Announcement Strategies and the Information in the Term Structure: 
Evidence from the Duration Distribution of Target Changes

Peter Anker*

1. INTRODUCTION

An important aspect of monetary policy on the tactical level is the central bank’s signalling strategy. Whereas there has been considerable convergence with respect to the operating target of central banks, there are important differences in the signalling strategies. In the US, the overnight rate serves as the operating target of monetary policy and announcements of the federal-funds-rate target are the key policy signal. There is no additional signalling role of other announcements of official interest rates. The German Bundesbank, like the Fed, relies on the overnight rate as the operating target but the signalling strategy is different. First, there are no explicit announcements of the overnight target. Instead, the rate on repurchase agreements (REPOs) is the main indicator of the Bundesbank’s short-term target for the overnight rate. In addition to the REPO rate, the official interest rates on two standing facilities, namely the discount and lombard rates, have a signalling-function.

This paper sheds light on the effects of signalling strategies like those of the Bundesbank and the ESCB and contrasts them with the US case. Actually, a central bank cannot at the same time directly control the overnight rate and the interest rate on a longer maturity. According to the rational expectations hypothesis of the term structure (REH), the latter is determined by expectations on future overnight rates. In forming these expectations the market will observe the central bank’s behavior in setting target levels for the overnight rate. Thus, if signalling is confined to announcements of targets for the

* University of Giessen, Department of Economics. 
Justus-Liebig-Universität Giessen, Volkswirtschaftslehre V, Fachbereich Wirtschaftswissenschaften, Licher Strasse 62, D-35394 Giessen. Phone: (0641) 99-22172, Fax: (0641) 99-22179, e-mail: peter.anker@wirtschaft.uni-giessen.de.

The author gratefully acknowledges financial support from the Deutsche Forschungsgemeinschaft (DFG).

1. See Borio (1997) for the operating procedures of the Federal Reserve and the German Bundesbank.
2. As regards announcements of official interest rates the procedure for the ESCB is close to the Bundesbank’s procedure: no explicit announcements of the operating target, the rate on repurchase agreements as the key policy rate and official interest rates on two standing facilities. See EMI (1997).
overnight rate, it should be possible to trace back the information content of money market rates to the stochastic characteristics of the targets for the overnight rate. Using a hazard functions approach, Rudubusch (1995) showed that this is possible for the US term structure. His simulation studies show that both the high information content of short-term money market rates and the poor information content of longer-term money market rates are consistent with the rational expectations hypothesis of the term structure and the stochastic properties of the federal-funds-rate targets.

This paper conducts a similar analysis for Germany, i.e., we simulate the informational content of the German term structure when markets make the best possible use of the univariate stochastic properties of the Bundesbank’s targets for the overnight rate. The analysis provides a characterization of interest rate setting in Germany compared to the US. In addition it contributes to the literature analyzing other aspects of signaling in Germany. Several studies have shown that changes in the German discount and Lombard rate lead to significant reactions of interest rates along the whole term structure. An open issue, however, is the question of whether these reactions imply better forecasts or changed risk premia and whether the reactions are caused mainly by announcements of REPO rates shortly before the discount or Lombard rate announcements. This paper’s analysis therefore can be viewed as complementary to the literature analyzing the information content of discount and Lombard rate changes. If the information content of the term structure could be traced back to the stochastic behavior of the Bundesbank’s target for the overnight rate, this would indicate that discount and Lombard rate changes are largely of a technical nature, i.e., lagging behind information already contained in other policy measures.

The paper is organized as follows. Section 2 briefly outlines differences and similarities between Germany and the US with respect to regression results for the informational content at the short end of the term structure. We also point out aspects of the Bundesbank’s money market strategy with a potential influence on the predictive power of the term structure. In Section 3 we analyze the German rate on securities repurchase agreements (REPOS), which provides an useful indicator of the Bundesbank’s operating target for the day-to-day interest rate. Section 4 presents simulation evidence on the question of whether the general patterns in the predictive power of the yield curve for Germany and the US can be traced back to the behavior of the respective central bank targets for day-to-day interest rates by maintaining REH. Section 5 provides a summary and conclusions.

2. TERM-STRUCTURE EVIDENCE FOR GERMANY AND THE US

Numerous studies have provided evidence that for the US there is a U-shaped pattern of the predictive ability of the yield curve. Whereas the one-month rate has high predictive

power for future changes in the funds rate, the spread between the six- and three-month rates has virtually no predictive power for changes of the three-month rate three months ahead. For spreads involving maturities longer than one year the informational content appears to improve.4

Several recent papers have tried to resolve this puzzle by explicitly analysing daily changes in the funds rate and their relation to the funds-rate targeting procedure of the Federal Reserve.5 In particular, RUDEBUSCH (1995) argued that by maintaining the rational-expectations hypothesis of the term structure (REH), the evidence cited above can be traced back to the Fed’s operating procedure for the money market. In a simulation experiment he showed that for the US the general pattern of term-structure results at the short end of the maturity spectrum is consistent with the behavior of the funds-rate target.

Like the Fed, the Bundesbank controls money market conditions by using targets for a day-to-day interest rate.6 As a first step, evidence on the informational content of the term structure for Germany is contrasted to that for the US.

Table 1 shows empirical results for regression tests of the REH. The regressions are of the general form7

\[
\frac{1}{k} \sum_{i=0}^{k-1} (r(m)_{t+m_i} - r(m)_t) = a + b[r(n)_t - r(m)_t] + \nu(n,m)_t
\]  

The left side is a perfect-foresight spread between interest rates for assets with n and m days to maturity. The regressor on the right is the observed spread at the same time. In the first row of Table 1 results for m = 1 and n = 30 days are shown. Under the REH the one-month rate r(30) is an average of k = 30 expected day-to-day interest rates (r(1)) implying b = 1. In this case the error term arises from errors of rational expectations and the OLS estimate of the slope coefficient in (1) will be consistent. With time-varying term premiums uncorrected with expected changes in interest rates the estimate of b will be biased towards zero (FAMA 1984). Therefore, tests in (1) commonly refer to the null hypothesis b = 0. A rejection of this hypothesis indicates that the spread carries information about future changes in the respective short-term interest rate.

The second row in Table 1 shows results for m = 30 and n = 90 days. This regression tests whether the three-month rate is an average of k = 3 expected one-month rates. The third regression examines the relation between the six-month rate (r(180)) and the three-month rate (r(90)). Under the REH the six-month rate should be an average of the actual three-month rate and the expected three-month rate three months ahead (k = 2).

7. See CAMPBELL and SHILLER (1991) for the specification of term-structure regressions with various maturity combinations.
### Table 1: Regression results for the German and US term structure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) n = 30, m = 1</td>
<td>0.663 (10.92)(^a) [0.545]</td>
<td>0.647 (15.26)(^a) [0.469]</td>
</tr>
<tr>
<td>(2) n = 90, m = 30</td>
<td>0.593 (4.452)(^a) [0.170]</td>
<td>0.573 (4.933)(^a) [0.242]</td>
</tr>
<tr>
<td>(3) n = 180, m = 90</td>
<td>0.258 (0.986) [0.016]</td>
<td>0.548 (5.169)(^a) [0.190]</td>
</tr>
</tbody>
</table>

Note: Estimated slope coefficients for regression equation (1). Autocorrelation and heteroscedasticity consistent t-statistics in parentheses; R\(^2\)s in brackets.

\(^a\) Significant at the one-percent level.

The US results\(^8\) for a sample from February 1, 1984 to December 31, 1996\(^9\) show the well known decreasing informational content of the term structure with increasing forecast horizons.\(^10\) As argued in RUDEBUSCH (1995), the high predictive power of the spread between the one-month rate and the federal-funds rate results from short-lived daily deviations of the funds rate from the target rate. These deviations arise because the Fed exerts its influence on the funds rate by daily open market operations as opposed to the exclusive use of standing facilities which potentially peg the funds rate to the target rate. If in the market such deviations are correctly identified as transitory, they will cause the high informational content of one-month interest rates. For example, if the funds rate falls below the target rate, the one-month rate as an average of the funds rates in the next 30 days will remain stable and the resulting positive spread between the one-month and funds rate correctly forecasts that funds rates will on average be higher than the actual rate during the next month.

---

8. The results in Table 1 for the US refer to the federal funds rate and Euro rates for longer maturities. For Germany the day-to-day interest rate as well as rates for longer maturities are onshore interbank rates. All time series were provided by DATASTREAM.

9. As noted in ROBERDS, RUNKLE and WHITEMAN (1996), despite the existence of borrowed reserves targets, the operating regime for this period can be viewed as funds-rate targeting similar to the regime of the latter half of the 1970s. Another constant feature of the sample period used above is contemporaneous reserve accounting.

10. The results for the US are close to those presented in the more extensive study of ROBERDS, RUNKLE and WHITEMAN (1996) for a sample ending in 1992.
The results for the three- and six-month spreads in rows (2) and (3) can be explained by considering the timing of target changes for the federal-funds rate. Because of a motive for interest-rate smoothing,¹¹ the Fed attains a new target in several smaller steps in the same direction. This produces predictable movements in the one-month rate leading to the considerable information content of the spread between the three-month and one-month interest rates.¹²

Using the same line of argument, under the maintained hypotheses of the REH the insignificant informational content of the six-month spread in the third row of Table 1 can be explained as follows: the adjustment towards a new target level is sufficiently rapid to prevent predictable movements of the three-month rate beyond a horizon of three months. RUDEBUSCH (1995) discovered that the adjustment to a new target is completed within about one month. Since there are no further predictable changes in the funds rate beyond one month, the actual three-month rate is dominated by the final new target value and no significant change in the level of the three-month rate three months ahead can be predicted.¹³

For Germany, the Bundesbank’s operating procedure for the money market has converged towards the strategy of the Fed.¹⁴ Both strategies are commonly labeled as interest-rate targeting and both strategies rely mainly on open-market operations as opposed to standing facilities. Since 1985 security repurchase agreements (REPOs), where the Bundesbank buys securities from credit institutions conditional on a simultaneous forward repurchase by the seller, have been the Bundesbank’s main instrument.¹⁵ Fluctuations in interest rates for central bank money arise because the REPOs are only offered once a week. Fluctuations are however moderate in size since, as in the US, reserve requirements which have to be met on average play a stabilizing role. In the case of severe temporary liquidity disturbances the Bundesbank reacts with additional measures, for example by using «quick tenders».¹⁶

The fact that the Bundesbank’s operating target is a short-term interest rate does not in itself imply a certain pattern of the predictive power of spreads. The tightness of the daily control of the target can differ, as can the strategy of short- and medium-term interest-rate smoothing. Table 1 shows results for the predictive content of the German term structure. Applying the reasoning applied for the US, the results for the one-month spread indicate

¹¹ The relation between a motive for interest-rate smoothing and the behavior of the funds rate is described in GOODFRIEND (1991).
¹² A similar effect arises, if the Fed does not react immediately to news affording target changes. See COOK and HAHN (1989).
¹³ As noted several times in the literature, with random-walk behavior of the short rate, the spread between this short rate and a longer rate shows no variation and a regression test of the expectations theory of the term structure will show no information content of the spread. See, for example, MANKIW and MIRON (1986).
¹⁴ For a more detailed survey of the Bundesbank’s monetary control instruments see NEUMANN and VON HAGEN (1993).
¹⁵ A more complete description of the REPO auctions is provided in NAUTZ (1997) and NEUMANN (1990). Until 1985, the Bundesbank controlled daily interest rates by use of the Lombard credit as a standing facility. Before 1980 the Bundesbank’s instruments did not allow a tight control of short-term interest rates.
¹⁶ See ISSING (1997).
that, as in the US, temporary fluctuations of the daily rate around the target are correctly
identified in the market leading to a high informational content of the spread between the
one-month rate and the daily rates. Also the results for the three-month spread are close
to those for the US. By maintaining the rational-expectations hypothesis of the term
structure this indicates that the Bundesbank applies an interest-rate smoothing strategy
similar to the Fed’s, where the adjustment towards a new target level is conducted in
several smaller steps.

The results for the spread between the six-month and three-month rates, however,
reveal an important difference between the US and Germany. The dramatic decline in the
informational content of the six-month spread compared to the three-month spread in
the US is not observable for Germany. On the contrary, the estimated slope coefficient
in the six-month spread regression has the same magnitude and precision as the slope
coefficient in the three-month spread regression and there is only a slight reduction in
the coefficient of determination.\(^{17}\)

The literature provides several possible starting points for an explanation of this
result. Among the most prominent are those which refer to the potential role of variable
liquidity premiums, of which the effect on the regression results in (1) is particularly
serious if they covary with expected interest-rate changes.\(^{18}\) However, RUDEBUSCH (1995)
showed with his simulation experiment that the drastic decline in the information content
of the US term structure can be a result solely of the duration distribution of changes in
the federal funds rate target.

Maintaining the REH the higher informational content of the six-month spread in
Germany results from differences in the interest-rate smoothing strategies. Evidently the
Bundesbank’s strategy does not induce random walk behavior of the three-month rate
over a horizon of three months. If signalling in Germany and the US is exclusively con­
centrated on the announcement of targets for the overnight rate, it should be possible to
trace back the differences in the term structure information to differences in the duration
distributions of the targets.

In order to investigate this issue, a measure of the Bundesbank’s operating target for
the money market is required. The Bundesbank does not publish an explicit interest-rate
target for daily central bank money. However, since 1985 the REPO rate is regarded
as the main indicator of the Bundesbank’s short-term target for the day-to-day interest
rate in the interbank market for central bank money (NEUMANN and VON HAGEN 1993).
The BUNDESBANK itself refers to the REPO rate as the leading interest rate, whereas the
lombard and discount rate, the leading interest rates until 1985, only follow developments
already established by the REPO rate.\(^{19}\)

\(^{17}\) The comparably low information content of the US six-month rate is also documented in GERLACH and
SMETS (1997), who examine the information content of money-market rates in 17 countries using monthly
data. For evidence with daily data see ANKER and WASMUND (1998).

\(^{18}\) Monetary policy reactions to interest-rate spreads can be one possible source of this covariation. See
MCCALLUM (1994).

\(^{19}\) See DEUTSCHE BUNDESBANK (1994).
3. STATISTICAL ANALYSIS OF THE GERMAN REPO RATE

This section examines in more detail the properties of the German REPO rate as an indicator of the Bundesbank's operating target. Figure 1 shows the German REPO rate together with the day-to-day interest rate for the time since the introduction of REPOS as the main tool of money market control. Regarding the REPO rate as the Bundesbank's target \( r^T \) for the day-to-day interest rate \( r \), we obtain the following model for the deviations \( u_t = r_t - r^T \) of the day-to-day interest rate from the target, estimated with OLS for the period February 4, 1985 to December 31, 1996:

\[
u_t = 0.03 + 0.539\cdot u_{t-1} + e_t; \quad R^2 = 0.29\]

Thus, the persistence of deviations is close to that observed for the US for the period March 3, 1984 to December 31, 1996. Here we obtain:

\[
u_t = 0.003 + 0.517\cdot u_{t-1} + e_t; \quad R^2 = 0.27.
\]

In the case of many outliers, however, robust estimators are more reliable. Minimizing the mean absolute value leads to

\[
u_t = 0.013 + 0.776\cdot u_{t-1} + e_t; \quad R^2 = 0.23 \quad (2a)
\]

for Germany and for the US we obtain

\[
u_t = -0.004 + 0.452\cdot u_{t-1} + e_t; \quad R^2 = 0.26. \quad (2b)
\]

The somewhat higher persistence of deviations from the target rate in Germany can be explained by differences in the operating procedure for the money market. The Fed's intervention frequency is higher and the REPOS offered by the Bundesbank are not a close substitute for daily money, since their maturity was usually at least four weeks in contrast to a maximum of ten days in the US. In the case of expected significant changes in short-term interest rates, this severely complicates the control of day-to-day interest rates by means of REPOS. For this reason the Bundesbank reduced the maturity of the REPOS to two weeks in October 1992.

20. The REPO rates in Figure 1 were taken from the monthly reports of the DEUTSCHE BUNDESBANK. The federal funds rate target for the US is the time series provided by DATASTREAM.

21. All the estimated AR coefficients are significant on the 1% level. Eliminating outliers does not affect the estimated coefficients in a significant way.
Figure 1: Money-market rates

Note: Thick lines are the federal funds rate target for the US and the REPO rate for Germany. Dashed lines are the federal-funds rate for the US and the day-to-day interest rate for Germany.
Comparing the German REPO rate with the Fed’s target for the funds rate in Figure 1, we note that both series share the characteristic that changes occur rather infrequently and mostly in small steps. Table 2 describes the distribution of target-change sizes. For the US the sample is September 13, 1974 to September 19, 1979 and March 1, 1984 to December 31, 1996. We took the data for the former period from Rudebusch (1995), since for this period the Fed’s operating procedure with regard to funds-rate targeting was close to that in the latter period. The distribution of funds-rate targets shown in Table 2 is close to that in Rudebusch (1995) for the sample ending in 1992. Target changes occur in roughly standardized steps, most of them being of one-eighth or one quarter of a percentage point for both positive and negative changes.

Table 2: Frequency distribution of absolute target-change sizes

<table>
<thead>
<tr>
<th>Germany: Absolute size of target change (basis points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 5 6 7 8 9 10 11 12 15 20 25 30 34 35 40 50 80</td>
</tr>
<tr>
<td>positive</td>
</tr>
<tr>
<td>negative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>US: Absolute size of target change (basis points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.25 12.5 18.75 25 31.25 37.5 43.75 50 56.25 62.5 75</td>
</tr>
<tr>
<td>positive</td>
</tr>
<tr>
<td>negative</td>
</tr>
</tbody>
</table>

Note: The sample for the US is 13/9/74 to 19/9/79 and 1/3/84 to 31/12/96 (203 changes of the federal-funds target). The target series for Germany is constructed from the REPO rate (see text). The sample is 4/2/85 to 31/12/96 (157 target changes).

With regard to the distribution of the target-change sizes in Germany it is not meaningful to look directly at the original REPO rates for the years since 1993, as there was a change in the Bundesbank’s treatment of REPO rates in 1993. The Bundesbank usually offers REPOS as «interest-rate tenders», where the interest rate is not fixed at the outset. But the Bundesbank avoided fluctuations in the stop-out rate and restricted itself to changes in the REPO rate of at least five basis points, aware that such changes would be regarded as a new target level in the market. In late 1992, however, the Bundesbank began to allow changes in the REPO rate of less than five basis points in order to gain flexibility with respect to the quantity of central bank money offered in interest-rate tenders. It was intended that such fluctuations in the stop-out rate of interest-rate tenders should not be viewed as target changes in the market. In order to generate a target rate
for the years 1993 to 1996 we therefore modified the series of the REPO rate in the following way: in the case of a change in the REPO rate of less than four basis points the old target was assumed to persist. If two successive small changes in the stop-out rate accumulated to more than three basis points, we identified the new rate with a new target level.  

<table>
<thead>
<tr>
<th>Sample (1)</th>
<th>Sample (2)</th>
<th>US</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>pos.after</td>
<td>neg.after</td>
<td>91</td>
<td>0.955</td>
</tr>
<tr>
<td>pos.</td>
<td>neg.</td>
<td>12</td>
<td>0.102</td>
</tr>
<tr>
<td>neg.after</td>
<td>pos.</td>
<td>179</td>
<td>0.001</td>
</tr>
<tr>
<td>pos.</td>
<td>neg.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3: Tests of the equality of duration distributions**

*Note:* For each country the first column shows the sizes of sample 1 and 2 separated by a semicolon. The second and third column show p-values for the indicated tests for equality of the two duration distributions. The sample periods used confirm with those in Table 2.

*Table 2* shows the distribution of the sizes of target changes from the constructed target rates. As in the US case, a concentration on only two sizes of change is apparent for positive changes (five and ten basis points) whereas for negative changes more intermediate values are possible.  

We now turn to the main issue of whether the term-structure evidence for Germany and the US is compatible with the respective duration distributions of the target rate. Fol-

---

22. The effect of the adjustment procedure on the results below should not be serious. There are 17 weeks in the sample where the constructed target differs by more than one basis point from the REPO rate. In 15 weeks the difference is one basis point. Differences between the constructed target and the REPO rate of two or three basis points never persist more than one week.

23. Dividing the sizes in classes of ten basis points, a chi-squared test of equal distribution of positive and negative changes does not reject at high significance levels.
Following Rudebusch (1995) we interprete the number of days separating target changes as duration data. Table 3 provides a first impression of the distribution of these durations. Although the sample for the US is four years longer than in Rudebusch, the results in Table 3 for the US are very close to those reported in Rudebusch (1995). The p-values for two non-parametric tests, the Wilcoxon and the log-rank test, show that the funds-rate target is not a martingale: most changes in the funds-rate target are followed by changes in the same direction and the distribution of durations between changes of the same sign is significantly different from the distribution of durations between changes of different signs. Furthermore Table 3 shows that for the US it does not seem necessary to differentiate the duration distributions of same-sign and different-sign changes with respect to the sign of the first change.

The main result for the US also holds for Germany: as shown in the last two rows, positive target changes are most likely followed by a further positive change and negative changes are most likely followed by further negative changes. The only difference is that we have to separate the distribution of days between a positive and a negative change from the distribution of days between a negative and a positive change.

In order to determine whether the term-structure results for Germany follow from the behavior of the constructed target rate for day-to-day interest rates, we estimate hazard functions $h(\tau)$ which show the conditional probability of a change in the target rate given that the target has been unchanged for $\tau$ business days. From the evidence in Table 3 we have to separate three different hazard functions. The function $h(\tau)^s$ gives the hazards for changes of the same sign, the function $h(\tau)^{+}$ gives the conditional probability of a negative change if the last change was positive, whereas $h(\tau)^{-}$ is the probability of a positive change after a negative change $\tau$ business days before. In order to obtain an adequate representation of the German data we choose the life-table estimator for the hazard function which splits up the durations in fixed intervals. Because REPOs are offered once a week, we have a high concentration of observed durations around multiples of five business days. This suggests that the hazards should be estimated for intervals of one week with the multiples of five business days as the center of the interval.

Figure 2 shows the results for the US and Germany. For the US the figure shows the same features as the corresponding figure in Rudebusch (1995) for the shorter sample ending in 1992. There is a high probability of a target change in the same direction during the first week. The probabilities of same-sign changes then decline but remain high until three to four weeks after the last change. The hazards for different-sign changes are very low for the first three weeks. They then rise and come close to the hazards for same-sign changes.

24. See Kiefer (1988) for an introduction to the methods for analyzing duration data.
25. The estimator is closely related to the Kaplan Meier estimator, where the intervals for which the hazards are estimated depend on the data. See Kiefer (1988).
For Germany the picture is different in several respects. As for the US, the hazards for same-sign changes are high during the first four weeks, but compared to the US the function is flatter. The peak in the first week is less pronounced and the hazard rates for the second and fourth weeks are higher. Another major difference compared to the US is the relatively high probability of a different sign change in the first and second week after a negative target change.

4. SIMULATION RESULTS

In a simulation experiment we attempt to determine, whether, by maintaining the REH, the differences in the term-structure results in Table 1 can be traced back to differences in the behavior of the target rates for day-to-day money as described by the size distrib-
utions of target changes in Table 2 and the hazard functions for the time between target changes in Figures 2. The setup for the simulations is described in Ruud (1995). The only difference is in the estimation of the hazards as described in the last section: the two distributions for different sign changes do not have to be equal and we apply a different estimator. These modifications serve to match the German situation as closely as possible.

Simulated data are generated as follows. At each point of time a random number decides according to the estimated hazard functions whether there is a target change of the same or different sign. We interpret the estimated hazard for the first interval as the probability of a target change after five business days, the hazard for the second interval as the conditional probability of a change after ten business days and so on. This comes very close to the German situation, where two target changes in one week never appeared. In the case of no target change during 6 weeks, we specify a 2% conditional probability per day for all changes after the 33rd business day.

The size of the target change is generated according to the distributions in Table 2. The deviation of the day-to-day rate from the target is determined by the estimated processes in equations (2a,b) where the shocks $e_t$ are bootstrapped from the fitted residuals. The term structure at time $t$ is generated according to the REH: long rates are averages of expected future day-to-day rates. The latter are model consistent in the sense described in Ruud (1995): they are the average of 200 additional simulations performed at time $t$. By this procedure 50 samples of 3000 observations on the day-to-day interest rate, the one-month, three-month and six-month rates are generated. With these data the regressions shown in Table 1 are estimated using a 2-week sampling interval. Table 4 shows the average t-statistics obtained from the 50 samples and contrasts them to the actual values.26

<table>
<thead>
<tr>
<th>Spread</th>
<th>US</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Simulation</td>
</tr>
<tr>
<td>$n = 30, m = 1$</td>
<td>10.92</td>
<td>30.52</td>
</tr>
<tr>
<td>$n = 90, m = 30$</td>
<td>4.45</td>
<td>3.64</td>
</tr>
<tr>
<td>$n = 180, m = 90$</td>
<td>0.99</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Note: Actual results are based on Table 1. Simulation results refer to the average t-statistic in 50 simulations described in the text.

26. Comparing estimated slope coefficients makes less sense because they are affected by the variance of risk premia.
We first note that the results for the US are very close to those reported in RUDEBUSCH (1995) indicating that for the US the observed link between the Fed’s operating procedure and term-structure evidence is robust with respect to the sample used and modifications in the estimation of the hazard functions. The results for Germany provide additional evidence that for horizons up to three months there is a close connection between the behavior of the central bank’s target for day-to-day interest rates and the information content of the term structure.

As regards this paper’s main question, however, the result for the six-month spread provides relatively strong evidence. The average duration distribution of the Bundesbank’s targets for the overnight rate does not imply the high informational content of this spread. According to the estimated hazard function the informational content of the six-month spread in Germany should be as low as in the US.

5. SUMMARY AND CONCLUSIONS

In the absence of variable risk premia and under the hypothesis of the rational expectations theory of the term structure, it should be possible to trace back results for conventional term-structure regressions to the behavior of interest rates for the shortest maturity. The latter is heavily influenced by the central bank’s strategy for the money market. For the US, RUDEBUSCH (1995) showed in a simulation study that the term-structure results at the short end indeed coincide with estimated univariate characteristics of the Federal Reserve’s target for the funds rate. This can be expected in a policy framework, where signalling is confined to announcements of the target rate. The effects of changes in the target on expectations of future overnight rates then mainly depend on the observed average durations between target changes in the past.

This paper’s results indicate that the situation in Germany is different from that in the US. Whereas the average duration distribution of targets for the overnight rate explains why the spread between the three-month and one-month rates has high informational content, the actual information content of the spread between the six-month and three-month rates is too high to be explained by the hazard functions of the target rate.

The differing results can not be caused solely by a failure of the REH, since the actual information content of the six-month spread is higher than the information content achieved in the simulations. Nor does it seem plausible that the results can be due to problems with the interpretation of the REPO rate as an indicator of the Bundesbank’s target for the overnight rate. In this case we would mainly expect problems in reproducing the high informational content of the German one- and three-month rates. Actually, the t-statistics for these term structure regressions were reproduced nearly exactly in the simulations.
Interpretations of the results obtained in this paper have to account for the greater diversity of signalling devices used by the German Bundesbank. Since this paper provides no direct evidence on the link between the information in the term structure and specific signalling devices, this issue is open to further research.

REFERENCES


27. In a broader sense, the signalling strategy is not confined to announcements of official interest rates but also includes the general communication to the public. This aspect might be particularly important for the German Bundesbank. See MISHKIN and POSEN (1997).


ZUSAMMENFASSUNG


SUMMARY

An important aspect of a central bank’s operating procedure is its signalling strategy. Whereas in the US announcements of the federal-funds-rate target are the key policy signal, the signalling strategy of the Bundesbank and the ESCB rely on announcements of several official rates. Following RUDEBUSCH (1995), this paper characterises the link between announcements on the operating target and the information content of the term structure in Germany in comparison to the US case. The results show that, in contrast to the US evidence, the information content of longer-term money-market rates in Germany is considerably higher than could be expected if markets made the best possible use of the univariate stochastic characteristica of the operating target.

RESUME

La stratégie du signal forme une partie centrale des stratégies de contrôle du marché monétaire des banques centrales. Aux Etats-Unis, l'annonce de l'objectif pour le federal funds rate est la source d'information dominante, tandis que les stratégies de la Bundesbank allemande et de la BCE consistent dans la publication de plusieurs taux officiels. Le présent article utilise une approche contenue dans RUDEBUSCH (1995) pour examiner la relation entre les annonces de l'objectif opérationnel et le contenu en information de la structure des taux d'intérêt en Allemagne et aux Etats-Unis. Contrairement aux résultats pour les USA, on constate qu'en Allemagne le contenu en information des taux monétaires à plus long terme est nettement supérieur à celui que l'on peut déduire du processus stochastique de l'objectif.