Interest Rate Variability, The Level of Interest Rates, and Monetary Policy

By V. Vance Roley

Interest rates have fluctuated substantially in recent years. Some financial market observers have expressed concern that the variability of interest rates may have some detrimental effects. In particular, increased variability may cause investors to be more uncertain about their assessments of future yields and prices of securities. The increased uncertainty may result in higher risk premiums in the levels of long-term interest rates. Thus, interest rate variability may cause higher average levels of interest rates than would otherwise be the case. Furthermore, to the extent that interest rates affect the performance of the economy, the higher interest rates may reduce economic growth.

The question of whether the variability of interest rates affects their average levels has implications for the conduct of monetary policy. Alternative approaches used to conduct monetary policy may have different impacts on interest rate variability. Using a reserve aggregate approach to monetary control—as has been suggested by a number of observers—may lead to greater interest rate variability than the approach now being employed, which uses short-term interest rates to influence money stock growth. Thus, the Federal Reserve's choice of the monetary policy instrument may influence the variability of interest rates.

The first section of this article examines the relationship between the variability and average levels of interest rates. The historical variability of interest rates is reviewed, and empirical tests are performed to determine whether the average levels of rates are affected by their variability. The second section explores the possible links between the conduct of monetary policy and the variability of interest rates. Further empirical tests 'are reported to determine the degree of Federal Reserve influence on interest rate variability. The final section summarizes the main conclusions.

THE RELATIONSHIP BETWEEN THE VARIABILITY AND AVERAGE LEVELS OF INTEREST RATES

The Concept of Variability

The distinction between the level and the variability of an interest rate or yield may be important to investors., Specifically, investors may be concerned with both the average level and the variability of a security's **yield—defined** in this article to include the capital gain or loss on a security in addition to the security's coupon, dividend, or discount yield. A yield defined in this manner is referred to as a holding-period yield. It may be computed over any interval or holding period that investors may use when evaluating the rate of return on their investments.

A holding-period yield, therefore, reflects the rate of return on a security during a holding period of a specific length. In this article, the holding period is assumed to be one calendar quarter. The variability of a security's holding-period yield refers to the fluctuation of the yield around its average level. A common statistic that represents this characteristic is the variance, which is computed by averaging the squared differences of a security's holding-period yield from its average holding-period yield over a particular period.[1]

The Variability of Security Yields Since 1950

The variability of selected security yields during the period beginning in the first quarter of 1950 and ending in the fourth quarter of 1977 is illustrated in Chart 1. The measure chosen to represent the variability of a security's yield is the variance of the security's quarterly holding-period yield[2] evaluated over the current and past seven quarters. For the fourth quarter of 1977, for example, the variance of the Treasury bond yield is computed using values of the security's quarterly holding-period yield from the first quarter of 1976 to the fourth quarter of 1977. During this period the quarterly holding-period yield on Treasury bonds averaged 8.26 per cent; however, it fluctuated considerably, varying from a high of 24.86 per cent to a low of -19.24 per cent. The computed variance was 199.04 for the fourth quarter of 1977.

The left-hand scale of Chart 1 measures the variability of quarterly holding-period yields on three long-term securities—Treasury bonds, corporate bonds, and corporate shares.[3] Long-term yields are emphasized in this article because most economists would agree that long-term yields have a more direct impact on the economy—through the cost of capital for private nonfinancial investment—than do short-term yields. The variability of these three long-term yields reflects factors which determine the variability of the demand for and/or supply of securities. Accordingly, in the initial phases of four of the five economic recoveries from recessions during the period examined in Chart 1,[4] the variability of security yields increased, reflecting cyclical variability in security demand and supply conditions. The recent substantial variability in corporate share yields may be due to such

1 For example, the eight-period variance of a variable X in period t is defined as:

$$\text{variance}(t) = \sum_{i=0}^{7} (1/7)\,(X(t-i) - \bar{X}(t))^2,$$

where $X(t)$ is the value of variable X in period t, and $\bar{X}(t)$ is the mean of the variable X over the current and past seven periods—that is,

$$\bar{X}(t) = \sum_{i=0}^{7} (1/8)\, X(t-i).$$

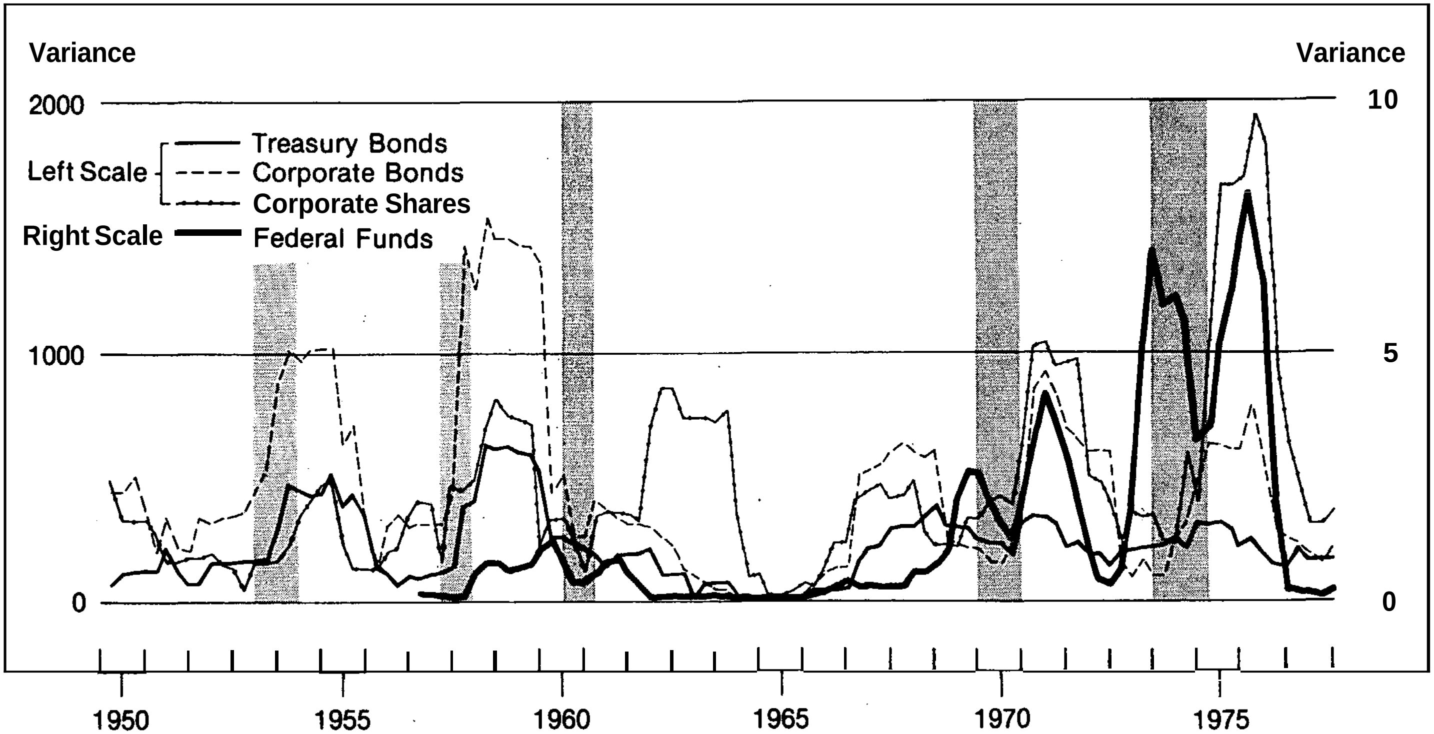
For a further discussion of these statistics, see any elementary mathematical statistics textbook.

2 Again, the quarterly holding-period yield of a security is defined as the asset's coupon, dividend, or discount yield plus any capital gain or loss on the asset, where the capital gain or loss is defined as the annualized percentage change of the price of a security during the given quarter. For debt securities, an approximation was used to compute the capital gain or loss component of the holding-period yield. The approximation is based on the assumption that long-term securities may be treated as consols—securities with infinite maturities and fixed coupons—so that the price of the security in period t (P_t) equals the reciprocal of its yield to maturity (r_t). It follows that a security's capital gain or loss may be represented as $(P_t - P_{t-1})/P_{t-1} = (r_{t-1} - r_t)/r_t$.

3 The holding-period yield on corporate shares is defined as the annualized percentage change of Standard and Poor's composite common stock price index. This measure is exhibited in Chart 1 since it is used in the empirical models reported below in the text.

4 The four economic recession periods correspond to the National Bureau of Economic Research reference troughs of 1954:Q2, 1958:Q2, 1970:Q4, and 1975:Q1.

Chart 1
THE VARIABILITY OF SECURITY YIELDS SINCE 1950



factors as the changing outlook for the economy and varying prospects for a national energy policy, the **U.S.** balance of payments, and potential tax reforms. Other factors, such as variable rates of inflation and Federal Reserve monetary' policy, may have also contributed to the variability of all long-term yields.

The Relationship Between the Variability and Average Levels of Interest Rates: Theoretical Considerations

Interest rate variability may influence average interest rate levels because investors may feel that increased variability increases uncertainty about future holding-period yields. The impact of uncertainty on the portfolio selection behavior of investors has been formalized in the economics literature beginning in the 1950's.[5] In the literature, it is usually assumed that investors not only assess the future holding-period yields on securities, but also consider the degree to which actual future holding-period yields may vary from their expected levels. As defined previously, this variation is measured by the variances of the future holding-period yields on securities.

Many versions of portfolio selection theory also suggest that investors demand less of a particular security if its future holding-period yield becomes more uncertain (variance increases), and demand more if its future holding-period yield becomes less uncertain (variance decreases). Furthermore, an increase in the variance of the future holding-period yield on corporate bonds, for example, may increase the demand for Treasury bonds if the variance of the future holding-period yield on Treasury bonds remains unchanged. This follows because there would be more uncertainty about the future holding-period yield on corporate bonds relative to the future holding-period yield on Treasury bonds. Thus, the investor would desire a larger share of his inyestment portfolio to consist of Treasury bonds, assuming that all yields remain unchanged.

The Relationship Between the Variability and Average Levels of Interest Rates: Empirical Evidence

To examine the relationship between the variability and average levels of interest rates, two separate models of Treasury bond yield determination were employed. Two models were used to demonstrate that the results are not unique to a particular model. Because Treasury bonds are long-term securities, the models examine the impact of interest rate variability on long-term security yields. In doing so, the models examine a number of the possible determinants of the Treasury bond yield in order to ascertain whether interest rate variability is one of the determinants. After a brief discussion of the methodologies employed in forming the models, estimates of the impact of the variances of long-term security yields on the level of the Treasury bond yield are presented.

Two Models of Treasury Bond Yield Determination. The two models of interest rate determination that are estimated are based on the portfolio selection theory reviewed earlier. This theory suggests that an investor's demand for a particular type of security varies positively with its expected rate of return, negatively with the rates of return on other securities, negatively with the variance of its future rate of return, and positively with the variance of the

[5] See Harry Markowitz, "Portfolio Selection," *Journal of Finance.* Vol. 7 (March 1952), pp. 77-91; and James Tobin, "Liquidity Preference as Behavior Toward Risk," Review *of Economic Studies,* Vol. 25 (February 1958), pp. 65-86.

future rates of return on other securities[6] Additional factors, such as investors' wealth and the level and/or variance of inflation,[7] may also affect the demand for a security.

While the two models used in the empirical tests are based on the same theory, they differ in important ways. In particular, one model is a disaggregated structural model, and the other is a reduced-form **model.**[8] The disaggregated structural model separately represents the demands for securities by individual categories of investors. These investors include: commercial banks, households, life insurance companies, mutual savings banks, nonfinancial corporate businesses, other insurance companies, private pension funds, savings and loan associations, state and local government general funds, and state and local government retirement funds. A typical estimated equation within the structural model represents the demand for a type of security by including terms for expected holding-period yields, variances of future yields, and other factors—such as wealth and portfolio adjustment parameters—that may differ across categories of investors. The aggregate demand for a type of security is the total of the individual demands for the security. By equating aggregate demand with aggregate supply, the holding-period yield of the security is determined.

In contrast to the disaggregated structural model, the reduced-form model does not distinguish among different categories of investors. The derivation of the reduced-form model begins by considering the aggregate demand for a particular type of security. Before estimating the model, aggregate demand is equated with aggregate supply to form an equation for the expected holding-period yield on the **security.**[9] Thus, instead of equations

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6 To empirically represent investors' assessments of the levels and variability of future security rates of return, it is additionally assumed that investors have relatively short portfolio holding periods so that capital uncertainty is predominant. With a quarterly holding period, for example, the holding-period yield on a 3-month Treasury bill is riskless in nominal terms, and the holding-period yields on securities with longer maturities are risky because of the uncertain future values of the capital gain or loss components. The theory of portfolio selection under uncertainty also suggests that the covariances of future rates of return on securities' are determinants of an investor's portfolio selection behavior. Covariances are not, however, treated explicitly in this article.

7 The level of inflation may represent an investor's return on real (as opposed to financial) assets, or represent a component of an investor's expectation formation process concerning nominal security yields. See, for example, Martin Feldstein and Otto Eckstein, "The Fundamental Determinants of the Interest Rate," Review *of Economics and Statistics,* Vol. 52 (November 1970), pp. 363-75; Martin Feldstein and Gary Chamberlain, "Multimarket Expectations and the Rate of Interest," *Journal of Money, Credit and Banking,* Vol. 5 (November 1973), pp. 873-902; Franco Modigliani and Robert J. Shiller, "Inflation, Rational Expectations, and the Term Structure of Interest Rates," *Economica,* Vol. 40 (February 1973), pp. 12-43; and Benjamin M. Friedman, "Price Inflation, Portfolio Choice and Nominal Interest Rates," Working Paper No. 235, National Bureau of Economic Research. 1978.

8 For a more detailed comparison of structural and reduced-form models, see Benjamin M. Friedman and V. Vance Roley, "Structural Versus Reduced-Form Models of Long-Term Interest Rate Determination," Working Paper No. 78-04, Federal Reserve Bank of Kansas City, 1978.

9 For example, the equation may be represented as

$$E(r_g^h) = a_0 + a_1V_g + a_2V_c + a_3V_s + a_4E(p) + \dots,$$

where $E(r_g^h)$ is the expected holding-period yield on Treasury bonds, $E(p)$ is the expected rate of price inflation, the "V" terms are the variances of future long-term security holding-period yields as defined previously, and the "a" terms are coefficients to be estimated. Other terms, such as the levels of security supplies, may also appear in the equation. Since the expected holding-period yield may be approximated as

$$E(r_g^h) = r_g + E(c_g),$$

where r_g is the current market yield on Treasury bonds and $E(c_g)$ is the expected capital gain or loss on Treasury bonds, the expression for the current market yield may be written as

$$r_g = -E(c_g) + a_0 + a_1V_g + a_2V_c + a_3V_s$$
$$+ a_4E(p) + \dots .$$

that estimate the demands for a security, the reduced-form approach estimates an equation for the yield directly.[10]

The Impact of Variances of Long-Term Security Yields on the Level of the Treasury Bond Yield. The estimation results for both the structural and reduced-form models indicate that security yield variability does affect the level of the Treasury bond yield.[11] For the structural model, the estimation results indicate that variances of holding-period yields are determinants of the Treasury bond yield through their impact on individual investor category demands for Treasury bonds. The reported t-statistics, shown in Table 1, indicate that the variance terms appearing in four of the estimated equations are statistically significant —that is, t-statistics greater than 2.0 indicate highly statistically significant effects.[12] Thus, if the variance of the holding-period yield on Treasury bonds increases, for example, commercial banks, life insurance companies, and state and local government retirement funds were found to reduce their demand for Treasury bonds. The variance terms are statistically insignificant in the estimated equations for the other investor categories, but the four investor categories with significant variance terms hold a majority of the outstanding Treasury bonds (63 per cent of private domestic holdings as of yearend 1975). Also, the overall results indicate that the structural model has a high degree of explanatory power. In particular, the Treasury bond yield has a root-mean-square error—a measure of within-sample predictive accuracy—of only 20 basis points for the sample period beginning in 1960:Q1 and ending in 1975:Q4.[13]

The estimation results for the reduced-form model are comparable to those of the structural

Table 1
SELECTED STATISTICS FOR THE STRUCTURAL MODEL
(Sample Period: 1960:Q1 to 1975:Q4)

Net Purchases of Treasury Bonds By:	t-Statistics: Variance of Treasury Bond Yield	t-Statistics: Variance of Corporate Bond Yield
Commercial Banks	−1.7	
Households		4.3
Life Insurance Companies	−3.7.	3.0
State and Local Retirement Funds	−2.6	4.0

Root-Mean-Square Error of the Treasury Bond Yield (in per cent) = 0.20

10 Although the reduced-form approach allows a fairly simple representation of a security's yield, it has several disadvantages. First, the yield expression is not constrained by the determinants of the portfolio selection behavior of individual categories of investors. Second, spurious correlation between economic time-series data may be more prevalent. Finally, reduced-form models may be unable to accommodate all of the economic variables that are relevant because of limitations on the sample size—that is, an equation cannot be estimated unless there are more data observations than economic variables.

11 As before, security yield variability is represented by lagged eight-quarter moving-average variances. The use of eight quarters was judged best based on experimentation with the models.

12 Values of coefficients are not shown since yield and variance terms in the structural model are multiplied by either flows or stocks of the net acquisition of financial assets. Only the t-statistics on the flow terms, which have unambiguous prior sign restrictions, are reported in the table if both appear in an estimated equation. Further estimation and simulation results involving the structural model are examined in detail elsewhere, and are available on request. See V. Vance Roley, A ***Structural Model of the U.S. Government Securities Market,*** Ph. D. dissertation, Harvard University, 1977.

13 The simulation used to obtain the root-mean-square error is fully dynamic in the sense that all lagged endogenous variables (i.e., Treasury bond demands and the Treasury bond yield) take values solved from the model in previous periods.

Table 2
ESTIMATION RESULTS FOR THE REDUCED-FORM MODEL
(Sample Period: 1960:Q1 to 1975:Q4)

Dependent Variable

Treasury Bond Yield (in per cent)

Independent Variables	Coefficient	t-Statistic
Constant	3.55	52.1
Variances:		
Treasury Bond Yield	0.00265	3.9
Corporate Bond Yield	–0.00118	–4.2
Common Stock Capital Gain or Loss	–0.000211	–1.9.
Capital Gain or Loss on Treasury Bonds:		
Current Period	–0.100	–4.4
Sum of Eight Previous Periods	–0.00853	–1.3
Percentage Change in Consumer Price Index:		
Current Period	0.125	4.4
Sum of Eight Previous Periods	0.335	10.8

Multiple Correlation Coefficient Corrected for Degrees of Freedom ($\bar{R}^2$) = 0.96
Standard Error of Estimate (in per cent) = 0.24
Durbin-Watson Statistic = 1.15

model.[14] The results again indicate that variances of holding-period yields are statistically significant determinants of the Treasury bond yield. (See Table 2.) The estimated coefficients suggest that an increase in either the variance of the holding-period yield on corporate bonds or corporate shares reduces the yield on Treasury bonds. In this case, the yield on Treasury bonds falls because alternative securities have become relatively riskier, causing an increased demand for Treasury bonds which lowers their yield. Similarly, an increase in the variance of the holding-period yield on Treasury bonds increases the Treasury bond yield. For example, a 10 per cent increase in the variance of the Treasury bond yield over the sample period implies that the Treasury bond yield would have been an average of 5 basis points higher. The yield increases in this case because Treasury bonds have become riskier in comparison to alternative securities, thereby reducing the demand for Treasury bonds which increases their yield. The overall explanatory power of the model is also comparable to that of the structural model, with a standard error of estimate equaling 24 basis points.

Although the estimation results indicate that the variability of long-term security yields does affect the average level of the Treasury bond yield, further experimentation with the models

[14] For purposes of estimation, the expected capital gain and price inflation terms are represented by autoregressive processes—that is, it is assumed that investors form future expectations from past values of capital gains and inflation. For an empirical comparison of alternative models of expectations formation, see Benjamin M. Friedman and V. Vance Roley, "Investors' Portfolio Behavior Under Alternative Models of Long-Term Interest Rate Expectations: Unitary. Rational, or Autoregressive," *Econometrica* (forthcoming). The autoregressive expectations terms in Table 2 were estimated using third-degree polynomials with the right-hand tails constrained to zero, and the lead coefficients estimated outside of the lag structure.

indicates that a **simultaneous** increase in the variability of **all** long-term security yields would have virtually no effect on the average level of the Treasury bond yield. In particular, a 10 per cent increase in all variances suggests that the Treasury bond yield would have been an average of three-tenths of 1 basis point lower according to the structural model, and four-tenths of 1 basis point higher according to the reduced-form model. These results may indicate that the effect of an increase in all long-term security variances in inducing investors to shift out of long-term securities is not of sufficient magnitude to detect empirically, given data limitations and other complications.[15] These findings may further imply that investors have somewhat longer holding periods than supposed, since investors apparently would not try to reduce their holdings of long-term **securities** if long-term security yield variability increases.

To summarize, the theory of portfolio selection suggests that the variability of interest rates is a determinant of the average levels of interest rates. Using two estimated models of the Treasury bond yield, variances of long-term security yields appear as statistically significant determinants of the average level of the Treasury bond yield. Thus, an increase in the variability of any one type of **security**—Treasury bonds, corporate bonds, or corporate **shares—does** affect the Treasury bond yield. However, a simultaneous increase in all long-term security variances has very little effect on the average level of the Treasury bond yield according to the models.

MONETARY POLICY AND THE VARIABILITY OF INTEREST RATES

This section investigates the possibility that Federal Reserve **monetary** policy has contributed to the variability of long-term yields. Turning to this possibility, the right-hand scale of Chart 1 measures the variability of the Federal funds rate—the interest rate that the Federal Reserve influences in the daily implementation of monetary **policy.**[16] The plot of the Federal funds rate's variability begins in 1957, which roughly corresponds to the emergence of a national Federal funds market that became fully developed in the late 1950's and early 1960's. It is evident that the Federal funds rate has always had some variability, but there has been a dramatic increase in its variability during the 1970's—the period corresponding to the Federal Reserve's stronger emphasis on stable growth of monetary and credit aggregates.[17] The impact of the variability of the Federal funds rate on the variability of long-term security yields is examined below, and the possible further effect on the level of long-term interest rates is also explored.

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15 To further explore the impact of increasing all long-term security variances, a general equilibrium model that simultaneously determines a variety of long- and short-term yields would be desirable. The construction of such a model is, however, beyond the scope of this study.

16 For a discussion concerning the implementation of monetary policy, see William Poole, "The Making of Monetary Policy: Description and Analysis," Economic Inquiry. Vol. 13 (June 1975), pp. 253-65. For a detailed description of the Federal funds market, see Charles M. Lucas, Marcos T. Jones, and Thom B. Thurston, "Federal Funds and Repurchase Agreements," Federal Reserve Bank of New York Quarterly Review. Vol. 2 (Summer 1977), pp. 33-48.

17 See Alan R. Holmes, Paul Meek, and Rudolph Thunberg, "Open Market Operations in the Early 1970's: Excerpts fmm Reports Prepared in 1971, 1972, and 1973," in Federal Reserve Bank of New York. Monetary Aggregates and Monetary Policy (New York: Federal Reserve Bank of New York, 1974), pp. 114-34.

Monetary Policy and Long-Term Interest Rate Variability: Theoretical Considerations

One possible determinant of long-term interest rate variability over a given period is the variability of the Federal funds rate over the same period.[18] The variability of the Federal funds rate may influence the variability of long-term interest rates through at least two interdependent links. First, through the arbitrage process, changes in the Federal funds rate may cause changes in other short- and long-term interest rates. Second, a change in the Federal funds rate may change expectations about the future course of monetary policy, and, therefore, the future levels of interest rates.[19] That is, current interest rate levels may change not only because of changes in the current Federal funds rate, but also because of further anticipated changes. For example, if the Federal funds rate is expected to increase in the future because of a recent increase, then other interest rates may also be expected to increase through the arbitrage process. Specifically, since investors holding long-term securities would suffer a capital loss if long-term yields increase, they may attempt to sell long-term securities thereby depressing long-term security prices.

Monetary Policy and Interest Rate Variability: Empirical Evidence

The Impact of the Variance of the Federal Funds Rate on the Variance of Long-Term Security Yields. The empirical relationship between the variability of the Federal funds rate and the variability of long-term security yields is examined using ordinary-least-squares estimation. From the estimated relationships, the variance of the Federal funds rate appears as a statistically significant positive determinant of the variances of the holding-period yields on Treasury bonds, corporate bonds, and corporate shares. (See Table 3.) That is, the relationships show that increased variability of the Federal funds rate increases the variability of long-term security yields.[20] In each case, however, the estimated relationship does not provide much explanatory power for the variance of the respective long-term security yield. The greatest explanatory power, as measured by the multiple correlation coefficient $(\bar{R}^2)$, is in the corporate share variance equation. In general, the low multiple correlation coefficients and the highly serially correlated residuals, as reflected by the low Durbin-Watson statistics, indicate that other determinants of long-term security variances may be more important than the variance of the Federal funds rate.

The Impact of the Variance of the Federal Funds Rate on the Level of the Treasury Bond

18 For a full description of the structural determinants of the corporate bond yield, see Benjamin M. Friedman, "Financial Flow Variables -and the Short-Run Determination of Long-Term Interest Rates," Journal of Political Economy. Vol. 85 (August 1977), pp. 661-89.

19 This link may not hold if a reserve aggregate approach is followed in the implementation of monetary policy. In particular, a reserve aggregate approach would allow the Federal funds rate to fluctuate while the level of some measure of reserves is controlled. Thus, the level of and changes in the Federal funds rate would not necessarily be a good indicator of even current Federal monetary policy. If the reserve aggregate approach were adopted, however, the Federal funds market may stabilize after a brief transitory period. See Richard G. Davis, "Short-Run Targets for Open Market Operations," in Monetary *Aggregates* and Monetary Policy (New York: Federal Reserve Bank of New York, 1974), pp. 40-59.

20 As is usual in empirical work, simultaneous relationships may, to some extent, exist between the variances of long-term security yields and the variance of the Federal funds rate. The causal effect of the variance of the Federal funds rate on the variances of long-term security yields most likely predominates, however.

Table 3
SIMPLE RELATIONSHIPS BETWEEN THE VARIANCE OF THE FEDERAL FUNDS RATE AND VARIANCES OF LONG-TERM SECURITY YIELDS
(Sample Period: 1960:Q1 to 1975:Q4)

	Independent Variables Coefficient (t-Statistic) Constant	 Variance of Federal Funds Rate	$\bar{R}^2$	Standard Error	Ourbin-Watson Statistic
Variance of Treasury Bond Yield	150 (9.7)	13.1 (4.0)	0.19	93.4	0.27
Variance of Corporate Bond Yield	259 (6.7)	23.8 (2.9)	0.10	235	0.40
Variance of Common Stock Capital Gain or Loss	139 (2.1)	73.7 (5.4)	0.31	392	0.84

Yield. The estimated relationships in Tables 1, 2, and 3 may be used to determine the impact of the variance of the Federal funds rate on the average level of the Treasury bond yield. In an experiment using the structural and reduced-form models, the average variance of the Federal funds rate was increased by 10 per cent over the sample period beginning in 1960:Q1 and ending in 1975:Q4. The results from the experiment indicate that the average Treasury bond yield declines very slightly. In particular, a 10 per cent increase in the variance of the Federal funds rate results in a 0.00035 per cent decrease in the Treasury bond yield according to the structural model, and a 0.0028 per cent decrease according to the reduced-form model. The decline in the Treasury bond yield results from the disproportionate effect of the variance of the Federal funds rate on the variance of the corporate share yield. (See Table 3.) Thus, an increase in the variance of the Federal funds rate increases the variance of the corporate share yield relative to the variance of the Treasury bond yield, causing investors on average to increase their demand for Treasury bonds thereby reducing the Treasury bond yield. Again, it should be noted that the Treasury bond yield decreases by less than 1 basis point for a 10 per cent increase in the variance of the Federal funds rate.

The results from the experiment indicate that the Federal Reserve may make reasonable discretionary changes in the Federal funds rate without having much influence on the average Treasury bond yield. This is not to say that the average level of the Federal funds rate is unimportant in the determination of the Treasury bond yield, only that the variability of the Federal funds rate does not have much effect. Furthermore, the results do not necessarily imply that large increases in the variance of the Federal funds rate would cause the average Treasury bond yield to decline significantly. Large changes in the variance of the Federal funds rate may induce structural shifts that would invalidate the estimated models.

CONCLUSIONS

Because financial market investors are uncertain about the future yields of the assets in which they are trading, both the levels and variability of interest rates may be important in forming investment decisions. Variability of interest rates may be important if investors translate variability into uncertainty about future security yields. The empirical results in this article do, in fact, indicate that the variability of past security yields is a determinant of the yield on U.S. Treasury bonds. The empirical results also indicate that relative changes in the variability of long-term security yields are more important than simultaneous changes in terms of the impact on the level of the Treasury bond yield.

It was also found that monetary policy may influence the variability of long-term security yields by influencing the variability of the Federal funds rate. However, the results indicate that increased variability of the Federal funds rate would have only a very small effect on the average level of the Treasury bond yield. The results imply, therefore, that increased variability of the Federal funds rate caused by either frequent monetary policy changes or the use of an alternative monetary policy instrument would not significantly affect the average level of the Treasury bond yield. Because other long-term yields may depend on similar factors, the results may generalize to include a broad range of long-term security yields.