cycles, the average yield of the longest-term governments has been about one hundred basis points greater than the average yield of 91-day Treasury bills.[3] For three-

[2] This view of liquidity preference appears in David W. Lusher, "The Structure of Interest Rates and the Keynesian Theory of Interest," *Journal of Political Economy*, April 1942, p. 274. He says: "Each rate of interest in the structure of rates may be looked upon as balancing the advantages of holding cash." Similarly, Abba P. Lerner in *Economics of Control*, New York, 1944, p. 343, says: "Competition equalizes the *sum* of money and liquidity yields." Samuelson regards liquidity preference as an explanation of the existence and level, not of the interest rate, but of the differential between the yield on money and the yields on other assets. See Paul A. Samuelson, *Foundations of Economic Analysis*, Vol. 80, Harvard Economic Studies, Cambridge, Mass., 1947, pp. 122–124.

[3] If the first postwar cycle (October 1945 to October 1949) is included in this calculation, a greater average spread between bills and long-term governments

month Treasury bills, turnaround costs (that is, the costs of getting into and out of bills) typically are around one-sixty-fourth of 1 per cent of value at maturity, or about sixteen cents.[4] In contrast, corresponding costs for the longest of long-term governments are about eight-thirty-seconds, or $2.50. Insofar as bills are bought at the weekly auction and held to maturity, transactions costs for their holders are zero. If bills are bought at auction and not held to maturity, or if bought from a dealer and held to maturity, then the relevant transactions costs are about eight cents. Bonds can, of course, also be bought directly from the Treasury and held to maturity. However, bonds are sold by the Treasury relatively infrequently, and infrequently held to maturity.

The extent to which transactions costs can account for the observed difference in yields on three-month bills and longer maturities is a function of the holding period. In general, the longer the holding period, the less the relative disadvantage of longer maturities, and conversely. If bills and long-term bonds are compared for a holding period of three months, and if bills are bought at auction and held to maturity and long-term bonds are bought and sold through a dealer, then the equalizing yield differential is equivalent to 1 per cent per year. That is, 4 per cent is the net yield to the

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results. The average size of the bill-bond spread is larger for the first than for any of the three succeeding cycles. It is excluded on the grounds that the bill rate for most of the first postwar cycle was largely a fictitious rate. The governmental policy that stabilized the prewar term structure of interest rates led to a bill yield that was low relative to the yield on bonds. The reduction in the size of the bill-bond spread between the first and the succeeding postwar cycles constitutes additional evidence that the reported bill rate was out of line with the yield on long-term governments and was, in effect, a nominal rate.

[4] The Commission on Money and Credit in their report, *Money and Credit,* Englewood Cliffs, New Jersey, 1961, p. 118, attributes the higher transactions costs to the greater risks to dealers of trading in long-term governments. This explanation implies that these costs must have been lower during the period when the structure of interest rates was pegged. In fact, the spreads between bid and asked prices were about half of what they are now.

Dealer operations are highly leveraged, more so than those of most banks, and the value of government securities as collateral is inversely related to term to maturity. The Joint Economic Committee, *A Study of the Dealer Market for Federal Government Securities,* Washington, D.C., 1960, p. 92, reports that dealer margin requirements for Treasury bills are one-quarter of 1 per cent. They are one-half of 1 per cent for certificates, 1 per cent for bonds under five years, 2 per cent for bonds between five and ten years to maturity, and 3 per cent for maturities over ten years.

holder of long-term governments, if the yield to maturity is 5 per cent; 3 per cent is the net yield, if the yield to maturity is 4 per cent, etc.[5] This implies that an investor who calculates on an expected value basis, and who wants to invest for three months and assumes that the yields of long-term securities will average 1 per cent more than bills, will find no difference between bills and long-term governments. Consequently, for holding periods less than three months, the equalizing yield spread between bills and bonds is in excess of an annual rate of 1 per cent. For more than three months, it is less than 1 per cent. For six months, the equalizing yield differential on an annual basis is one-half of 1 per cent, and for one year, one-quarter of 1 per cent.

If one assumes transactions costs for bills of one-thirty-second, which is a more realistic assumption, the equalizing yield differential between bills and nine- to twelve-month governments for a three-month holding period is twelve to thirteen basis points (this assumes a two-thirty-second turnaround cost for the longer maturity). When nine- to twelve-month governments are compared with three- to five-year governments for a one-year holding period, the equalizing yield differential is about six basis points (this assumes a two-thirty-second turnaround cost for the shorter, and a four-thirty-second cost for the longer maturity).

Actual yield differentials (implied by Table 7) have exceeded the equalizing yield differentials computed above. This suggests that pure transactions costs do not fully account for the observed yield differentials. However, one must be careful in making this comparison. During the period encompassed by Table 7, there was a secular trend upward in yields which caused holders of long-term securities to incur capital losses. Therefore, for the long bond-bill comparison, it is necessary to add the assumption that the market failed to anticipate the secular rise in rates.[6]

[5] A $2.50 transaction cost would come to $10.00 on an annual basis, hence it would reduce the gross yield by 10/1000, or 1 per cent.

[6] This assumption is consistent with a number of other observations. It is consistent with the observed difference between correlations of forward and one-year spot rates considered for just one cycle and for the entire 1901–54 period when a secular downward movement was followed by a secular upward movement in rates. It is consistent with the finding that the differential between bills and nine- to twelve-month governments cannot be explained by transactions cost

On the whole, this analysis suggests that yield differentials as a function of term to maturity cannot be rationalized completely as a consequence of transactions cost differences. Risk avoidance must be introduced. Unfortunately this statement and the calculations upon which it is based are not as straightforward as they appear. Typically, bid and asked prices overstate spreads; most transactions take place within this range and almost none outside of it. This tends to make the advantage of investing in long-term securities somewhat better than these calculations indicate. On the other hand, because the market for long-term governments is relatively thinner than that for short-term governments, the price at which a transaction takes place is more likely to be affected by its size. As a result, more transactions in long-term governments are brokerage transactions than is true of bills. Virtually all bills are bought and sold for the account and risk of dealers, whereas for long-term governments, dealers less frequently buy and sell from their own inventories for their customers.[7] Hence, an estimated 25 per cent of all trading in long-term governments represents brokerage transactions. From the point of view of the holders of long-term securities, this alone makes them less liquid than bills because it takes more time to consummate a brokerage transaction than a dealer

differences alone. For this comparison, trends in rates are virtually irrelevant. And finally, it is consistent with the composite yield curve for 1901–54 implied by the Durand data. The difference between the average yields of long- and short-term securities cannot be explained by transactions costs. Yet on balance, the trend in interest rates for this entire period is, if anything, down.

[7] This seems to be a direct result of a thin market. Dealers that expect long-term bond prices to fall would be willing to buy all offered for their own account if they could either turn around and sell them at the existing market price or sell short another issue very similar to the issue offered. To the extent that hedging is possible, dealers can win trading profits without incurring risks of capital losses. Since only three or four dealers deal extensively in long-term governments, it is not unusual to find that they all have the same price expectations. If they expect a fall in prices, they are willing to buy at current prices only what it is possible to hedge; they will buy the rest only at less than the current price.

Bid and asked prices widen when prices are expected to fall and narrow when they are expected to rise as a result of changes in the cost of carrying inventories. Of course, quoted bid and asked prices often are not meaningful numbers when dealers are unwilling to take positions.

Brokerage costs for a complete turnaround, a purchase and a sale, are usually two-thirty-seconds or less. However, would-be brokerage transactions are subject to the risk of never being consummated. They make sense when customer market expectations differ from those of dealers.

trade. Most of the time, and for most transactions, the difference between bid and asked prices for bills and long-term bonds measures the relative costs of transactions. For large transactions, however, say over two million (which would be regarded as a small transaction in bills), bonds are substantially less liquid than bills when dealers expect yields to rise. Hence, bid and asked prices with the usual spreads understate the relative costs of trading in the long-term bonds.[8]

Although ambiguities exist in the measurement of transactions costs for long-term securities, it seems fairly clear that average yield differentials as a function of term to maturity, if cyclical effects upon yield differentials are ignored, are too large to be solely explained by transactions costs. Hence, the Keynesian view, that short-term securities are preferred in order to avoid risks of capital losses, does have a role to play in explaining observed yield differentials. Motives other than transactions costs must be introduced to explain the observed yield differentials; the rationale for the holding of money substitutes is the same as the rationale for the holding of money proper.

The Keynesian view of the term structure of interest rates has implications that are, in a crude sense, consistent with observed yield differentials over the cycle. This view does more than imply that yield curves ought to rise with term to maturity. Vulnerability to capital loss is not a linear function of term to maturity; it increases at a decreasing rate with increases in maturity. Hence average yields ought to rise with term to maturity at a decreasing rate. To illustrate: an unanticipated permanent increase in short-term rates from 3 to 6 per cent implies, for securities bearing a 3 per cent coupon, that (a) a perpetuity would lose half its value, (b) a bond with a twelve-year term to maturity would fall in value by 25 per cent, and (c) a bond with four years to maturity would fall in value by about 10 per cent.[9]

[8] There is a danger of making too much of this point. It is clear that the market for long-term governments is characterized by a larger volume of trading than the most heavily traded corporate security, A. T. & T. bonds.

[9] This point appears in Harry C. Sauvain, "Changing Interest Rates and the Investment Portfolio," *Journal of Finance*, May 1959, pp. 235 ff., and Malkiel, *Quarterly Journal of Economics*, May 1962, p. 202, theorem 3.

These authors fail to point out that the greater variance in the prices of long-

The evidence for postwar business cycles shows that average yields rise at a decreasing rate as term to maturity increases. For the three latest cycles, the spread between bills and nine- to twelve-month governments is thirty basis points. This implies a rise in the average rate, for this segment of the yield curve, of about forty-eight basis points per year. The yield spread between nine- to twelve-month governments and three- to five-year governments is forty-three basis points, or a rise in the average rate of about seventeen basis points per year. The differential in yields between three- to five-year governments and twenty-year governments is twenty-eight basis points. Hence the average rate for the segment encompassed by these two maturities rises about one and three-quarter basis points a year. Similar conclusions are implied by the composite yield curve constructed from Durand's data [10] (see Chart 2).

The Keynesian view, that the market prefers short- to long-term securities to avoid the risks of capital losses, does not imply that participants in this market need be characterized as risk avoiders generally. An enterprise that is quite willing to speculate in what it regards as its principal line of economic activity may rationally be unwilling to run risks of capital losses on its holdings of money substitutes. As long as it can speculate more efficiently in its principal activities, there is no inconsistency between its risk aversion in bond markets and risk acceptance or preference in other markets.

This argument is symmetrical for money holders. Some money is held in preference to long- and short-term governments to avoid risk. Yet it does not follow that money holders are generally risk avoiders. To determine whether they are or not involves an over-all

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term vis-à-vis those of short-term bonds is an economic, and not an arithmetic, proposition which rests on the assumption that errors in forecasting future spot rates are positively correlated. In principle, prices of long-term bonds could fluctuate less than short-term bonds. To illustrate: Consider the price behavior of a one- and a two-year bond, assuming that errors in forecasting the current one-year rate are negatively correlated with errors in forecasting the one-year rate one year hence. If long-term bonds did not fluctuate in price more than short-term bonds, then Meiselman would not have observed that forecasting errors and forecast revisions were positively correlated.

[10] Malkiel (*ibid.*, p. 206) also concludes that, as term to maturity increases, yield curves flatten out and the marginal vulnerability to interest rate changes decreases.

evaluation of their total risk positions. Knowledge of just money holdings, or money substitute holdings, is not enough.[11]

Acceptance of the Keynesian empirical judgment that the market for governments is largely composed of risk avoiders does not necessarily imply that short-term rates will be systematically lower than long-term rates. It suggests that speculative opportunities will exist for those who are willing to bear risks, i.e., those who are willing to calculate on an expected value basis. More specifically, it suggests that there ought to exist gains to be derived from being short on near maturities and long on distant maturities.[12]

Such a financing short is rarely undertaken. The going rate for borrowing securities is one-half of 1 per cent. This is, in effect, a call loan rate for governments. It can be terminated at the option of either the supplier of securities on loan or the borrower. Securities on loan usually can be recalled on twenty-four hours notice. Borrowers of securities must maintain collateral, in the form of other governments, with the lenders of securities. The borrower usually has the right to substitute from day to day among the securities held as collateral, subject to the constraint that the aggregate value of the collateral be equal to or greater than the securities borrowed.[13] The short seller must, when the lender wants his securities back, either arrange for another loan or close out his short position. In any case, he must reacquire the securities initially borrowed through a new loan or by buying them in the market. Since bills are held as money substitutes, the calling up of borrowed bills by lenders during their term to maturity is to be expected. Insofar as longer-term securities than bills are borrowed, the trans-

[11] Similarly, the fact that a firm holds cash balances does not imply that it is a creditor and is expecting deflation. Nor does the existence of bonds outstanding for a firm imply that it is a net debtor. A more complex analysis of the entire structure of monetary assets and monetary liabilities is necessary before such a judgment can be reached.

[12] It is important to recognize that this is not arbitrage. Changes in interest rates will produce dramatic effects on the net equity position of a speculator in such a position. A rise in rates implies capital losses, and a fall, capital gains.

[13] This is one of the principal factors that make the loan rate as high as one-half of 1 per cent. The lenders of securities, usually banks, incur clerical costs as a result of frequent changes in the collateral offered by borrowers, typically government bond dealers. Bond dealers usually offer the securities held in their position as collateral.

actions costs for borrowing and reborrowing are reduced at the expense of higher rates of interest. Consequently, the short seller has the choice of costs in the form of low interest rates (i.e., the yields of very short maturities) with borrowing and reborrowing problems, or somewhat higher rates and somewhat more stable borrowing arrangements.[14]

The costs of maintaining and financing a short position are usually so large that it is more economical for dealers to finance the holding of long-term governments through bank loans or repurchase agreements. As a consequence, the yields of short-term securities are brought into line with long-term yields, not directly through a short position in near-term maturities, but indirectly through borrowing in the money market (i.e., a short position in bank credit). For the suppliers of funds for the money market—banks and nonfinancial institutions such as industrial enterprises—providing credit to dealers is an alternative to holding bills. Consequently, the bill rate is linked to the cost of short-term dealer financing through both the demand and the supply side of the market. As a result of this interrelationship between the yield on long-term governments on the one hand and financing costs of dealers in the money market on the other, an equilibrium spread exists between the yields of short- and long-term governments. In equilibrium, the marginal costs of borrowing to finance the holding of long-term governments should equal the yield spread between bills and bonds. This spread measures the marginal costs of the resources required for additional commitments in long-term securities financed by short-term liabilities.

Insofar as costs of speculating on the spreads between bills and bonds exist, speculation will not operate to make the expected value of bond yields the same as bill yields. Bonds will yield more than bills and this differential will be a function of the costs of being short on near maturities and long on distant maturities. That such positive costs exist is strongly supported by the empirical evidence. Their existence implies that forward rates implicit in the

[14] Joint Economic Committee, *Study of the Dealer Market*, p. 59, reports that the probability of a transaction in a government security is inversely related to its term to maturity.

term structure of interest rates, if one accepts the expectations hypothesis, will be biased estimates of future short-term rates. The interesting question is, how large are the costs of simultaneously taking long positions on distant maturities and short positions on near maturities?

The government bond market does not exist in isolation. At the short end it is an integral part of the money market, and at the long end, of the capital market. A number of financial institutions (in particular, commercial banks, the Federal Reserve System, savings banks, investment banks, savings and loan associations, life insurance companies, government, municipal, and corporate bond dealers, and the Federal National Mortgage Association), although conventionally regarded as being extremely conservative, are speculators in the money and capital markets. The average maturity of their assets is greater than the average maturity of their nonequity liabilities. Hence, they are speculators in the sense that they are long on long-term money and short on short-term money and by and large, live on the carry. Their economic viability is a function of the spread in yields between their assets and their liabilities.

Each of these classes of financial institutions operates in distinct and overlapping portions of the money and capital markets. Moreover, the specifics of their modus operandi differ. Savings banks, savings and loan associations, and life insurance companies issue forms of time deposits to finance their acquisition of assets. Commercial banks and the Federal Reserve Banks hold many short-term assets, but they issue demand deposits. Dealers and investment bankers use bank loans and similar short-term credit instruments; life insurance companies hold extremely long-term assets. These institutions all operate the same way in one essential respect—they reduce the yields on long maturities and raise the yields on short maturities. The existence of an average yield differential between bills and bonds of about one hundred basis points over the three latest reference cycles reflects the marginal costs of speculation to reduce this yield differential. It emerges despite the work of all of these financial institutions and reflects the fact that speculative activity, like most economic activities, is not cost free.

This analysis suggests that there exists an equalizing difference

in yields between short- and long-term governments. This yield differential measures, at the margin, the relative advantages of short- and long-term governments as money substitutes, i.e., as a means of avoiding risks of interest rate changes and keeping down transactions costs. It is analytically the same as the yield differential between cash and long-term bonds that is often referred to as "the rate of interest," but it is smaller because short-term governments are less than perfect substitutes for cash balances.

The analysis also suggests that the spread between long- and short-term governments need not be the same as the spread between long- and short-term corporate bonds. Corporates have higher transactions costs which limit the value of short-term corporates as money substitutes. Hence, the corporate short-long spread ought to be smaller than the corresponding yield spread for governments. The usual brokerage charge for buying and selling a corporate bond that is listed on the New York Stock Exchange and sells for about $1,000 is $5.00, or one-half of 1 per cent. However, there is some question as to whether the cost is comparable to the spread between the bid and asked prices for governments. The latter includes the cost of the services of the dealer who takes a position, whereas the former does not. A more relevant comparison is the over-the-counter, one-hundred bond corporate market. This is where most bonds are bought and sold. Dealers take positions and have buying and selling prices comparable to the bid and asked price for governments. For the bonds of A. T. & T., the corporate security with the widest market, the most frequently found spread is three-quarters, or $7.50 per bond for long-term bonds. This ranges down to about one-sixteenth for the very shortest-term bonds.

These findings strongly support the Keynesian theory of "normal backwardation" which rests on the premise that speculative services on net balance come at a positive pecuniary cost to society. This theory has common implications for commodity markets and the markets for government securities.[15] In commodity markets, the

[15] John M. Keynes, *A Treatise on Money*, Vol. II: *The Applied Theory of Money*, London, 1930, pp. 142 ff. This theory also appears in Hicks, *Value and Capital*, pp. 136 ff.

theory implies that forward prices are biased and low estimates of future spot prices; the prices of forward commitments rise as their term to maturity shortens. Similarly, in the money and capital markets, the theory implies that forward rates are biased and high estimates of spot rates; the prices of forward commitments rise as their term to maturity shortens.

Normal backwardation views speculators as selling insurance services to risk avoiders (or hedgers, in the case of commodity markets). This particular type of insurance, in common with insurance generally, comes at a cost to society; the nonpecuniary returns to speculators as a class are not large enough to compensate them for the opportunity costs of the resources used to provide their services. In contrast to this view, Professor Knight and, subsequently, Professor Telser enunciated the view that hedgers or risk avoiders provide the services of a casino to speculators.[16] Futures markets, in their view, are places where a speculator or gambler can get relatively favorable betting odds, i.e., where the house take is relatively small. Consequently, they contend that forward prices could represent unbiased or even high estimates of the spot value of future commitments. The nonpecuniary returns to speculators can be large enough to compensate or more than compensate for the opportunity costs of the resources employed in providing speculative services.

These views of futures markets imply that individuals choose either to bear risks or to hire speculators to bear risks, at either positive, zero, or negative cost. In fact the choice confronting the holders of governments is either to bear risks of capital losses or risks of income instability, or some combination of both. Given the stocks of long- and short-term securities that have been outstanding during the period under investigation, society has on balance chosen to bear the risks of income uncertainty and to hire speculators at positive costs to bear the risks of capital uncertainty.[17]

[16] Frank H. Knight, *The Economic Organization*, New York, 1951, p. 79; Lester G. Telser, "Reply," *Journal of Political Economy*, August 1960, p. 406.

[17] Although society has, on balance, paid for the service of bearing the risk of capital losses, this does not imply that those who have provided this service have been unable to hedge their risks. Insurance companies, because of the predictability of their expenditures, have been important suppliers of this service. Commonly, authors have referred to insurance company liabilities as long term. It is

The costs of bearing the risks of income uncertainty appear to have been negative. If "normal backwardation" is interpreted to mean avoiding the risk of capital losses and not risk avoidance per se, then these findings support the Keynesian view.[18]

The existence of bias in the estimates of future short-term rates, implied by the Lutz-Meiselman variant of the expectations hypothesis, implies that securities of different terms to maturity are not perfect substitutes for one another when the holding period yields are equal. The existence of positive costs of arbitrage and speculation is a necessary condition for the existence of liquidity premiums. Whether there exists any yield relationship for which securities of different maturities are perfect substitutes depends on the character of cost conditions in the production of speculative services.

The evidence presented suggests that the futures market for money is in a sense segmented into many markets that are partly isolated from one another through the existence of costs of converting long- into short-term securities. This market, like that for beer in the United States, is segmented by the existence of transportation costs.[19]

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clear that these liabilities are not long term in the same sense that the issuer of a long-term bond has a long-term liability. The cash surrender value of an insurance policy is clearly a short-term liability, as are the rights to borrow against cash surrender values. Similarly, death benefits may be regarded as constrained short-term liabilities.

[18] The empirical evidence that has been brought to bear on the issue of bias in forward rates in commodity markets has not been interpreted as providing clear support for either the Knightian or Keynesian position. In large part, the source of the difficulty has been that a very small bias in forward prices could provide the going rate of return on capital to speculators. Yet the presence of a small bias, particularly in a world in which prices have not been absolutely stable, is very hard to detect. The relevant literature on this point includes Lester G. Telser, "Futures Trading and the Storage of Cotton and Wheat," *Journal of Political Economy*, June 1958, p. 233; a subsequent exchange between Cootner and Telser in the August 1960 issue of the same journal; and Holbrook Working, "New Concepts Concerning Futures Markets and Prices," *American Economic Review*, June 1962, pp. 449–454.

[19] Specialists in the market for government securities are fond of arguing that no one regards long- and short-term securities as perfect substitutes for one another (presumably when holding period yields are alike), hence they are not perfect substitutes in the market. Although this reasoning leaves something to be desired, the conclusion appears to be valid.

A striking piece of evidence, already cited, that corroborates the views of

The introduction of costs of converting long- into short-term securities implies that, if the provision of speculative services in this market is an increasing cost industry, the relative yields of short- and long-term securities can be affected by the maturity composition of outstanding stocks. Hence, these yields can be influenced by open market operations; whether or not the Fed (Federal Reserve System) follows a bills-only policy can make a difference. Insofar as the Fed buys bills, and bills only, the decrease in the stock of bills outstanding implies an increase in the volume of speculative services produced by financial intermediaries and hence a rise in yield differentials. Conversely, insofar as the Fed buys only long-term governments, the decrease in the stock of these securities outstanding implies a decrease in the volume of speculative services produced by financial intermediaries and hence a fall in yield differentials. How large this fall or rise will be depends upon the supply elasticity of speculative services.

Increasing costs of providing speculative services imply that variations in the stocks of long- and short-term governments outstanding will affect long-short yield differentials. This is a sufficient but not a necessary condition for open market operations to affect yield curves. The existence of constant costs for speculative services implies that a specified range of yield differentials will exist; this range will be analogous to gold points under a gold standard. Depending upon how wide the counterparts to gold points are, there still remains some scope for open market operations as a means of influencing the long-short yield differential. Probably the strongest grounds for believing that increasing costs are relevant is the argu-

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market practitioners is the term structure of bill yields during September 1960. These observations show that positive costs of arbitrage must exist. Hence, by an a fortiori argument, positive costs of providing speculative services must also exist. Assuming that the market prefers to avoid risks of capital loss, these costs imply a positively sloped yield curve. The rarely observed negative forward rates were produced apparently by corporate treasurers who, to meet tax obligations on December 15, mechanically bought Treasury bills that matured on December 15 in order to match tax expenditures with receipts.

The existence of these costs of arbitrage or speculation implies that forward rates can vary from expected rates. Forward rates are usually higher than expected rates and the difference can be accounted for by risk avoidance and speculative costs. Insofar as this is what is meant by market segmentation, the position of specialists in the market is correct.

ment that there exist variations among investors with respect to their willingness to bear risk. Hence, as the volume of speculative services produced increases, the costs of financial resources to speculators will also increase.

A theoretical frame of reference similar to that enunciated in this section seems to be implicit in the writings of many economists in the field of debt management. For example, Simons believed that short-term debt is a better money substitute than long-term debt.[20] This implies that there must be a pecuniary yield differential between long- and short-term debt since aggregate or total yield on both types of debt must be equal. Hence, a positively sloped yield curve is implied.[21] An advocate of a pure expectations hypothesis would regard short- and long-term debt as having equal inflationary potential; variations in the maturity distribution of outstanding debt would have no effect on aggregate demand.

[20] See "On Debt Management," and "Rules Versus Authorities in Monetary Policy," in Henry C. Simons, *Economic Policy for a Free Society*, Chicago, 1948.

[21] Simons (*ibid.*, p. 225) recognizes this implication when he says, ". . . issue-yields will normally vary directly with maturities."