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David Navrátil and Viktor Kotlán [*]

Abstract

This paper asks to what extent the market prices in the future monetary policy decisions of the Czech National Bank (CNB), how this policy predictability has evolved over time, and whether the change in the central bank's forecasting methodology in mid-2002 had any impact. Using a sample up to mid-2004, the results are threefold.

First, three-quarters of the CNB's decisions were in line with medium-term money market expectations. Notwithstanding this relatively high predictability of CNB policy, the average mistake in the expectations was biased upwards: over the entire IT period the market has priced in a higher repo rate than has actually turned out to be the case.

Second, our analysis shows that the period in which forecasts with an active monetary policy (unconditional forecasts) have been used is characterized by smaller "surprises" of the money market. On the one hand, this may be connected with a change in the CNB's communication of the forecast, including releases of verbal comments on the interest rate trajectory that is consistent with the outlook. On the other hand, it may reflect a different economic environment in the second stage of IT in the Czech Republic.

Third, we analyze whether there is convergence or divergence between the central bank's forecast-consistent interest rate trajectory and market forward rates. We show that in most cases market rates converged toward the CNB's interest rate trajectory after the publication of the forecast.

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1. Introduction

Since 1998, when the Czech National Bank (CNB) switched to inflation targeting, the inflation forecast has been the main tool for its decision-making. Prior to July 2002, the CNB was using and publishing a forecast conditioned on the assumption of unchanged short-term interest rates (and consequently long-term interest rates) – the "conditional forecast" or "constant-interest-rate forecast". This forecast showed what would probably happen in the economy if the CNB did not react to the expected deviations of inflation from its target.

With consolidation of the internal forecasting and policy analysis system (see Coats et al., 2003), the CNB decided to move to a different forecasting methodology. Since July 2002 the CNB has been using and publishing an unconditional forecast or "forecast with an active monetary policy",[1] which includes endogenous monetary policy depicted by a simple forward-looking monetary policy rule consistent with the CNB's goals.[2] Hereafter we will call the period connected with the constant interest rate forecast as the conditional forecast period (January 1998 – June 2002) and the period connected with the new methodology, i.e. forecast with an active monetary policy, as the unconditional forecast period (July 2002 – June 2004).

In this paper we analyze to what extent the market was pricing in future CNB decisions. In other words, we ask to what extent were the decisions anticipated by market participants. In section two, we conduct an analysis of the whole IT time span. Later, in section three, we focus in more detail on the unconditional forecast period. The last section of the paper concludes with some policy deliberations.

Our results show that during the unconditional forecast period, the market has been able to price in expected CNB decisions with greater precision than before. At the same time, there is, however, no clear evidence on to what extent (the CNB's comments on) the forecast-consistent interest rate trajectory influences money market expectations about future interest rate movements.

2. Predictability of Monetary Policy

Monetary policy is predictable if economic agents generally expect the monetary policy decisions taken by the central bank.[3] This holds particularly in the case where agents understand how the decisions on policy rates are reached and are consequently able to predict the sign and size of the interest rate change. The central bank contributes to this understanding by having explicit goals

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[1] See the CNB's July 2002 Inflation Report for a more detailed explanation of this change and Woodford (2003), Archer (2003) or Skořepa and Kotlán (2003) for an in-depth discussion of constant interest rate forecasts (conditional forecasts) versus forecasts with an active monetary policy (unconditional forecasts).

[2] See the CNB's October 2003 Inflation Report for a description of the monetary policy rule used in the CNB's Quarterly Projection Model (QPM). See also Navrátil (2004) for some estimates of the CNB's monetary policy rule.

[3] In the tests that follow, we examine the market reaction one day and three days after the decision. This effectively means that we regard the communication surrounding the decision (press conference, statements) as part of the decision.

(e.g. inflation targets), by explaining its decision-making (e.g. during press conferences or minutes) and by informing the public about the data set for the decision (e.g. the forecast).

2.1 Beyond the Expectations Hypothesis

Central banks can effectively control only one asset price. This is usually some short-term interest rate – from the overnight rate (Fed) to the two-week repo rate (CNB, ECB). Longer-term interest rates are then determined by the market following an arbitrage-based expectations hypothesis of the term structure of interest rates. In short, long rates are a function of current and expected future short rates and possibly some term premium.

For example, the one-year interest rate ($IR12M_t$) is determined from the current two-week repo rate ($repo_t$) and from expected future two-week repo rates. Disregarding the term premium, we can write down the corresponding "term structure equation" in the following form (1) (where we assume that one year has 52 weeks).

$$IR12M_t = \frac{1}{26} \cdot \sum_{i=0}^{26} repo_{t+i}^e \tag{1}$$

If the money market fully comprehends the central bank's decision-making process, then the change in the repo rate will be expected and will be priced into market interest rates with maturities longer than 2W. These market rates should thus not change immediately after the Bank Board decision. On the other hand, if the central bank changes the interest rate unexpectedly, and the decision is thus not fully "priced in", then this unexpected development will be followed by a change in market rates.

We use an illustrative indicator based on Bernhardsen and Kloster (2002), which we further develop. The idea behind it is rather simple: the Bank Board holds meetings and makes decisions about interest rates every month. The one-month money market rate (1M PRIBOR) is thus a good indicator of expectations about the *current* Bank Board decision. Longer-term interest rates also embody expectations about *future* Bank Board decisions. The difference in market rates (1M PRIBOR) between the day after and the day before the Bank Board meeting implies to what extent the policy decision was (un)expected. If the decision was fully in accordance with expectations, then the difference is zero. If the difference is non-zero, it means that the decision was to some extent unexpected.

This approach is similar to the one taken by Podpiera (2000). His focus, however, lies in testing the efficiency of the Czech financial market (with a negative conclusion). Interest rate responses several days before and after repo rate changes are thus analyzed separately.

Matoušek (2001) also examines the reaction of interest rates to the change in the CNB's policy rate. His focus is, however, different from ours. In his view, no reaction of short-term interest rates to a repo rate change implies transparent policy, and no change in long-term interest rates can be understood as highly credible policy. Comparing the market reaction to the repo rate changes prior to the introduction of IT to the IT period, he concludes that IT added to policy transparency.

2.2 The CNB's Behavior

As a warm-up for our analysis we start this section with a brief description of the frequency and direction of monetary policy decisions. Table 1 shows some statistics on the CNB's monetary policy meetings and the decisions taken. The CNB holds regular monthly meetings on monetary policy. Besides these, a number of irregular meetings were held during the earlier period.

Table 1: Number of monetary policy meetings, repo rate changes and changes in direction

	Whole period	Conditional forecast period	Unconditional forecast period
Number of meetings	87	63	24
- irregular	12	12	0
Repo rate changes	31	25	6
Changes in direction	4	3	1

Note: "Changes in direction" show how many times the CNB changed the direction of the interest rate changes from tightening to easing and vice versa

Figure 1 introduces some dynamics by exposing the 2W repo rate changes over the entire IT period. Apart from three 0.25 p.p. hikes, the whole period is characterized by decreasing interest rates in line with the disinflation process.

Figure 1: The 2W repo rate (right-hand scale, in %) and its changes after the Bank Board meeting (left-hand scale, in p.p.)
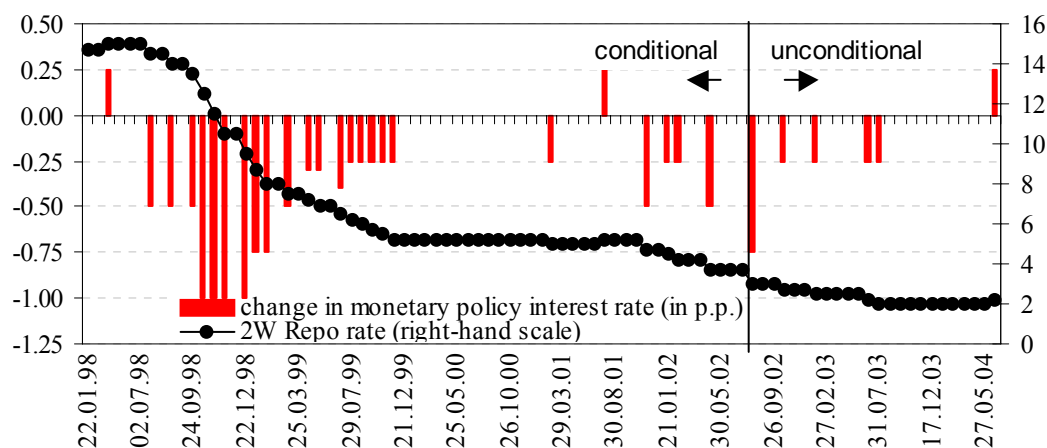
Figure 2 presents a histogram of the repo rate changes. The interest rate cuts were not restricted to gradual movements (meaning 0.25 p.p. changes), but were also carried out in larger steps. However, the more aggressive cuts took place almost exclusively in the conditional forecast period.

This brief description shows that the unconditional forecast is connected with "smoother" monetary policy, in the sense that there were no irregular meetings and the repo rate changes were more gradual. It is, however, unclear to what extent this increased "smoothness" can be attributed

to the end of the disinflation period and fewer external shocks and to what extent the change in the forecasting methodology played a role.[4]

Figure 2: Histogram of the size of the repo rate changes
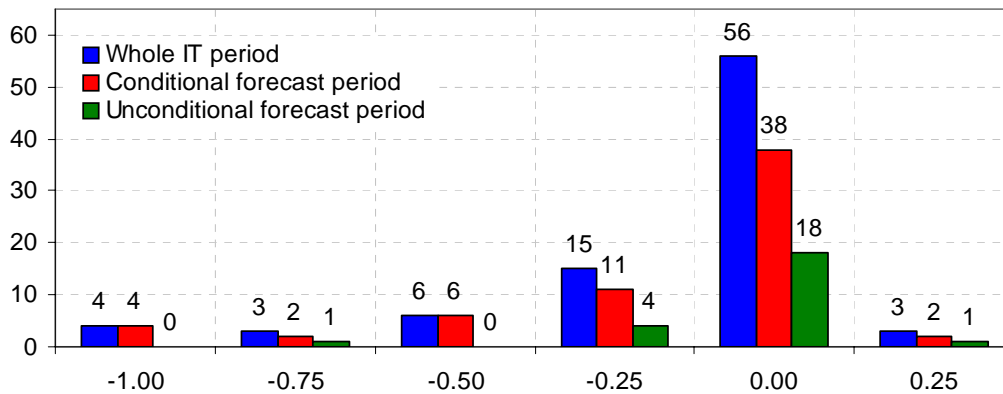
2.3 Measuring Predictability

Coming back to the methodology of Bernhardsen and Kloster (2002) outlined above, in Figure 3 we plot the difference in interest rates (2W repo rate and 1M PRIBOR) between the day after and the day before the Bank Board meeting. Since decisions to leave rates unchanged are just as important as decisions to change rates, we analyze both.[5] The change in the 1M PRIBOR measures the degree of surprise. A positive value, e.g. +0.25 p.p., means that the money market expected an interest rate 0.25 p.p. lower than was realized. In August 1998, for example, the money market expected the CNB to lower the rate by approximately 0.25 p.p., but in fact the CNB lowered it by 0.50 p.p., therefore the surprise was approximately -0.25 p.p. In December 2002, the CNB decided to keep the interest rate unchanged. However, part of the market expected it to fall. On the other hand, in October 2002, the CNB lowered the interest rate by 0.25 p.p., which (as Figure 3 shows) was completely in accord with money market expectations.

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[4] For an evaluation of the CNB's IT policy in a historical context, see Coats et al. (2003) or Kotlán and Navrátil (2003).

[5] It could be argued that for the financial markets decisions to change the repo rate are more important. The reason is that market intermediaries live from changes in asset prices triggered by interest rate moves. For the economy, on the contrary, it is the level of the interest rate that matters for inter-temporal decision making. To check for robustness we examined only a subsample of the decisions to change the repo rate. There was no major impact on our conclusions below.

Figure 3: The 2W repo rate and 1M PRIBOR – difference between the day after and the day before the Bank Board meeting (in p.p.)
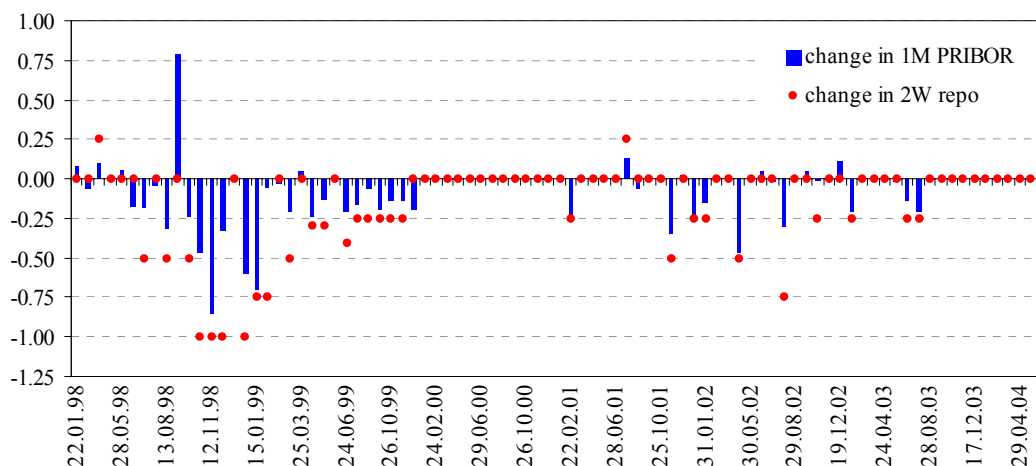
Apart from looking at the reaction of short rates, we also examine the extent to which the decision is "priced in" in longer rates (12M PRIBOR). One reason to do this is that longer-term interest rates influence output and subsequently inflation. Therefore, the ability to influence long-term interest rates determines whether the CNB is successful in stabilizing the economy and fulfilling its targets. Another reason is that while longer-term interest rates carry only very vague information on the timing of policy moves, they do matter for the expected direction of policy moves. Figure 4 shows the difference in the 12M PRIBOR (and repo rate) between the day after and the day before the Bank Board meeting. The numerical interpretation is discussed in table 3 below.

Figure 4: The 2W repo rate and 12M PRIBOR – difference between the day after and the day before the Bank Board meeting (in p.p.)
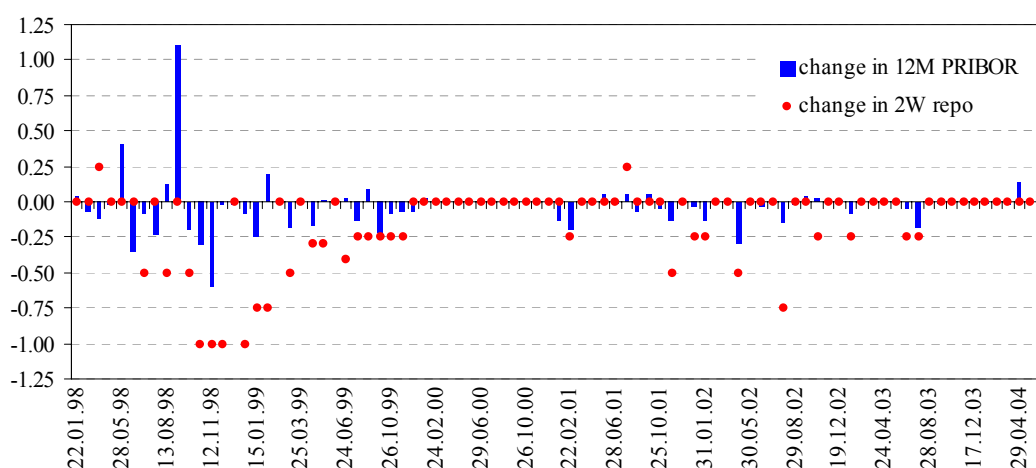
The impact on short and long-term rates may also be a good indicator of the perception of monetary policy transparency. This is the type of analysis table 2 attempts to present. It shows a matrix of all the possible combinations which can occur after the Bank Board meeting. If the

decision was expected and it did not change the money market outlook, the 1M and 12 PRIBOR did not change[6] (first quadrant). But if the decision was expected and long-term interest rates changed at the same time, it could mean that communication changed the outlook regarding the future assumed repo rate development (second quadrant).

Table 2: Matrix of reactions after the Bank Board meeting

	no change in 12M PRIBOR	change in 12M PRIBOR
no change in 1M PRIBOR	decision was expected and outlook was not changed	decision was expected and outlook was changed
change in 1M PRIBOR	decision was not expected and outlook was not changed	decision was not expected and outlook was changed

The two other combinations relate to situations where the 1M PRIBOR changed, i.e. the market was surprised by the decision taken. If a change in 1M PRIBOR met with no change in the 12M PRIBOR, it could indicate that (i) the repo rate change was not credible, or (ii) the change was in accord with the money market's longer-term expectations, but the timing was different (third quadrant). On the other hand, if an unexpected decision (a change in the 1M PRIBOR) was accompanied by a change in the 12M PRIBOR, this could mean that this unexpected change was credible and, together with communication, influenced the money market's repo rate outlook (fourth quadrant).

It is possible to illustrate all the combinations mentioned in Table 2 with examples from the history of IT in the Czech Republic. The first quadrant corresponds to the October 2002 meeting, where it was decided to cut the repo rate by 0.25 p.p., which was fully in accord with short-term and long-term expectations. The decision to cut the repo rate by 0.75 p.p. at the January 1999 meeting was expected, but the 12M PRIBOR increased at the same time. The money market began to expect a monetary policy tightening in the future. This expectation may have been influenced by a highlighting of the pro-inflationary risks by the Bank Board at the press conference. The meeting in January 2003 represents the third quadrant. The money market did not expect the repo rate cut (0.25 p.p.) this month. However, the no change in the 12M PRIBOR indicates either that a monetary policy easing was expected in the coming months or that the repo rate cut was not perceived as credible. An illustration of impacts on both short and longer rates (fourth quadrant) is given by the July 2003 interest rate cut of 0.25 p.p.

Table 3 summarizes the number of combinations in each quadrant. It implies that the majority of the decisions (76%) were in accord with longer-term money market expectations about the future development of the repo rate (no change in the 12M PRIBOR). This means that the market anticipated the direction of policy quite well. And in most cases the money market also predicted the timing well (also no change in the 1M PRIBOR). The CNB's policy thus seems predictable from this point of view.

This indicator is based on the difference between rates the day after and the day before the Bank Board meeting. This short "window" (two days) minimizes the impact of other factors

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[6] In the empirical part later in the text, "no change" refers to a 0–0.1 p.p. movement in interest rates.

determining interest rates apart from the Bank Board meeting (e.g. foreign developments, release of new data). This is an advantage. On the other hand, market interest rates can take several days to adjust to the Bank Board decision. Podpiera (2000) estimates that it takes four days for the financial market to adjust fully to the change in the repo rate. Therefore, to check for robustness we also present the combinations based on the difference three days after and one day before the Bank Board meeting. The results for the four-day window are presented in parentheses in table 3. They do not differ substantially.

Table 3: Number of combinations for each quadrant

	no change in 12M PRIBOR	change in 12M PRIBOR
no change in 1M PRIBOR	51 (49)	5 (7)
change in 1M PRIBOR	15 (11)	16 (20)

Notwithstanding the high "predictability" of the direction of CNB policy, it is interesting to note from table 3 that at the times the rate move was unexpected (31, or 27, out of 87), the market was primarily surprised on the downside, regardless of the "window" we look at. The market systematically expected a higher interest rate than the Bank Board actually set. The reason may be that the money market is more backward-looking than the CNB. If the central bank is more forward-looking than other agents in the economy, then – in disinflations – it will lower interest rates more rapidly than is generally expected. Nevertheless, by graphical inspection we can guess that the degree of surprise has decreased over time. The improvement in the predictability of the CNB's policy is also accompanied by smaller changes in the 12M PRIBOR as the money market learned about the CNB's decision pattern. This hypothesis is among the issues we investigate in the next section, which focuses on the unconditional forecast period.

3. The Unconditional Forecast Period

3.1 Publication of the Unconditional Forecast

In the inflation targeting regime, the central bank publishes the inflation forecast as its main tool in the decision-making process. To make the forecast credible and transparent, its key properties and assumptions should also be published. In the case of the unconditional forecast, this translates to publishing the interest rate trajectory generated by some policy rule embedded in the forecasting toolbox. This trajectory is neither an assumption nor a product of the forecast – in a simultaneous setting, it is simply the trajectory that is "consistent" with the forecast.

Communicating the interest rate trajectory consistent with the given forecast is, however, a tricky task for central bankers. This is because the interest rate path could be interpreted by less sophisticated market participants as a commitment of the central bank regarding future interest rate decisions (see the references under footnote 1 for more discussion of the issue).

So, how do the IT central banks go about this issue? New Zealand and Canada both produce an unconditional forecast but differ markedly in how they communicate the interest rate trajectory.

On the one hand, Canada does not comment on this trajectory in any way; on the other hand, New Zealand publishes explicit figures for each forecast quarter.[7] The CNB is somewhere in between these two extreme cases. Since the launch of the new forecasting methodology in July 2002, it has elected to comment verbally on the forecast-consistent interest rate trajectory. The comments are first released at a press conference following the Bank Board meeting, then a week later in the Inflation Report and twelve days after the meeting in the Minutes of the Bank Board meeting.

At the same time, the CNB carefully explains that the "…implied trajectory cannot be viewed as binding as regards the future path of interest rates. The arrival of new information following publication of the forecast can change the outlook for the evolution of the economy and the related consistent reaction of the central bank. The second reason is the fact that no simple, model reaction function can entirely precisely express the detailed monetary-policy debate that precedes the decision on the interest rate setting." (see the CNB's October 2003 Inflation Report, p. 30). Moreover, as central banks' forecasting models are usually quarterly models, the forecast-consistent interest rate path is expressed in terms of three-month rates. Needless to say, these can at times differ considerably from policy rates.

3.2 The Unconditional Forecast and Money Market Behavior

In this part we focus in more detail on the predictability of the CNB's behavior during the unconditional forecast period. We aim to provide a preliminary exploration of whether the move to the unconditional forecasting methodology, and in particular the publication of the comments on the interest rate trajectory that is consistent with this unconditional forecast, changed the predictability of the CNB's behavior. Figure 5 "zooms in" on the data presented in figure 3 for the unconditional period and adds the 12M PRIBOR series (the difference in the 12M PRIBOR between the day after and the day before the Bank Board meeting).

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[7] The published interest rate trajectory that is consistent with the forecast is not entirely model based, because the MPC "…examines the projection, calling for judgmental adjustments to the projection and occasionally to the underlying model and policy reaction function structure as required in order to generate simultaneously a plausible projection and a 'sensible' policy path." (Archer, 2003, p. 13).

Figure 5: The unconditional forecast period: The 2W repo rate, 1M PRIBOR and 12M PRIBOR – difference between the day after and the day before the Bank Board meeting (in p.p.)
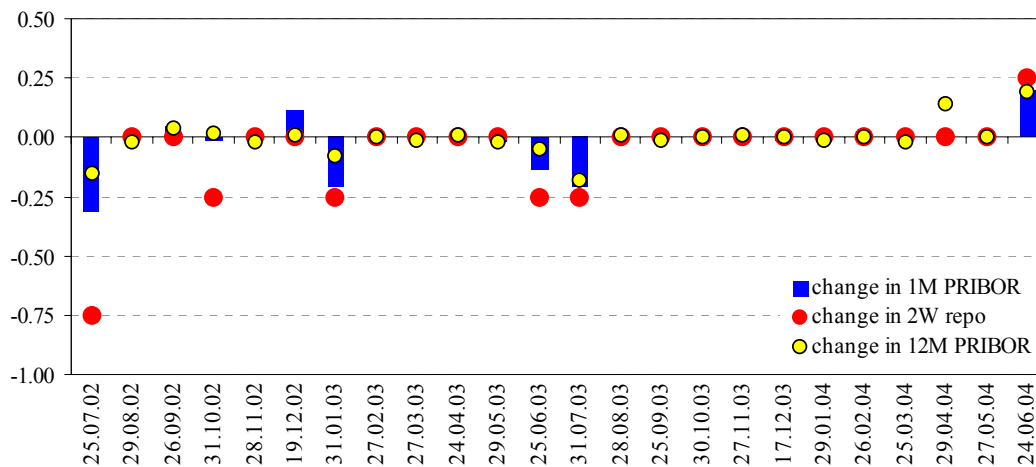

Table 4 shows the mean and variance of the "surprises" (changes in the 1M and 12M PRIBOR) for the whole sample and two subsamples: the conditional forecast period and the unconditional forecast period. Only results for the two-day window are presented. After the bank started to publish the unconditional forecast, including its comments on the forecast-consistent interest rate trajectory, the mean and variance were reduced to approximately one-quarter. This change in statistical properties could imply that the "surprises" have been reduced in this period. It is, however, not possible to make a strong statement in a statistical sense on the link between fewer surprises and the publication of the interest rate trajectory, since the time series available are not long enough.

Table 4: Mean and variance of the change in the 1M PRIBOR and 12M PRIBOR

1M PRIBOR	Mean	Variance
Whole inflation targeting period	-0.075	0.039
Conditional forecast period	-0.096	0.049
Unconditional forecast period	-0.022	0.011
12M PRIBOR		
Whole inflation targeting period	-0.029	0.030
Conditional forecast period	-0.038	0.040
Unconditional forecast period	-0.006	0.005

3.3 Does the forecast-consistent interest rate trajectory anchor the expectations of the market?

The final exercise we conduct focuses on possible co-movement of the interest rate trajectory that is consistent with the bank's forecast and that expected by the market. Specifically, we examine whether, after the publication of the bank's forecast, there is convergence or divergence of the two interest rate trajectories.[8]

Our prior expectation is that if the money market correctly understands the verbal comments on the forecast-consistent trajectory and its outlook corresponds to the CNB inflation forecast, the market yield curve should converge to that consistent with the CNB's forecast. At the short end the reason is clear – it is the CNB that controls rates. At the long end, the reason for convergence should be based more on the credibility of the central bank's policy and forecasting tools.[9] There are, however, two other issues. The first is the ownership of the forecast. If the forecast is produced mainly by the bank's staff, the Board may rely on it in its decision-making process with varying intensity, not only across individual board members, but also over time. If the majority of the Board members do not identify with the forecast, there is no use in comparing the interest rate trajectories (see Figure 6).

Figure 6: The Board's attitude to the forecast and the arrival of new information
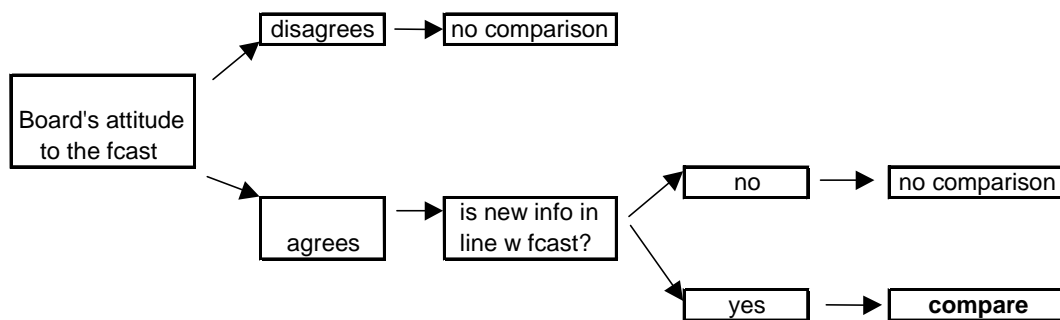
Another issue is the validity of the forecast over time. Needless to say, new information may change our perception of the economy and hence make the forecast obsolete. It would then make no sense to compare the interest rate trajectory of the old forecast with the trajectory envisaged by the markets, as the latter already takes into account any possible "revisions" of the economic outlook based on the new info. However, if the new information is in line with the old forecast, then the forecast does not become obsolete and the comparison makes sense (again see Figure 6). Controlling for these two issues in the comparison is a labor-intensive exercise, since it requires careful reading of the corresponding Inflation Reports and Minutes. We have undertaken this effort and present a detailed discussion of the individual quarters in the appendix.

For the analysis we use the 3M PRIBOR and FRA rates (3x6, 6x9 and 9x12) and construct differentials between these rates and the relevant interest rates from the forecasts. The results are

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[8] This analysis was first conducted in the Czech setting by Kateřina Arnoštová and David Vávra.

[9] Given that the central bank in general puts far more resources into producing its forecast than do market participants, its quality (at least perceived) should be better.
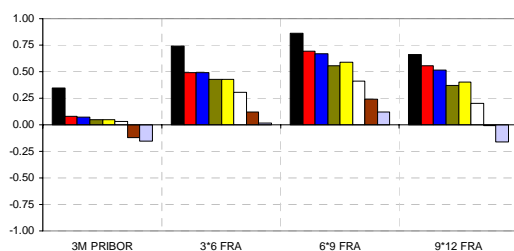
depicted in Figure 7. A positive differential means that the money market expected a higher interest rate. Furthermore, we study how these differentials change over time: the day before and the day after the Bank Board meeting, the Inflation Report release, the Minutes releases and the Bank Board meetings in the interim periods before the new forecast is produced.

Figure 7: Differences between the implied forecast-consistent interest rates and market interest rates (3M PRIBOR and FRAs)
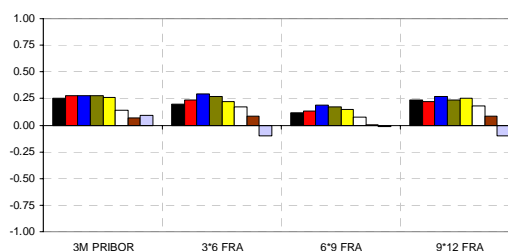
Key

- ■ 1 day before the forecast announcement
- ■ Inflation Report release
- ■ 1nd "Small" Report
- ■ 2nd "Small" Report
- ■ 1 day after the forecast announcement
- ■ Minutes release ("Big" Report)
- □ Minutes release (1nd "Small" Report)
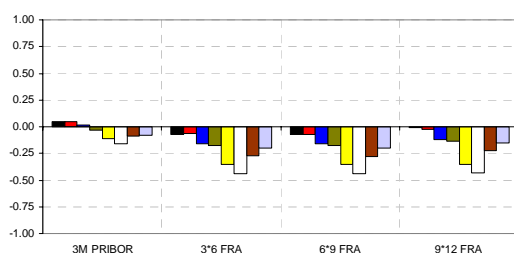- □ Minutes release (2nd "Small" Report)
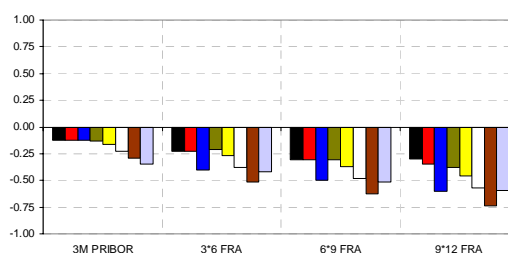
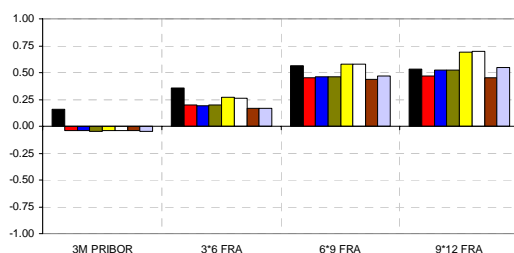**3Q2002 (July forecast)**   **4Q2002 (October forecast)**
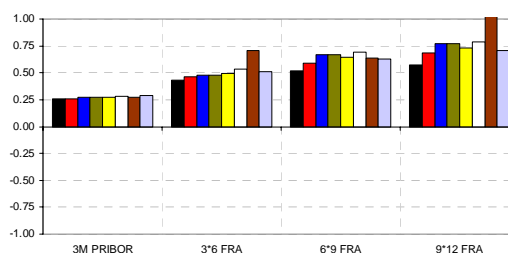

1Q2003 (January forecast)   **2Q2003 (April forecast)**
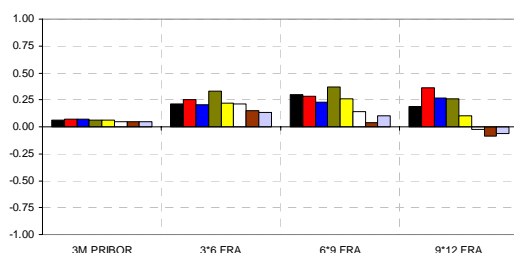

3Q2003 (July forecast)   **4Q2003 (October forecast)**

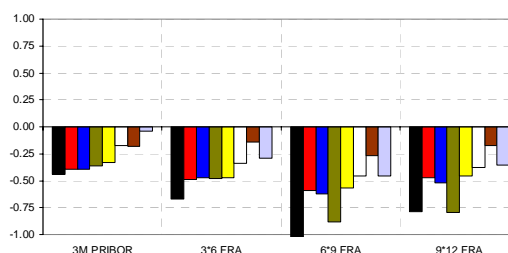**1Q2004 (January forecast)**   **2Q2004 (April forecast)**

Figure 7 shows that money market interest rates have converged in five cases out of eight (2002Q3, 2002Q4, with an initial divergence tendency in 2003Q1, in 2004Q1 and 2004Q2). The result is positive, albeit very preliminary: the sample is too small for any conclusion backed by statistically significant results.

4. Results

The aim of this paper was to analyze the market's perception of the Czech National Bank's interest rate changes. Special emphasis was put on the way in which the move to an unconditional forecasting methodology, including the publication of the forecast-consistent interest rate trajectory, might have influenced this perception. We have analyzed data up to the second quarter of 2004.

The results of the analysis point to several conclusions. First, almost three-quarters of CNB's decisions were in line with longer-term money market expectations. The CNB's policy can thus be considered as predictable over this medium-term horizon. The average mistake in the expectations was biased upwards: over the entire inflation targeting period the repo rate has been expected to be higher than has actually turned out to be the case. We argue that this result might be explained by the central bank's more forward-looking nature, which causes systematic undervaluation of the policy easing expected by the markets in disinflations.

Second, our analysis shows that the period of the unconditional forecasting methodology is characterized by smaller "surprises" of the money market. The predictability thus tends to improve over time. It is plausible that the communication of the forecast-consistent interest rate trajectory might have contributed to this.

Last but not least, we analyze whether the subsequent communication after the publication of the forecast has led to a closing of the gap between the CNB's interest rate forecast and the market's expectations. The result is that in most cases market rates converged toward the CNB's interest rate trajectory. As in the previous case, it is, however, too early to conclude this issue with statistically significant results.

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Appendix

In July 2002, the money market expected the interest rate to be reduced by approximately by 0.50 p.p., the forecast implied -0.75 p.p. (in 2002Q3) and the Bank Board cut the repo rate by 0.75 p.p. Thus, the monetary policy easing was expected, but the money market undervalued this easing. This undervaluing may have been caused by (i) the relatively high magnitude of the easing, which had been seen only twice before (see Figure 2); and (ii) the July irregular meeting (July 11), where the Bank Board had decided to intervene in the foreign exchange market and not to change the repo rate (four votes for keeping rates unchanged, one for a 0.5 p.p. cut). The publication of the Inflation Report did not have an impact on the FRAs itself; there was a bigger reaction after the releases of the Minutes (July, August and September) and the September meeting. The main signal about a potential additional monetary policy easing was given in the September Bank Board meeting. Part of the money market expected the repo rate decrease (see Figure 5). During this quarter, market interest rates converged toward the implied ones.

At the end of 2002Q3, the money market had broadly expected the additional interest cut of 0.25p.p. The new October forecast implied a cut of 0.5 p.p. (in 2002Q4) and the Bank Board decided to lower the rate by 0.25 p.p., so this change was fully expected. The convergence to the implied forecast-consistent trajectory began after the November Minutes and (again) part of the money market expected an interest rate cut at the December Bank Board meeting (one month before the new forecast would be made), but the repo rate remained unchanged. In addition, it was mentioned in the December Minutes that an easing of monetary policy would surface during 2003, and also the voting pattern did not indicate an interest rate bias. In this quarter, too, we can see a convergence in the FRAs toward the forecast-consistent interest rate path.

In January 2003, the Bank Board decided to cut the repo rate by 0.25 p.p., which was in accord with the implied forecast-consistent trajectory. The money market expected stability in this month, although it anticipated some reduction of interest rates during 2003Q1 (as indicated by the 3M PRIBOR). During the first two months of 2003Q1, however, the expected term structure diverged from the forecast-consistent term structure because money market participants started to expect lower interest rates, probably as actual inflation fell below the inflation forecast and even into negative values (see Figure 9). This can also be seen in Figure 8, which depicts the actual and implied 12M PRIBOR – the actual 12M PRIBOR fell below the implied 12M PRIBOR. A change came in March 2003, when the expected future impact of EU tax harmonization on inflation was commented on for the first time. It was mentioned that these tax adjustments would push inflation above the inflation target: "…It was stressed that the expected changes in indirect taxes were the largest risk from the quantitative point of view. The likelihood of implementing these changes was high, because they primarily involved tax harmonization. As a result, inflation could end up temporarily above the upper boundary of the targeted band." (Minutes of the Bank Board meeting on 27 March 2003). This was affirmed by the voting pattern (7:0 for leaving the repo rate unchanged).

In April 2003, the forecast implied interest rate stability and the Bank Board's decision not to change repo rate was expected by the money market. However, the money market expected a lower interest rate level throughout the quarter. These expectations were supported by the Bank Board's comments (e.g. the May meeting and the Minutes) that the inflation forecast was overestimated: "…the Board confirmed the rise in disinflationary risks since the last situational

report… Some board members expressed substantial doubts about whether or not the current forecast was consistent and credible enough and recommended as an exceptional case that a new inflation forecast be submitted early to the Board, i.e. for the discussion of the June situational report." (Minutes of the Bank Board meeting on 29 May 2003). In June 2003, the Bank Board cut the interest rate by 0.25 p.p., which was partly expected. During this quarter the interest rates diverged, and the publication of the forecast did not help to bring the market's and the CNB's forecasted trajectories any closer.

In July 2003, the money market assumed interest rate stability. Nevertheless the Bank Board cut the repo rate in accord with the forecast-consistent trajectory by 0.25 p.p., so the cut came as a surprise to the market. The yield curve, however, did not decrease, as the money market expected a higher interest rate path.

In October 2003, although the forecast implied a cut of 0.25 p.p., the Bank Board kept the repo rate unchanged, which was in line with what the money market had expected. The decision to keep the repo rate unchanged was also expressed in the interest rate comments, which "played down" in a downside direction the implied interest rate change consistent with the forecast for the first time. The longer-term interest rate moved above the CNB's forecasted trajectory and during 2003Q4 the difference widened (see also Figure 8).

In 2004Q1, the Bank Board decided to keep rates unchanged, which was in accord with the implied trajectory. Nonetheless, the forecast started to indicate the necessity of a turnaround in monetary policy (from cuts to hikes) in the upcoming quarters.

The turn in the tightening direction was also implied by the April forecast. In spite of this, the Bank Board did not change the interest rate in April and verbally softened the implied trajectory ("a gradual rise"). The Bank Board rather gradually opened the way for interest rate hikes with the aid of minutes and press interviews. This was successful, as money market expectations regarding the long-term interest rate increased (see Figure 8) and the market term structure converged steadily toward the CNB's forecasted trajectory. In spite of this, the increase of 0.25 p.p. in June was unexpected.

Figure 8: Differences between the implied forecast-consistent interest rates (3M PRIBOR and FRAs) and market interest rates the day before the Bank Board meeting

Figure 9: Inflation – actual and forecasted (unconditional)
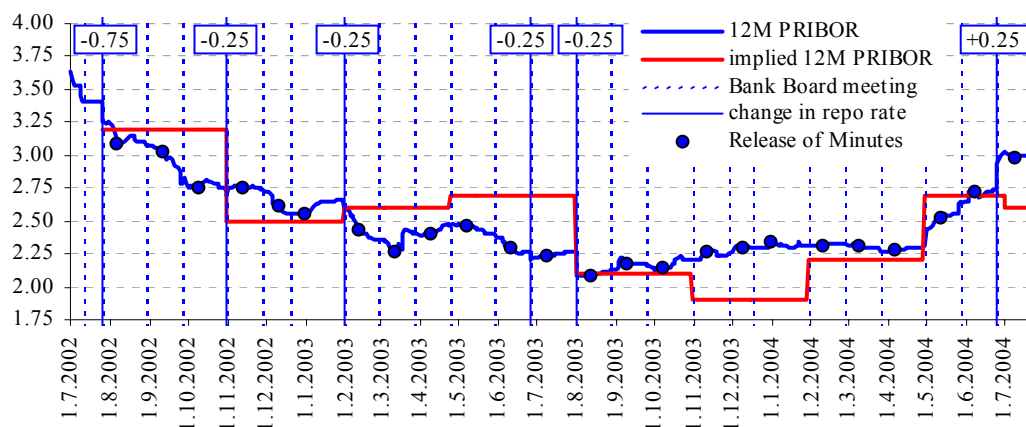
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