Forecasting the Past: The Case of US-American Interest Rate Forecasts

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Abstract

This study evaluates the interest rate forecast efforts of US-American banks, insurance companies, other financial service companies, research- and consulting institutes, associations, and industrial companies. 10-year US-Government bond yield forecasts made between October 1989 and December 2003 are analyzed. Forecast error measures are Theil’s $U_2$, TOTA coefficient, and forecast quality matrix. All of the 33 forecast time series lag behind reality and prove to be inferior to the naïve forecast. Without exception they can be categorized as quasi-naïve forecasts and are thus unsuitable as decision-making tools.

Keywords: Interest rate forecasts, forecast accuracy, topically orientated trend adjustment behavior, quasi-naïve forecast

JEL Classification: E47, G21, G12

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1. Introduction

Forecasts of the future interest rate development are of fundamental importance for many business decisions. This especially holds for the banking sector. Commercial banks obtain a substantial profit contribution by maturity transformations. In which design and to which extent these maturity transformations are useful depends on the present and expected future interest rate development. Only if reliable interest rate forecasts can be generated the risks arising from maturity transformations shrink to a manageable residual.

Interest rate forecasts are indispensable requirements for the successful implementation of active portfolio management strategies in the bond market. Both the proprietary trading and the asset management departments of investment banks thus depend on reliable interest rate forecasts. Among others, fundamental stock market- and exchange rate forecasts are usually based on interest rate forecasts. Research departments also work out interest rate forecasts as input for further forecasts of the financial market.

Industrial companies create interest rate forecasts to achieve the best possible timing for their investments. Capital procurement cost in a high interest rate phase can amount to many times over the cost of finance in a low interest rate phase. Also, with regard to the future, medium- and long-term price policies should consider the interest rate as a cost issue.

Against the background of the important role interest rate forecasts play for various financial areas of responsibility within banks and industrial companies it is of special interest if, and if so, to which extent, US-American companies succeed in dealing with this task. This study takes up a series of examinations with various results.

Throop (1981) concludes that the reviewed estimations of market professionals lead to better forecast results than an autoregressive forecasting equation based on the past history of the interest rate. Belonia (1987) shows that the reviewed interest rate forecasts by analysts in less than 50% foresee the correct development trend. Additionally, the estimates
made by analysts prove to be inferior to the naïve forecast. Dua (1988) comes to mixed conclusions. Depending on examined forecast subject, forecast horizon, and forecasting period the forecasts are partly better and partly worse than the naïve forecast. In a further comparison of interest rate forecasts of different market experts with the naïve forecast Hafer and Hein (1989) establish that, depending on the reviewed period of time and the applied forecast error measure, sometimes the naïve forecast and sometimes the analysts’ forecast provide minimally better results. This impression is widely confirmed in the later study of Hafer, Hein, and MacDonald (1992). Domian (1992) argues that money market mutual funds which are able to forecast interest rates should lengthen their maturities before a drop in rates, and shorten their maturities before a rise in rates. An examination of the maturity structures of the reviewed funds shows that the fund managers were not able to predict the future interest rate development. In a similar study Francis (1991) examines commercial bank exposure positions. The intuition is that the management of exposure to interest rate risk reveals the banks’ implicit forecast of interest rates. It emerges that changes in the exposure position are unrelated to later changes of the interest rate level. Kolb and Stekler (1996) show that interest rate forecasts by market experts were not significantly better than random walk forecasts. Opposed to this Gosnell and Kolb (1997) find that the reviewed interest rate forecasts by market experts were if only a little, but discernible better than naïve forecasts. Albrecht (2000) and Spiwoks (2003) show that interest rate forecasts by German banks predict future interest rate developments less correctly than corresponding naïve forecasts. Greer (2003) establishes that the reviewed analysts’ estimates have a better forecast quality than the random walk forecast.
Table 1

**Synoptic Overview of Existing Literature on the Success of Interest Rate Forecasts**

This synopsis only considers studies in which explicit forecast data were evaluated. The studies of Francis (1991) and Domian (1992), which indirectly evaluated forecast competence, are not included. Their research concept does not match this categorisation design. Here the focus is on which kinds of interest rate were forecast, where forecast data were published, in which time intervals the forecasts were made, and which periods of time each of the studies cover. For some cases special facts are highlighted.

<table>
<thead>
<tr>
<th>Study</th>
<th>Evaluated forecast subject</th>
<th>Source of data</th>
<th>Frequency of forecast</th>
<th>Period of time</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gosnell / Kolb (1997)</td>
<td>3-month Euromarket rate for USA, UK, Germany, Japan, Switzerland</td>
<td>Risk</td>
<td>Monthly</td>
<td>1990 – 1992</td>
<td>Only 10 reviewed market experts</td>
</tr>
<tr>
<td>Albrecht (2000)</td>
<td>3-month German money market rate 10-year German Government bond yield</td>
<td>Finanzen</td>
<td>Monthly</td>
<td>1991 – 1997</td>
<td>In German; only 12 reviewed market experts</td>
</tr>
</tbody>
</table>

Further research efforts are necessary for the following reasons: 1. A number of existing studies present significantly differing results. 2. In some studies the data basis is rather
small, because either only six-monthly or quarterly data were evaluated, the reviewed period of time is relatively short, or because only few market experts were included in the study. 3. An investigation of ten-year US-Government bond yield forecasts is still outstanding (Table 1).

This study therefore focuses on the evaluation of ten-year US-Government bond yield forecasts which were monthly published by 33 US-American banks, insurance companies and other financial services companies, research- and consulting institutes, associations and industrial companies between October 1989 and December 2003 (Chapter 4). The underlying methods are presented in Chapter 2, while the data base is defined in Chapter 3. A summary of research results as well as the conclusion follows in Chapter 5.

2. Methods

Let us assume that a black box generates a quantifyable event in regular time intervals. We can observe the time series of these events, but we have no insight whatsoever into the processes occurring inside the black box, and how the visible results were generated. Let us also assume that despite our complete ignorance we have to make a forecast on the future tendency of the time series. As we have no information on the genesis of events, both the future increasing and decreasing course of the time series are equally probable. Thus it seems sensible to assume an unchanged situation in the future (naïve forecast). This idea goes back to the French mathematician Pierre Simon Laplace (1814), who introduced it into the literature as the “principle of insufficient reason”. Since then the naïve forecast has been judged as the rock-bottom of forecast quality. Even if nothing is known about the forecast subject, the forecast quality of a naïve forecast can be achieved without effort. If a market expert at least roughly understands the processes to be forecast, his forecasts should have a significantly better quality than naïve forecasts.
Henri Theil (1955, 1966, 1971) used this assumption to develop forecast error measures which allow an implicit comparison of a forecast time series with the time series of the respective naïve forecast. Hereby especially Theil’s new inequality coefficient (Theil’s $U_2$) has been generally accepted.

\[
U_2 = \sqrt{\frac{1}{T-h} \sum_{t=h+1}^{T} (P_t - A_t)^2} \sqrt{\frac{1}{T-h} \sum_{t=h+1}^{T} (A_t)^2}
\]

(1)

\[
P_t = \frac{\hat{x}_t - x_{t-h}}{x_{t-h}}
\]

(2)

\[
A_t = \frac{x_t - x_{t-h}}{x_{t-h}}
\]

(3)

with

- $t$: continuous time index
- $T$: Total amount of present forecasts or actually occurred events
- $x_t$: Occurred event at point of time $t$ ($t$ from $t = 1$ to $T$)
- $\hat{x}_t$: Present forecast at point of time $t$ ($t$ from $t = 1$ to $T$)
- $h$: Forecast horizon
- $x_{t-h}$: Occurred event at point of time $t-h$ (point of origin of forecast)

Theil’s $U_2$ provides several good characteristics which significantly enable this forecast error measure to assess quantitative forecast time series of the financial market. 1. A mutual cancelling out of over- and underestimates is impossible. 2. The standardization enables the comparison of forecast data of different market phases (i.e. high interest rate phase and low interest rate phase). 3. Strong deviations of a forecast from the actual event are over-
proportionally included into the forecast error measure. 4. By the implicit comparison with
the respective time series of naïve forecasts each forecast time series can be qualified as
suitable or unsuitable without further comparison data. 5. The findings can be interpreted
easily and unambiguously.

For a perfect forecast follows $U_2 = 0$. If $U_2 = 1$ the reviewed forecast time series on av-
erage is as bad as the time series of naïve forecasts. For $U_2 > 1$ the applied forecasting pro-
duction is even worse than naïve forecasting. According to Theil a forecast time series which
is systematically better than the time series of naïve forecasts will result in $U_2 < 0.4$. Al-
though forecast time series with a test result of $1 > U_2 > 0.4$ are clearly better than the naive
forecast, still this “success” may simply be based on an accidental oscillation around value
1, which represents the naïve forecast.¹

It must be noted that Theil’s $U_2$ is not designed for the evaluation of absolute values.
Rather, the forecast changes are compared to the actual changes. Prior to this the absolute
values are tranformed into their natural logarithms. To exclude non-stationarity also the first
differences are made.² According to Taylor (1992) this method (examination of the first dif-
fferences of the change rates of the logarithms of the absolute values) can be considered as
the standard methodology for the evaluation of historic forecast data.

When forecasts are shaped mainly by the current development of the variable to be fore-
cast, so that the forecasts to a larger extent correspond with actual events at the time of their
respective emergence than with those at their respective point of time of validity, this is la-
belled as topically orientated trend adjustment behavior of forecasts (TOTA).

¹ Following case shall serve as an example: A market expert totally used to rely on the naïve forecast for years;
he always forecasts the actual value for the future. Just at one single forecast date he makes a bet and flips a
coin. Heads mean he fixes the forecast value minimally below the actual value. Tails mean he fixes the fore-
cast value minimally above the actual varible. Be it tails and the forecasted value incidentally increases in the
forecast period of time, $U_2$ has a value of < 1, although the market expert has had no clear idea of the future
development. For a forecast time series to be systematically better than the time series of naïve forecasts, the
correlation of forecasts and actually values must be so close that Theil’s $U_2 < 0.4$. Theil defined this borderline
for Theil’s old inequality coefficient ($U_1$). In analogy it can be also used for $U_2$. See Theil (1961), p. 32.
² See for data transformation appendix A.
Financial market forecasts which are continually adjusted to actual market developments may, in the worst case, completely lose their future-oriented character. Therefore it is of special interest if a forecast is marked by topically orientated trend adjustment behavior. The TOTA coefficient\(^3\) can be used to identify this characteristic. To calculate the TOTA coefficient at first the coefficient of determination of the forecast data and the actual events are calculated \((R^2_A; \text{Figure 1})\). Then the coefficient of determination of the forecast data from the time of emergence with the actual events is calculated \((R^2_B; \text{Figure 2})\). It must be noted that the TOTA coefficient is always calculated on the basis of the (non-transformed) absolute values.

\[
\text{TOTA coefficient} = \frac{R^2_A}{R^2_B} = \frac{R^2_{\text{forecasts; actual}}}{R^2_{\text{forecasts; actual - } h}} \tag{4}
\]

If the value of the TOTA coefficient is \(< 1\), a topically oriented trend adjustment must be assumed. In this case the forecast time series transferred back to its time of emergence shows a higher correspondence with the actual values than the forecast time series at the time of its validity with the actual values. For TOTA coefficient \(< 1\) the forecast time series stronger reflects the presence than the future.

The understanding of the quality of forecast time series can be significantly improved if apart from Theil’s \(U_2\) also the TOTA coefficient is considered. TOTA coefficient was developed by Andres and Spiwoks (1999). It has received attention especially since Bofinger, one of the highly ranked economics consultants of the German government, has taken up this analysis tool and applied it in several studies.\(^4\)

\(^3\) For calculation and meaning of TOTA coefficient see Andres and Spiwoks (1999), pp. 531-534, or Bofinger and Schmidt (2003), p. 444.

\(^4\) A. o. see Bofinger and Schmidt (2003, 2004), and Leitner, Schmidt, and Bofinger (2003).
With the help of Theil’s $U_2$ and the TOTA coefficient now four different forecast qualities can be differentiated in the forecast quality matrix. On the one hand it is taken into account if the reviewed forecast time series is better or worse than the corresponding time series of naïve forecasts. On the other hand there is the separation into existing and non-existing topically oriented trend adjustments. If these two distinctive features are combined the quality forecast matrix (Figure 11) emerges, with which the following four forecast categories could be set up:

1. The quasi-naïve forecast ($U_2 > 1; \text{TOTA} < 1$): This forecast quality is lower than that of the naïve forecast. A further significant characteristic is its topically oriented trend adjustment. The market expert was not able to make proper assumptions about future events. Instead he was closely oriented at the development of the variable to be forecast at the time of making the forecast. Focused on the current data he was not better able to judge the trend of development (increasing or decreasing) than using the naïve forecast. Such a forecast is definitely not suited as the basis of decision-making.

2. The directional forecast ($U_2 < 1; \text{TOTA} < 1$): Although this forecast time series shows a topically oriented trend adjustment, considering the actual value it still meets the development trend better than the respective time series of naïve forecast. For many decisions it is highly significant to estimate the degree of expected change. This forecast type can not deliver the necessary valuable information. Yet, for many issues it can be very helpful to know the correct development trend. Therefore, within limits, the directional forecast suits as a basis of decision-making.

3. The vain forecast ($U_2 > 1; \text{TOTA} > 1$): In this case the effort to forecast the future without defining the market development as dominating factor, was not successful. Although this forecast time series shows no topically oriented trend adjustment, the forecast

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quality is not higher than the time series of naïve forecasts. Therefore this forecast category
does not deliver a suitable basis for financial decisions.

4. The future-depicting forecast ($U_2 < 1; \ TOTA > 1$): This forecast time series presents
a significantly higher quality than the time series of naïve forecasts and is not dominated by
the phenomenon of topically oriented trend adjustments. The market experts recognized the
facts of future development without having been influenced too much by the market develop-
ments at the time of making the forecast. This forecast category is undoubtedly the one
best suited as the basis for decision-making.

The differentiation between vain forecast and quasi-naïve forecast is especially helpful
to assess the market experts, and to demonstrate possibilities of improvement. It is important
to know if mainly an inappropriately strong orientation at current market events at the time
of making the forecast has to be corrected, or if the model underlying the forecast does not
reflect reality. The differentiation between directional forecast and future-depicting forecast
is important regarding the usability of the forecast. If the degree of future market develop-
ments is important for the decision-making, a directional forecast is not sufficient.

This study uses Theil’s $U_2$ and the TOTA coefficient as criteria. They allow a thorough
characterization of the reviewed forecast time series within the forecast quality matrix. As
an introduction some forecast time series are graphically analyzed to simplify an intuitive
understanding of the character of forecast time series.

3. **Data**

Bates and Granger (1969) were the first to ask if through the combination of forecasts
better forecast results could be achieved. This is based on the idea that each of the existing
forecasts contains useful information on future events, and that these sets of information
could be merged by combining the forecasts. This theory initiated a lively scientific discus-
sion about the possibilities and limits of combined forecasts, which culminated in 1989 with special editions of both the Journal of Forecasting and the International Journal of Forecasting. Before the background of this pointed discussion the Consensus Economics company founded the Consensus Forecasts magazine. It has been published monthly since October 1989. In each reviewed economy local financial service companies, research institutions, and industrial companies deliver the forecast data for their countries to Consensus Economics. Forecasts are made for important economic values. The consensus forecasts are made by the unbalanced average of the included single forecasts.

This way Consensus Economics produces, among others, interest rate development forecasts. Not only the combined forecasts, but also the single forecasts of the involved companies and institutions are published. These data are the basis of this study.

Forecasts of the ten-year US-Government bond yield with a forecast horizon of 12 months are evaluated. Here all companies are examined which delivered their interest rate forecasts for at least 5 years without interruption to Consensus Forecasts. This applied to 33 companies total, among which were banks, insurance companies, and other financial services companies like U. S. Trust, Northern Trust, Merrill Lynch, Credit Swiss First Boston, J. P. Morgan, Chase Manhattan, Smith Barney, Wells Fargo, Chemical Bank, Nations Bank, Continental Bank, First Union, Fannie Mae, Metropolitan Life, and Prudential Insurance. Also included are research- and consultant institutes as well as associations like Interindustry Forecasting at the University of Maryland (Inforum), Research Seminar in Quantitative Economics at the University of Michigan (RSQE), Oxford Economic Forecasting (OEF), Wharton Econometric Forecasting Associates (WEFA), Conference Board, Standard & Poor’s, Regional Financial Association / Economy.com, Consensus Economics, Dun &

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7 Occasionally some forecast data are missing in the time series, because there was no or no timely delivery of the forecasts to Consensus Economics. The gaps were closed by later research and supplementation of the forecast data after contacting the respective forecasting companies. In some cases this was not possible because the company does not exist any more or was not willing to cooperate. Then the data gaps were closed by linear interpolation.
Bradstreet, Griggs & Santow, National Association of Homebuilders, and National Association of Manufactures. Also big industrial companies such as General Motors, Ford Motors, Daimler / Chrysler, Amoco, DuPont, and Eaton Corp. appear as market experts.

The researched period of time is October 1989 to December 2003. The 33 forecast time series contain a total of 3,662 data. The shortest examined time series is 60 months, the longest 171 months. On average each of the 33 time series provides 108 monthly data.

4. Empirical Results

At first the time series of the combined forecasts of Consensus Economics is examined (Figure 1). It is obvious that the forecast time series reflects the actual interest rate development very insufficiently. Thus the forecast for October 1994 designates a local interest rate low of 5.7%, but actually there is a local interest rate high of 7.9%. In January 1996 a local interest rate high of 7.9% is forecast, while in reality there is a local interest rate low of 5.6%. Again, in January 2000 the interest rate level is significantly underestimated. While the forecast expects a local interest rate low of 5.0%, a local interest rate high of 6.6% appears. May 2003 provides an absolute interest rate low of 3.4% whereas the forecast suggests a local interest rate high of 5.7%.

Yet, it is apparent that the forecast time series corresponds with the actual interest rate development in a certain way. The forecast time series seems to be a delayed image of the factual interest rate development; the forecast lags behind reality. This is especially recognizable when the forecast data are each shifted left for the forecast horizon (12 months), so that the forecast data are no longer attributed to their respective points of validity but to their respective points of time of emergence (Figure 2). This projection indicates that the market experts were highly influenced by the current market situation. It could be claimed that not the future, but merely the presence is “forecast”. There is obviously a topically oriented
trend adjustment for this time series. The TOTA coefficient value is 0.387 and thus confirms the topically oriented trend adjustment.

A final evaluation of the forecast time series of Consensus Economics also requires the calculation of Theil’s $U_2$, which not considers the absolute values of the forecasts and the factual interest rates. But it is examined how well the time series of the forecast value changes describe the time series of the actual value changes. Prior to this the absolute values are transformed into their natural logarithms. Finally the first differences of the time series are made. This transformed database provides an $U_2$-value of 1.459. A strict orientation at the naïve forecast would have led to better (but still not good!) forecast results.

The forecast time series must be categorized within the forecast quality matrix as a quasi-naïve forecast. It is therefore definitely an unsuitable support of finance decisions.

To show that the characteristics of the forecast time series of Consensus Economics is not a special case some further examples are presented as charts. The forecast time series of Core States / First Union (Figures 3 and 4), Standard & Poor’s (Figures 5 and 6), Eaton Corp. (Figures 7 and 8), as well as U. S. Trust (Figures 9 and 10) show the same obvious shortcomings. For these and all other examined forecast times series a TOTA coefficient $< 1$ is calculated (Table 2). Thus all 33 cases reflect a significant topically oriented trend adjustment.

Theil’s $U_2 > 1$ is the result to be found for all 33 forecast time series (Table 2); not one of the reviewed cases achieved to only roughly forecast the future interest rate development. In all 33 cases a consistent orientation at the naïve forecast would thus have led to better (albeit not good!) forecast results.$^8$

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$^8$ All in all the data transformation (evaluation of the first differences of the change rates of the natural logarithms of the absolute values) hardly influences the $U_2$-results. If Theil’s $U_2$ is calculated on the basis of non-transformed absolute values, 28 of the 33 forecast time series again show results of $U_2 > 1$. For the other five cases $U_2$ lies minimally below threshold value 1.
Figure 1
Ten-year US-Government bond yield (bold line) and respective forecasts of Consensus Economics (thin line)
The figure shows that most of the forecasts predicted the actual interest rate development completely incorrectly. The figure presents monthly data and covers the period from October 1990 to December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.

Figure 2
Ten-year US-Government bond yield (bold line) and forecasts shifted to the left by 12 months from Consensus Economics (thin line)
The figure shows that the forecasts – depicted here at their times of origin – were strongly influenced by the then actual market situation. The figure presents monthly data and covers the period from October 1989 to December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.
Figure 3

Ten-year US-Government bond yield (bold line) and respective forecasts of Core States / First Union (thin line)
The figure shows that most of the forecasts predicted the actual interest rate development completely incor-
rectly. The figure presents monthly data and covers the period from October 1990 to December 2003. The
forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.

Figure 4

Ten-year US-Government bond yield (bold line) and forecasts shifted to the left by 12 months from Core
States / First Union (thin line)
The figure shows that the forecasts – depicted here at their times of origin – were strongly influenced by the
then actual market situation. The figure presents monthly data and covers the period from October 1989 to
December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the
data bank Data Stream.
The figure shows that most of the forecasts predicted the actual interest rate development completely incorrectly. The figure presents monthly data and covers the period from July 1991 to December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.

The figure shows that the forecasts – depicted here at their times of origin – were strongly influenced by the then actual market situation. The figure presents monthly data and covers the period from July 1990 to December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.
Figure 7
Ten-year US-Government bond yield (bold line) and respective forecasts of Eaton Corp. (thin line)
The figure shows that most of the forecasts predicted the actual interest rate development completely incor-
crectly. The figure presents monthly data and covers the period from November 1992 to December 2003. The
forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.

Figure 8
Ten-year US-Government bond yield (bold line) and forecasts shifted to the left by 12 months from
Eaton Corp. (thin line)
The figure shows that the forecasts – depicted here at their times of origin – were strongly influenced by the
then actual market situation. The figure presents monthly data and covers the period from November 1991 to
December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the
data bank Data Stream.
Figure 9

Ten-year US-Government bond yield (bold line) and respective forecasts of U. S. Trust (thin line)
The figure shows that most of the forecasts predicted the actual interest rate development completely incorrectly. The figure presents monthly data and covers the period from October 1994 to December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.

Figure 10

Ten-year US-Government bond yield (bold line) and forecasts shifted to the left by 12 months from U. S. Trust (thin line)
The figure shows that the forecasts – depicted here at their times of origin – were strongly influenced by the then actual market situation. The figure presents monthly data and covers the period from October 1993 to December 2003. The forecast data stem from Consensus Forecasts magazine, the comparison data from the data bank Data Stream.
### Table 2

**Accuracy of the 10-year US-Government bond yield forecasts**

The evaluation considers forecast time series which were published monthly in the Consensus Forecasts magazine between October 1989 and December 2003 by 33 banks, insurance companies, other financial services companies, research- and consultant institutes, associations and industrial companies. The forecasts provide a forecast horizon of 12 months. All forecast time series which had at least a duration of 60 months were examined. Evaluation measures were Theil’s $U_2$, TOTA coefficient and the forecast quality matrix. The calculation of Theil’s $U_2$ requires the examination of the forecast and actual change rates of the natural logarithms of the absolute values and finally the generation of the first differences. Theil’s $U_2 > 1$ indicates forecast results which are even worse than the respective time series of naïve forecasts. The calculation of TOTA coefficients is based on the absolute values of forecasts and actual interest rate developments. Results $< 1$ show a strong relation to the actual present interest rates and, simultaneously, a weak relation to the actual interest rates of the forecast future. The classification of the forecast time series into the forecast quality matrix is based on the results of Theil’s $U_2$ and the TOTA coefficient. Forecast efforts that are identified as quasi-naïve must be considered as total failures.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Forecasting period</th>
<th>months</th>
<th>Theil’s $U_2$</th>
<th>TOTA original forecast time series</th>
<th>Status in Forecast Quality Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core States / First Union</td>
<td>Oct. 1989 – Dec. 2003</td>
<td>171</td>
<td>1.444</td>
<td>0.334</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Standard &amp; Poor’s</td>
<td>July 1990 – Dec. 2003</td>
<td>162</td>
<td>1.844</td>
<td>0.231</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Wells Fargo</td>
<td>Mar. 1993 – Dec. 2003</td>
<td>130</td>
<td>1.441</td>
<td>0.126</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Griggs &amp; Santow</td>
<td>Nov. 1989 – July 2000</td>
<td>129</td>
<td>1.384</td>
<td>0.236</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>General Motors</td>
<td>Jan. 1994 – Dec. 2003</td>
<td>120</td>
<td>1.933</td>
<td>0.156</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>WEFA Group</td>
<td>July 1991 – June 2000</td>
<td>108</td>
<td>3.783</td>
<td>0.061</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Chase Manhattan</td>
<td>Oct. 1989 – Mar. 1997</td>
<td>90</td>
<td>1.190</td>
<td>0.069</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Metropolitan Life</td>
<td>Oct. 1989 – Sep. 1996</td>
<td>84</td>
<td>1.134</td>
<td>0.001</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Amoco Corp.</td>
<td>Oct. 1989 – June 1996</td>
<td>81</td>
<td>1.204</td>
<td>0.051</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Chemical Bank</td>
<td>Nov. 1989 – Jan. 1996</td>
<td>75</td>
<td>2.250</td>
<td>0.001</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Credit Swiss First Boston</td>
<td>Oct. 1989 – July 1995</td>
<td>70</td>
<td>1.647</td>
<td>0.012</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Inforum - Univ. of Maryld.</td>
<td>Apr. 1998 – Dec. 2003</td>
<td>69</td>
<td>2.159</td>
<td>0.011</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Dun &amp; Bradstreet</td>
<td>Apr. 1991 – July 1996</td>
<td>64</td>
<td>1.180</td>
<td>0.186</td>
<td>quasi-naïve</td>
</tr>
<tr>
<td>Nations Bank</td>
<td>Aug. 1993 – Aug. 1998</td>
<td>61</td>
<td>1.555</td>
<td>0.001</td>
<td>quasi-naïve</td>
</tr>
</tbody>
</table>
The findings are shocking, as the quality of naïve forecasts can be achieved even by those “experts” who have absolutely no knowledge of interest rate processes.

The question arises how it can be possible that, while all market experts, when doing their forecasts, are strongly oriented at the actual market situation, not one of them managed to achieve an $U_2$-value of just below 1 – even if this was merely accidental. A look at the graphic presentation of the data clarifies this (Figures 2, 4, 6, 8, 10).

The bad results can probably be put down to the fact that all relevant market developments are mirrored in the forecasts with a delay of one to three months. To put it more
pointedly: The examined institutions did not forecast the future. They have not even been able to “forecast” the presence, which would have led to \( U_2 \)-values of around 1. In fact they merely re-established in their forecasts the interest rate development of the prior one to three months – they “forecast” the past.

If the results of TOTA coefficient and Theil’s \( U_2 \) are examined together, all 33 reviewed interest rate forecast time series fall into the category of quasi-naïve forecasts in the forecast quality matrix (Table 2, Figure 11). Without exception the forecast efforts must be considered as utterly failed. The forecasts were unsuitable as the basis of financial decision-making.

5. Examination Results and Conclusion

It must be concluded that the evaluation of 33 interest rate forecast time series (with a duration of 60 to 171 months between October 1989 and December 2003) does not indicate that one or more of the reviewed market experts were able to generate interest rate forecasts which could be considered as a reliable basis for decision-making.

This examination result is especially serious for two reasons:

1. Sources for the review were banks, insurance companies, other financial services companies, research- and consulting institutes, associations, and industrial companies: a cross-section through the US-American forecast landscape. The fact that not a single one of the reviewed institutions could achieve satisfying forecast results nourishes the suspicion that the presented outcome is characteristic for the whole guild of interest rate forecasters.

2. The examined forecast data on average cover a period of nine years, some even more than fourteen years. Therefore it can be excluded that the bad forecast results might be the consequence of an “adverse” period of time.
The practical consequences arising from the unsatisfying quality of the interest rate forecasts are extensive:

In the face of the weaknesses regarding the forecast of the market-determining 10-year US-Government bond yields a reliable forecast of the future interest rate development seems, on the whole, not to be guaranteed. Therefore, it is not possible to master the risk of changing interest rates when dealing with maturity transformation solely with the help of interest rate forecasts. A critical inspection into the maturity transformation volume as well as a consistent use of the known procedures of risk evaluation and –limitation appears to be urgently recommended before the background of this study results.

Without the necessary reliability of interest rate forecasts, active investment strategies in the bond market can not lead to the desired success, namely the achievement of systematic surplus yields. As active investment strategies are also relatively expensive, a stringent orientation to passive investment strategies should be pursued.

Before the background of the low reliability of interest rate forecasts established here also other financial market forecasts should be critically examined on their accuracy, because fundamental stock market- and exchange rate forecasts normally rely on assumptions on the future interest rate development. All research results should be subject to a thorough, systematical controlling to avoid false assumptions regarding one’s own forecast competence.

Finally, industrial companies should not depend their timing of real investments on expected changes of the cost of finance.

The findings of the present study may lead to further interesting areas of research: What is the reason of the timid behavior of financial analysts? Why do they so strongly align their forecasts to present interest rate levels, although for years this has only led to drastic failure?
Do anchoring-heuristics or possible rational herd behavior of financial analysts play a role here?

References

Albrecht, Thomas, 2000, Zur Eignung professioneller Zinsprognosen als Entscheidungsgrundlage, Diskussionsbeiträge der Sonderforschungsgruppe Institutionenanalyse (sofia), No. 00-7, Darmstadt.


Appendix A

Data transformation for using Theil’s $U_2$:

\[ \hat{x}_t = \left[ \ln (f_t) - \ln (i_{t+12}) \right] - \left[ \ln (f_{t+1}) - \ln (i_{t+13}) \right] \]

\[ x_t = \left[ \ln (i_t) - \ln (i_{t+12}) \right] - \left[ \ln (i_{t+1}) - \ln (i_{t+13}) \right] \]

with

$\hat{x}_t$ : present forecast at point of time $t$ (transformed)

$x_t$ : occurred interest rate at point of time $t$ (transformed)

$f_t$ : present forecast at point of time $t$ (absolute value)

$i_t$ : occurred interest rate at point of time $t$ (absolute value)

$z_t = \ln (f_t)$

$y_t = \ln (i_t)$

$w_t = z_t - y_{t+12}$

$v_t = y_t - y_{t+12}$

$\hat{w}_t = w_t - w_{t+1}$

$x_t = v_t - v_{t+1}$