



## American Finance Association

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Expectations, Surprises, and Treasury Bill Rates: 1960-82: Discussion

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(6¼ percentage points). The estimation equation also explains the full 7½ percentage point decline in the nominal six-month rate during 1981 and 1982, although rates did not come down as rapidly as the equation predicts.

The current paper tells only part of the recent interest-rate story. The full story requires the modeling of expected changes in all the variables utilized in this study: the bill rate itself, anticipated inflation, industrial production growth, monetary growth, tax rates and expenditures policies.

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## DISCUSSION

DONALD J. MULLINEAUX\*: Professor Hendershott's paper presents evidence which he claims advances at least a partial rehabilitation of the expectations theory of the term structure of interest rates, which has been under some substantial attack of late. He also interprets his evidence to support a view that the recent behavior of interest rates is much less "strange" than many have

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argued. He is claiming, it seems, that though interest-rate movements are essentially “unpredictable,” they are nevertheless essentially “explainable.” Philosophers of science could argue endlessly about the ultimate meaning of such a claim, but my early discussion will instead focus on the econometric meaning and implications of Hendershott’s exercise. I will conclude with some quibbling about details, which seems the wont and for some, the woof, of the discussant trade.

Hendershott posits a model to explain changes in interest rates in a reduced-form context, as in:

$$\Delta R = \phi(\Delta Q, \Delta \pi, \dots) + \epsilon \quad (1)$$

where  $R$  is a short-term interest rate,  $Q$  is output,  $\pi$  is expected inflation, and  $\epsilon$  is an i.i.d. error term.

If such an equation is used *ex ante* to forecast, then predictions of the exogenous variables are obviously required. Errors in forecasting output, inflation, etc. would be “in the error term.” If information on the size of those forecast errors was available, however, an *ex post* regression could be estimated using forecasts and forecast errors as explanatory variables. This is what Hendershott does, using the Livingston data to measure forecast errors. What is “left in the error term” is now open to question, however, as I shall try to develop.

One of Hendershott’s principal findings is that expected interest rates are significant in the regression once forecast errors are included. Since the expected rate is not significant in a regression without forecast errors, this suggests interest-rate forecast errors and the forecasts are correlated. This contradicts the hypothesis of efficient or rational forecasting. Hendershott fails to note the significance of this finding. To some, this would call the overall results into question. To others, this would be seen as valid evidence of inefficiency.

The fact that forecast errors are found to be correlated with forecasts also raises questions about interpreting the results. The finding that some “news” (a forecast error) matters for the coefficient of expected rates suggests there may be more such news “still in the error term.” About half the variance remains unexplained in the *ex post* regression. I see little reason to conclude that this is all “irreducible” variance. Nor is there reason to believe that the “missing news” is uncorrelated with the expected interest rate. Consequently, we cannot be confident of the reliability of the coefficient estimate of the expected interest rate or of the explanations advanced for recent bill rate behavior based on the model. To make us more confident, Hendershott must either remove practically all of the error variance or convince us that any remaining “news” in the error is orthogonal to what’s in the regression.

In the area of quibbling, there is a better and more intuitive measure of inflation uncertainty than the standard deviation of the Livingston forecasts, mainly the mean-squared error of the individual forecasters during each period. It is not highly correlated with the standard deviation. Second, the unexpected money growth which enters Hendershott’s reduced form cannot be the same term that enters his money demand equation. For demanders of money to adjust their holdings to money-forecast errors, they must *observe* the error. That is, at time  $t$  their forecast error looks backward. At time  $t$ , the forecast error in Hendershott’s

reduced form looks forward. There is no rationale for introducing a lagged money prediction error, so this appears to be a misspecification. Finally, there is a certain arbitrariness to using the Livingston data to measure expected and unexpected changes because of the very discrete nature of the timing of the forecast data (bi-annual). Suppose, hypothetically, that all the Livingston forecasters change their incorrect predictions to the actual value which obtains the day after Livingston publishes the forecasts. Then over practically all of the six-month horizon, there is no forecast error. However, Hendershott's procedure records one. It is, of course, impossible to know how serious this shortcoming may be.

In sum, Hendershott's paper introduces a novel approach to testing the expectations theory. However, the evidence he presents is weaker than he contends. The explanations advanced for interest-rate movements over the last few years therefore must be viewed with some degree of suspicion.