Rationality of Naive Forecasts of Long-Term Rates

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In the Fall 2004 issue of this Journal, Brooks and Gray [2004] examined the accuracy of economists' long-term interest rate forecasts in *Wall Street Journal* surveys from 1982 through 2003. In June and December each year, the *WSJ* asks economists to predict the levels of short-term and long-term interest rates six months hence. Brooks and Gray find that no-change forecasts of the 30-year Treasury rate 11% were more correct than economists' consensus forecasts. They conclude that "naive forecasts are better than the consensus *WSJ* forecast."

I show that the Brooks and Gray results are consistent with term structure theory and other empirical work. According to term structure theory, the optimal near-term forecast of a long-term rate is essentially today's rate (see Pesando [1979]). Thus, the no-change model should produce near-term forecasts of long-term rates that are indistinguishable from rational economic forecasts. Several authors conclude that these no-change forecasts: 1) have provided more accurate forecasts of long-term rates than economists' consensus forecasts in other surveys, and 2) have passed rigorous tests of rational forecasts. It is not surprising that economists' consensus forecasts could not match much less improve on the accuracy of no-change forecasts of long-term interest rates.

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THEORY

Let R_t^n denote the pure discount or spot interest rate on an n-period bond at time t and f_t denote the

one-period forward rate at time t. According to the pure expectations theory (also called the unbiased expectations hypothesis), the forward rate at time t is the expected one-period spot rate at time t, r_t. That is, $f_t = r_t$. According to this theory, one plus today's n-period spot rate, R_t^n, is:

$$(1+ R_t^n)^n = (1+ r_t)\ (1+ r_{t+1})\ (1 + r_{t+2}) \ldots (1+ r_{t+n-1}) \quad (1)$$

This theory says that today's n-period spot rate is the geometric average of today's one-period spot rate and one-period spot rates expected to prevail over the next $n-1$ periods. That is, today's long-term rate reflects the expected evolution of the one-period or short-term rate.

The expectation today of one plus the expected n-period spot rate one period hence, $E_t[R_{t+1}^n]$, is:

$$(1+ E_t[R_{t+1}^n])^n = (1+ r_{t+1})\ (1 + r_{t+2}) \ldots (1+ r_{t+n-1})(1+ r_{t+n}) \quad (2)$$

It follows from Equations (1) and (2) that the expected one-period change in the n-period rate is approximately 1/n-th the difference between the expected one-period spot rate n periods hence and today's one-period spot rate:

$$E_t[R_{t+1}^n] - R_t^n = 1/n\ \{r_{t+n} - r_t\} \quad (3)$$

Thus theory suggests that no-change predictions should be good near-term forecasts of *long-term* interest rates.*

Recall that Brooks and Gray [2004] examine six-month-ahead forecasts of the 30-year Treasury rate. In their case, study, 1/n in Equation (3) is 1/60 as there are 60 non-overlapping six-month periods in the 30 years. The expected six-month change in the 30-year spot rate is 1/60th the difference between the expected six-month spot rate 30 years hence and today's six-month spot rate. For example, if the expectation today of the six-month spot rate 30 years hence, r_{t+n}, is 4.4% and today's six-month spot rate, r_t, is 3.2% then Equation (1) becomes:

$$E_t[R_{t+1}^n] - R_t^n = 1/60\ \{4.4\% - 3.2\%\} = 0.02\%.$$

The rational economic forecast of the six-month change in the 30-year rate is 2 basis points. Thus the no-change forecast is trivially different, and we should not be surprise that no-change forecasts of a long-term rate prove difficult to beat.

The liquidity preference theory of the term structure of interest rates assumes differences between today's one-period spot rate and multiperiod rates are due to: 1) the expected evolution of the one-period rate, and 2) term premiums. The expected six-month change in the 30-year spot rate is: 1) 1/60th the difference between the expected six-month spot rate 30 years hence and today's six-month spot rate plus 2) the expected change, if any, in term premium. As some scholars question existence of the term premium, it should come as no surprise that the evidence suggests near-term changes in the term premium cannot be predicted. Therefore, according to the liquidity preference hypothesis, near-term changes in long-term rates should be essentially unpredictable.

In short, the two most prominent term structure theories imply that near-term changes in long-term interest rates should be essentially unpredictable. The empirical evidence is consistent with this theory.

EMPIRICAL EVIDENCE

There are two types of empirical tests related to the prediction that near-term changes in long-term interest rates are unpredictable. The first examines the relative accuracy of no-change forecasts of long-term interest rates. The second summarizes tests that examine whether no-change forecasts satisfy the rational expectations requirements of unbiasedness and consistency and whether they fully reflect available information.

Relative Accuracy of No-Change Forecasts of Long-Term Rates

Brooks and Gray find that forecast errors—measured as the difference between the actual percentage error and the predicted percentage error—were 11% lower for the no-change forecasts than for the consensus forecasts. This is consistent with term structure theory. Since no-change forecasts are essentially rational economic forecasts, they should provide predictions that are accurate on average.

The evidence in Brooks and Gray contributes to previous research that suggests that no-change forecasts of long-term rates are more accurate than economists' consensus forecasts. For example, Pesando and Plourde [1988] compare the average accuracy of no-change forecasts and consensus forecasts of long-term Canadian interest rates. They examine three- and six-month ahead forecasts of ten-year and longer-term interest rates in three series of surveys of economists' forecasts. The series

were collected by Data Resources, Inc., of Canada (DRI), the Conference Board of Canada (CB), and McLeod, Young, and Weir (MYW). They compare forecast accuracies for periods before and after the October 1979 shift in monetary policy.

In the DRI and CB surveys, the no-change forecasts are consistently more accurate than the consensus forecasts for both the pre- and post-shift periods. In the MYW surveys, the no-change and consensus forecast accuracy is essentially similar; the no-change forecasts were more accurate in three tests, and the consensus forecasts were more accurate in three tests, even though the economists' forecasts enjoyed an information advantage of up to a month.

Pesando and Plourde state:

> On balance, the recorded [consensus] forecasts fare quite poorly. There is no evidence that the recorded forecasts of the long-term rates are superior to the no-change prediction [1988, p.].

Rationality of No-Change Forecasts of Long-Term Rates

To be considered rational expectations, no-change forecasts must pass a rigorous series of tests. They must 1) fully reflect available information, (2) evince forecast errors that are uncorrelated with previous changes in that rate and other rates, and (3) be unbiased.

In Reichenstein [1989] I examine the rationality of one-quarter through four-quarter-ahead no-change forecasts of 30-year conventional mortgage and GNMA rates. The results suggest that no-change forecasts of these two interest rates are rational forecasts for forecast horizons of up to three quarters ahead.

To be more specific, the results suggest that these no-change forecasts fully reflect information embedded in the unemployment rate, the growth in industrial production, the CPI inflation rate, change in the inflation rate, growth in the M1 money supply, growth in monetary base, the federal government budget deficit, change in the three-month Treasury bill rate, and lagged values of conventional or GNMA rates. The no-change model's forecast errors (i.e., future changes in rates) are uncorrelated with prior changes in the same rate and prior changes in other rates. And, these no-change forecasts are unbiased.

I conclude that

> the tests support the hypothesis that no-change predictions of the 30-year conventional home mortgage and GNMA rates are optimal for forecast horizons of up to three-quarters-ahead [1989, p.]

Applying the same rigorous series of tests to Treasury yields, Reichenstein and Shetty [1993] conclude that no-change forecasts of five-year and longer Treasury rates are rational one-quarter-ahead forecasts.

We should thus not be surprised that economists individually or through consensus forecasts cannot beat the accuracy of no-change forecasts of long-term rates.

SUMMARY

Brooks and Gray [2004] make an important contribution in their examination of the accuracy of economists' forecasts of long-term interest rate. They demonstrate that economists' consensus forecasts of the six-month-ahead level of the long-term Treasury rate cannot match the accuracy of naive or no-change forecasts. Their study extends our understanding of predictability of near-term changes in long-term interest rates.

The pure expectations and liquidity preference theories imply that near-term changes in long-term rates should be essentially unpredictable. Empirical studies conclude that no-change forecasts of long-term rates 1) are at least as accurate as economists' consensus forecasts, and 2) satisfy several rigorous tests of rational expectations. Thus these no-change forecasts are not naive forecasts—rather, they are rational economic forecasts. So, we would do well to extrapolate from Brooks and Gray's conclusion that no-change forecasts are better than economists' consensus forecasts of the long-term Treasury rate to other long-term interest rates.

ENDNOTES

*For more complete development of Equation (3) and related work, see Pesando [1979 and 1981] and Pesando and Plourde [1988].

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