WORKING PAPER 14/2022 (ECONOMICS)

Analysts versus the Random Walk in Financial Forecasting: Evidence from the Czech National Bank's Financial Market Inflation Expectations Survey

Kamil Kladívko and Pär Österholm

ISSN 1403-0586

Örebro University School of Business
SE-701 82 Örebro, Sweden

Analysts versus the Random Walk in Financial Forecasting: Evidence from the Czech National Bank's *Financial Market Inflation Expectations* Survey

Kamil Kladívko[∀]
School of Business, Örebro University

Pär Österholm[◊]
School of Business, Örebro University
National Institute of Economic Research

Abstract

In this paper, we analyse how financial market analysts' expectations in the Czech National Bank's *Financial Market Inflation Expectations* survey perform relative to the random-walk forecast when it comes to predicting five financial variables. Using data from 2001 to 2022, our results indicate that the analysts are able to significantly outperform the random-walk forecast for the repo rate and Prague Interbank Offered Rate at the one-month forecasting horizon. For the five-year and ten-year interest rate swap rate, the random walk significantly outperforms the analysts at both the one-month and one-year forecasting horizons. For the CZE/EUR exchange rate, no statistically significant differences in forecast precision were found.

JEL Classification: E47, G17

Keywords: Survey data, Out-of-sample forecasts, Exchange rates, Interest rates

---

[∀] Örebro University, School of Business, 701 82 Örebro, Sweden
e-mail: kamil.kladivko@oru.se

[◊] Örebro University, School of Business, 701 82 Örebro, Sweden
e-mail: par.osterholm@oru.se

1. Introduction

In 1998, the Czech Republic adopted inflation targeting as its monetary policy framework and accordingly became the first emerging economy to turn to this practice. In line with other inflation-targeting central banks, the Czech National Bank relatively shortly thereafter – in May 1999 – introduced a survey among financial market analysts in order to monitor expectations regarding key macroeconomic and financial variables.[1] The survey – named *Financial Market Inflation Expectations* – is conducted at a monthly frequency and contains predictions for inflation, GDP growth, wage growth, a number of interest rates and an exchange rate.

Being one of the most prominent economic surveys in the Czech Republic, *Financial Market Inflation Expectations* receives a fair amount of attention. However, little is known about the forecasting properties of the expectations in the survey; only the inflation expectations of the survey have been evaluated (Czech National Bank, 2018).[2] The analysis conducted in this paper will fill some of this knowledge gap. We do this by evaluating the forecasting precision concerning the five financial variables in the survey, that is, *i)* the two-week repo rate, *ii)* the twelve-month Prague Interbank Offered Rate (PRIBOR), *iii)* the five-year interest rate swap rate, *iv)* the ten-year interest rate swap rate, and *v)* the CZK/EUR exchange rate.

When conducting the analysis, we will compare the performance of the survey expectations to that of a random-walk forecast (also known as a *naïve forecast*). This means that our paper contributes to the literature which deals with forecasting financial variables – a literature that has established that it is difficult to beat the random-walk forecast; see, for example, Elliott and Baier (1979), Meese and Rogoff (1983a, 1983b), Frankel and Chinn (1993), Duffee (2002), Diebold and Li (2006), Mitchell and Pearce (2007), Rossi (2013), Baghestani *et al.* (2015), Ince and Molodtsova (2017), Ren *et al.* (2019), Kunze (2020) and Kladívko and Österholm (2021). The main novelty of our paper is the data employed, where the expectations concerning financial variables of the *Financial Market Inflation Expectations* survey have not been analysed before. The survey contains expectations at two different forecast horizons – one month and one year – and we use monthly data where the expectations range from December 2001 to July 2022 for the shorter horizon and from December 2001 to August 2021 for the longer horizon. The Czech National Bank's inflation target has been constant since January 2010 but its specification was changed several times during the first part of our sample.[3] In addition to analysing the full sample, we also conduct analysis on two subsamples to assess the robustness of our findings.

[1] Similar surveys include the Bank of England's *Survey of External Forecasters*, the Reserve Bank of New Zealand's *Survey of Expectations* and Sveriges Riksbank's *Prospera* survey.

[2] The survey has not been used much in the literature; one exception is Fukac (2005).

[3] The present target was declared in March 2007; see Czech National Bank (2007).

Turning to our results, we note when looking at the full sample that the precision of the analysts is significantly higher than that of the random walk only when forecasting the repo rate and PRIBOR at the one-month horizon. The random walk, on the other hand, significantly outperforms the analysts at both the one-month and one-year horizons when forecasting the five-year and ten-year interest rate swap rates. Our findings regarding interest rates are in line with recent results presented by Baghestani *et al.* (2015) and Kladívko and Österholm (2021); both of these studies suggest – based on analysis using international and Swedish data respectively – that survey expectations at short horizons of short interest rates were able to beat the random walk whereas the survey expectations of long interest rates were unsuccessful with respect to this (regardless of forecast horizon). In general, the results of our study support the broad conclusion from the literature mentioned above, namely that it is difficult to beat the random walk when it comes to forecasting financial variables.

The rest of this paper is organised as follows: In Section 2 the data are presented. Our empirical analysis and results are described in Section 3. Finally, Section 4 concludes.

2. Data

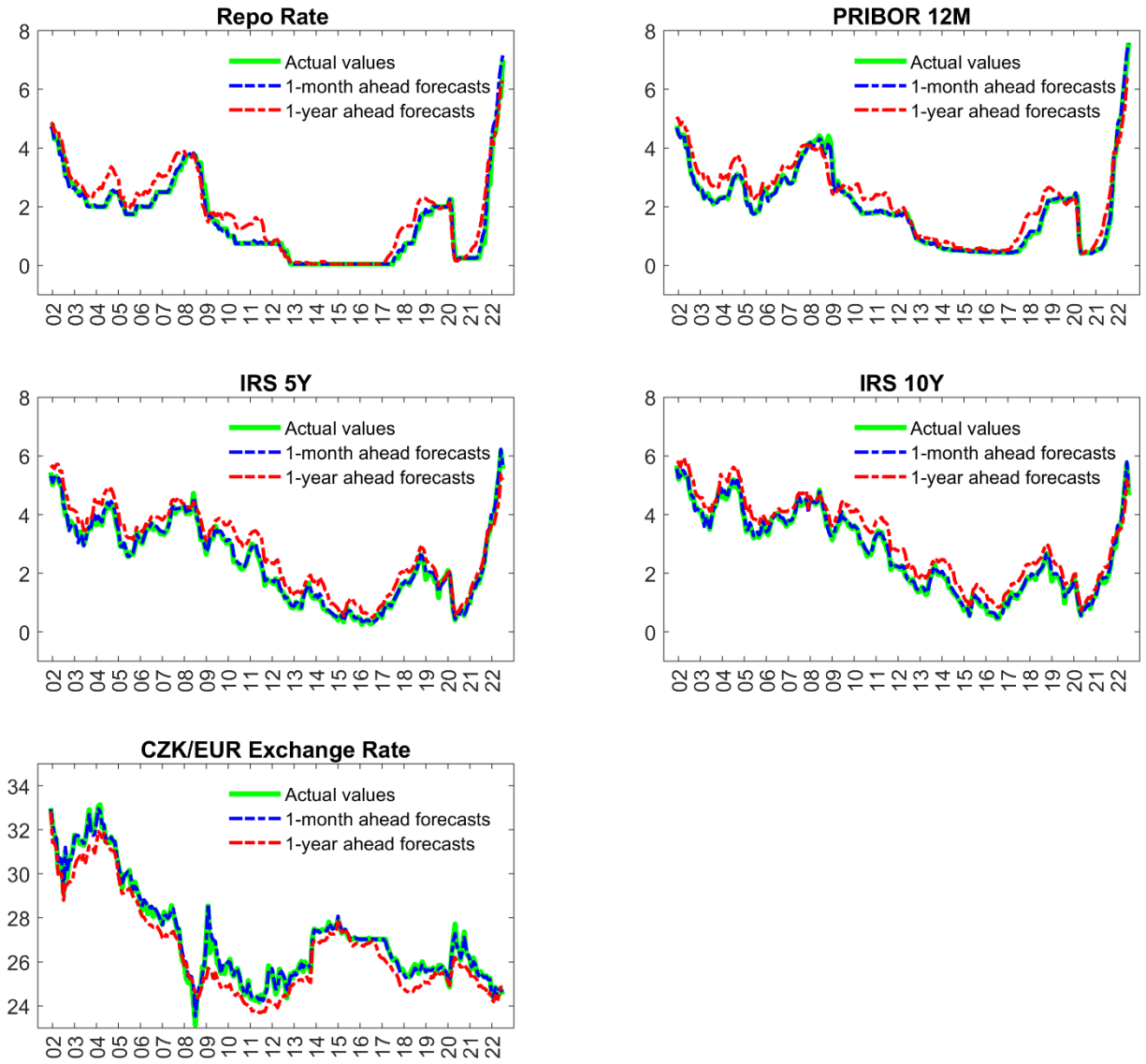
The *Financial Market Inflation Expectations* survey is conducted at a monthly frequency. The set of respondents is made up of analysts from large banks and brokerage companies who are highly active in the money and capital markets. The survey participation is consistently high; for example, during the period October 2019 to February 2022, 15 domestic and three foreign-based analysts were surveyed with an average participation rate of 93 percent.[4]

As pointed out above, the respondents are asked about their expectations regarding a number of macroeconomic and financial variables. The focus in this paper is on the five financial variables, that is, the two-week repo rate, twelve-month PRIBOR, the five-year interest rate swap rate, the ten-year interest rate swap rate, and the CZK/EUR exchange rate. We evaluate both horizons at which forecasts are provided, that is, one month and one year. We base our analysis on the data that are the key output from the survey, that is, the time series which are generated by taking the mean over respondents at each point in time.[5] Data are shown in Figure 1.

[4] Over 227 surveys from August 2003 until June 2022, the median number of respondents is 13, where the minimum and maximum number is seven and 19, respectively.

[5] Since the May 2005 survey, the Czech National Bank reports names of the participating analysts, but micro-level data for each respondent are not publicly available. At the date of writing of this paper, the surveys are available at the Czech National Bank's webpage: https://www.cnb.cz/en/financial-markets/inflation-expectations-ft/

Figure 1. Survey expectations.



Note: Percent on vertical axes for interest rate data. "Actual values" shows variable values at the dates when forecast were made, the so-called survey conduct date.

Source: Czech National Bank,Bloomberg and Prague Stock Exchange

While the survey has been conducted since May 1999, we use data which begin in December 2001. This is due to the fact that the exact dates that the survey was conducted are not available before then, and the exact dates are needed in order to generate the random-walk forecast and evaluate forecasts precision.[6] The survey data we use range from December 2001 to July 2022 for the one-month horizon and from December 2001 to August 2021 for the one-year horizon. It thus follows that the time series we analyse – that is, the forecast errors – consist of 248 observations in the case of the one-month ahead forecasts, and 237 observations in the case of one-year ahead forecasts.

In order to evaluate the forecasts from the survey, we obtain actual values of the variables from the Czech National Bank (repo rate, PRIBOR and CZK/EUR exchange rate) Bloomberg (interest rate swap rates), and Prague Stock Exchange (Czech government bond prices; see the next paragraph for details). For the repo rate, PRIBOR and CZK/EUR exchange rate the actual values are unambiguous (the CZK/EUR exchange rate used is the exchange rate declared by the Czech National Bank); for the five-year and ten-year swap rates, the closing mid-price quotes have been used.

Two details deserve to be pointed out concerning the data. The first of these relate to the repo rate, where it should be noted that until (and including) the December 2003 survey, the respondents were asked about the one-week PRIBOR – not the repo rate; this was changed as of the January 2004 survey. We accordingly use one-week PRIBOR data in the beginning of the sample when evaluating the forecasts (and the repo rate thereafter).[7] Second, until (and including) the March 2005 survey, the respondents were asked to predict a specific government bond yield with a time-to-maturity of approximately ten years; the ten-year interest rate swap rate first appeared in the April 2005 survey. We accordingly use yield to maturity of the Czech government bonds in question.[8] The yield to maturity is calculated from the end-of-day mid-price quotes provided by the Prague Stock Exchange.

[6] The random-walk forecast is equal to the last observed value at the time of generating the forecast; see also the description in Section 3.

[7] In addition, the top-left panel of Figure 1 shows one-week PRIBOR for the period December 2001 to December 2003 and the repo rate thereafter.

[8] Specifically, the following three bonds were used in the surveys: 6.4%/2010 bond (issue number 33), 6.55%/2011 bond (issue number 36), 3.70%/2013 bond (issue number 40). The left panel in the second row of Figure 1 shows yield to maturity of these Czech government bonds for the period December 2001 to March 2005.

3. Empirical analysis and results

The focus of our paper is on forecast precision, where we will compare the expectations from the *Financial Market Inflation Expectations* survey to a random-walk forecast.[9] Our main analysis is based on the full sample; this is presented in sub-section 3.2. We also assess how robust those results are with respect to the chosen sample in sub-section 3.3.

3.1 Assessing forecast precision

The horizon-*h* forecast generated at time *t* is denoted $\hat{y}^{x}_{t+h|t}$, where $x \in \{\text{FMIE}, \text{RW}\}$ (where FMIE indicates the survey data and RW the random walk). Regarding the random-walk forecast, it is given as $\hat{y}^{\text{RW}}_{t+h|t} = y_t$, where y_t is the value of the variables in question observed on the day the survey was conducted. We set the survey-conduct day to the survey-submission deadline. If the survey-submission deadline falls on a non-business day, we set the survey-conduct date to the first business day preceding the survey submission deadline.[10]

Forecast precision is assessed based on the root mean squared forecast error (RMSFE). For each horizon *h*, N_h forecasts – generated at dates $t_1, t_2, \cdots, t_{N_h}$ – are evaluated. The RMSFE is given as

$$\text{RMSFE}^{x}_{h} = \sqrt{\frac{1}{N_h}\sum_{i=1}^{N_h}\left(e^{x}_{t_i+h|t_i}\right)^2} \tag{1}$$

where

$$e^{x}_{t_i+h|t_i} = y_{t_i+h} - \hat{y}^{x}_{t_i+h|t_i} \tag{2}$$

is the forecast error for forecaster *x* at horizon *h* (where one month and one year are the two horizons evaluated). RMSFEs are reported in Table 1. In the table, we also report the relative RMSFE (RRMSFE). This measure is here defined as

$$\text{RRMSFE}_{h} = \frac{\text{RMSFE}^{\text{FMIE}}_{h}}{\text{RMSFE}^{\text{RW}}_{h}} \tag{3}$$

[9] We do, however, also report results regarding forecast bias in the Appendix, seeing that this often is a topic of interest in the forecasting literature.

[10] The survey submission deadline is typically round the middle of the month. For example, since the July 2019 survey has always been on the 15th of the month.

so that values smaller than unity indicate that the RMSFE of the survey data is lower than that of the random-walk forecast.

Since the RMSFEs and RRMSFEs can be seen as "point estimates" – as they do not take uncertainty into account – we also employ the Diebold and Mariano (1995) test in order to establish whether differences in forecast precision are statistically significant. This is done by running the regression

$$\left(e^{\mathrm{FMIE}}_{t_i+h|t_i}\right)^2 - \left(e^{\mathrm{RW}}_{t_i+h|t_i}\right)^2 = c + v_{t_i+h}, \qquad (4)$$

where $e^{\mathrm{x}}_{t_i+h|t_i}$ is given by equation (2), c is the regression intercept and v_{t_i+h} is an error term. The null hypothesis of equal forecast precision is then tested by assessing the significance of the intercept using a standard *t*-test; if the test statistic is negative enough, the survey expectations outperform the random walk. In order to account for potential heteroscedasticity and autocorrelation, Newey-West standard errors (Newey and West, 1987) are used when conducting inference.

3.2 Main results – full sample

Results from our analysis for all five variables are given in Table 1. As a general reflection, it can first be noted – in line with what one would expect – that it clearly is more difficult to predict these variables at the one-year horizon than at the one-month horizon. For all five variables are the RMSFEs at the one-month horizon substantially lower than those at the one-year horizon.

Looking at the results for the repo-rate expectations, we find that the survey expectations have a lower RMSFE than the random-walk forecast at both horizons; the difference is small at the one-year horizon though. It is also only at the one-month horizon that the difference is statistically significant at traditional significance levels. The picture is similar for PRIBOR (which is strongly correlated with the repo rate; the correlation coefficient over the studied period is 0.96). The survey expectations' RMSFE is lower than that of the random walk at both horizons – by 11.3 and 6.4 percent at the one-month and one-year horizons respectively – but the difference in precision is statistically significant only at the one-month horizon.

Regarding the longer-term interest rates – that is, to the five- and ten-year interest rate swap rates – the survey data expectations are clearly outperformed by the random walk. The relative differences between analysts' and the random-walk's forecast precision – which range between 8.2 and 18.4 percent – are in all cases significant at the one percent level.

Finally, concerning the CZK/EUR exchange rate, we can see from Table 1 that the RMSFE of the survey data is 4.9 percent higher than that of the random walk at the one-month horizon, whereas at the one-year horizon,

the RMSFE of the survey data is instead lower than that of the random walk (by 6.7 percent), but the differences are not statistically significant.

Table 1. RMSFEs, Relative RMSFEs and results from the Diebold-Mariano tests for all financial variables in the survey – full sample.

	Sample (forecast error count)	RMSFE FMIE	RMSFE RW	RRMSFE FMIE/RW	DM *t*-stat
Repo rate					
1-month ahead	2001M12-2022M07 (248)	0.135	0.226	0.597	-2.78[a]
1-year ahead	2001M12-2021M08 (237)	1.211	1.294	0.936	-1.16
PRIBOR 12M					
1-month ahead	2001M12-2022M07 (248)	0.195	0.220	0.887	-2.11[b]
1-year ahead	2001M12-2021M08 (237)	1.269	1.356	0.936	-1.19
IRS 5Y					
1-month ahead	2001M12-2022M07 (248)	0.250	0.231	1.082	3.16[a]
1-year ahead	2001M12-2021M08 (237)	1.176	1.035	1.136	2.67[a]
IRS 10Y					
1-month ahead	2001M12-2022M07 (248)	0.246	0.226	1.092	2.81[a]
1-year ahead	2001M12-2021M08 (237)	1.113	0.941	1.184	3.10[a]
CZK/EUR					
1-month ahead	2001M12-2022M07 (248)	0.471	0.449	1.049	1.54
1-year ahead	2001M12-2021M08 (237)	1.262	1.352	0.933	-0.94

Note: "IRS 5Y" is the five-year interest rate swap rate. "IRS 10Y" is the ten-year interest rate swap rate. Sample dates refer to when the survey was conducted. "RRMSFE" is the relative RMSFE; this is given as the RMSFE of the survey data for a given horizon divided by the RMSFE of the corresponding random-walk forecast. "DM" is the Diebold-Mariano test; this is given as the test's t-statistic calculated using Newey-West standard errors. a and b indicate significant results of a two-tailed test at the 1 and 5 percent level respectively. Number of observations (that is, forecast errors), N_h, in parentheses ().

Summing up, we have found statistically significant evidence that the survey data outperform the random walk only at the one-month horizon for the repo rate and PRIBOR. This indicates that the analysts have been able to anticipate the monetary policy decisions of the Czech National Bank in the short run during the period studied here. (Success in predicting the repo rate should translate also into successful forecasts of PRIBOR since these short interest rates are very highly correlated.) This finding might be related to the fact that the Czech National has had a high level of transparency for a long time; it can be noted that it is ranked among the most transparent central banks in the world (Dincer *et al.*, 2022). The analysts' failure to predict the repo rate and PRIBOR at the one-year horizon does not necessarily contradict this conclusion; transparency about policy deliberations might not help in guiding the analysts at this horizon since both analysts and the central bank itself likely have problems in forecasting the factors that determine the central bank's policy rate with reasonable precision. Concerning the five- and ten-year interest rate swap rates and the CZK/EUR exchange rate, we conclude that the forecasting performance of the survey data indicates that the survey respondents have fewer valuable insights regarding these variables. While not particularly flattering for the survey participants, this finding is not surprising though; it is a well-established consensus in the literature that it is difficult to forecast financial variables.

3.3 Robustness of results – analysis of subsamples

As we pointed out above, the Czech National Bank's inflation target has been changed several times. Inflation targeting was initiated in 1998 and the following years, the inflation target was stated as a range for the CPI adjusted for administered prices and changes to indirect taxes; this range changed several times. Between 2002 and 2005, the inflation target was given as a linearly declining band for CPI inflation (starting at three to five percent in January 2002 and gradually decreasing to two to four percent in December 2005). The inflation target has been specified in terms of a point (rather than a range or a band) for inflation since 2006. Between 2006 and 2009 its level was three percent; since 2010, it has been at its present level of two percent.

Seeing that the specification of the inflation target – or the fact that the specification of it changes – could affect the survey respondents' ability to forecast, we next assess whether our results are robust over time. We do this by dividing our sample into two subsamples. The first subsample is the period where the target was subject to changes; for this we use expectations data that range from December 2001 to December 2009. Our second subsample is accordingly the period in which the present inflation target has been in place; for this we use expectations data ranging from January 2010 to July 2022 for the one-month horizon and January 2010 to August 2021 for the one-year forecast horizon. Results from this exercise are given in Tables 2 and 3.[11]

The results from the subsamples largely paint the same picture as those for the full sample (in Table 1). The most robust finding is that the survey data outperform the random walk when it comes to forecasting the repo rate at the one-month horizon; the Diebold-Mariano test is significant in both subsamples. The RRMSFEs for PRIBOR at the one-month horizon is similarly smaller than unity in both subsamples; however, statistical significance is only found in the second subsample. It can also be seen that the RRMSFEs of the survey expectations for the five- and ten-year interest rate swap rates consistently are larger than unity in both subsamples; also here does statistical significance vary with the subsamples though.

[11] Mean forecast errors and tests for bias can be found in Tables A2 and A3 in the Appendix.

Table 2. RMSFEs, relative RMSFEs and results from the Diebold-Mariano tests for all financial variables in the CNB survey – first subsample.

	Sample (forecast error count)	RMSFE FMIE	RMSFE RW	RRMSFE FMIE/RW	DM *t*-stat
Repo rate					
1-month ahead	2001M12-2009M12 (97)	0.120	0.192	0.626	-2.53[b]
1-year ahead	2001M12-2009M12 (97)	1.079	1.046	1.032	0.46
PRIBOR 12M					
1-month ahead	2001M12-2009M12 (97)	0.208	0.214	0.975	-0.33
1-year ahead	2001M12-2009M12 (97)	1.053	1.035	1.018	0.18
IRS 5Y					
1-month ahead	2001M12-2009M12 (97)	0.245	0.228	1.076	1.63
1-year ahead	2001M12-2009M12 (97)	1.117	0.913	1.224	2.54[b]
IRS 10Y					
1-month ahead	2001M12-2009M12 (97)	0.230	0.212	1.086	1.60
1-year ahead	2001M12-2009M12 (97)	1.106	0.884	1.252	2.82[a]
CZK/EUR					
1-month ahead	2001M12-2009M12 (97)	0.627	0.576	1.089	2.21[b]
1-year ahead	2001M12-2009M12 (97)	1.476	1.757	0.840	-1.99[b]

Note: "IRS 5Y" is the five-year interest rate swap rate. "IRS 10Y" is the ten-year interest rate swap rate. Sample dates refer to when the survey was conducted. "RRMSFE" is the relative RMSFE; this is given as the RMSFE of the survey data (FMIE) for a given horizon divided by the RMSFE of the corresponding random-walk (RW) forecast. "DM" is the Diebold-Mariano test; this is given as the test's t-statistic calculated using Newey-West standard errors. a and b indicate significant results of a two-tailed test at the 1 and 5 percent level respectively. Number of observations (that is, forecast errors), N_h, in parentheses ().

Table 3. RMSFEs, relative RMSFEs and results from the Diebold-Mariano tests for all financial variables in the CNB survey – second subsample.

	Sample (forecast error count)	RMSFE FMIE	RMSFE RW	RRMSFE FMIE/RW	DM *t*-stat
Repo rate					
1-month ahead	2010M01-2022M07 (151)	0.143	0.245	0.585	-2.14[b]
1-year ahead	2010M01-2021M08 (140)	1.295	1.441	0.898	-1.45
PRIBOR 12M					
1-month ahead	2010M01-2022M07 (151)	0.186	0.224	0.831	-2.33[b]
1-year ahead	2010M01-2021M08 (140)	1.399	1.540	0.909	-1.48
IRS 5Y					
1-month ahead	2010M01-2022M07 (151)	0.252	0.232	1.086	2.81[a]
1-year ahead	2010M01-2021M08 (140)	1.215	1.113	1.092	1.56
IRS 10Y					
1-month ahead	2010M01-2022M07 (151)	0.256	0.234	1.096	2.33[b]
1-year ahead	2010M01-2021M08 (140)	1.118	0.978	1.143	1.92
CZK/EUR					
1-month ahead	2010M01-2022M07 (151)	0.334	0.343	0.973	-0.82
1-year ahead	2010M01-2021M08 (140)	1.090	0.978	1.115	1.08

Note: "IRS 5Y" is the five-year interest rate swap rate. "IRS 10Y" is the ten-year interest rate swap rate. Sample dates refer to when the survey was conducted. "RRMSFE" is the relative RMSFE; this is given as the RMSFE of the survey data (FMIE) for a given horizon divided by the RMSFE of the corresponding random-walk (RW) forecast. "DM" is the Diebold-Mariano test; this is given as the test's t-statistic calculated using Newey-West standard errors. a and b indicate significant results of a two-tailed test at the 1 and 5 percent level respectively. Number of observations (that is, forecast errors), N_h, in parentheses ().

The least consistent results are found for the repo rate and PRIBOR at the one-year horizon, and for the CZK/EUR exchange rate (at both horizons). As can be seen from Tables 2 and 3, the RRMSFEs are here larger than unity in the first subsample and smaller than unity in the second subsample. The only statistically significant results though among these are those for the CZK/EUR exchange rate in the first subsample. In particular, the analysts significantly outperformed the random walk at the one-year horizon. As we can observe in Figure 1, the Czech koruna had a strong appreciation trend during the first subsample between 2004 and the Global Financial Crisis in 2008. An appreciation of the Czech koruna was at this time very broadly anticipated, the main reason being a net inflow of foreign direct investments and a productivity differential; see for example, Melecký and Komárek (2007).

4. Conclusions

Being one of the most prominent surveys in the Czech Republic, the Czech National Bank's *Financial Market Inflation Expectations* is an important source of information to both the central bank and other agents in the economy. In this paper, we have evaluated the forecasting performance of the expectations concerning the financial variables covered by the survey.

Our results indicate that the survey data significantly outperform a random-walk forecast only at the one-month horizon for the repo rate and interbank rate. At both the one-month and one-year horizon for the five-year and ten-year interest rate swap rates, the random-walk forecast instead significantly outperforms the analysts' expectations. For the CZE/EUR exchange rate, the random-walk forecast has a lower root mean squared forecast error than that of the analysts' forecast at the one-month horizon whereas at the one-year horizon the opposite is found; however, none of these differences are statistically significant.

The results from this study accordingly line up with results from previous studies fairly well. The Czech analysts tend to understand what the actions the central bank will take in the short run. However, for most financial variables their expectations have difficulties outperforming the random-walk forecast.

References

Baghestani, H., Arzaghi, M. and Kaya, I. (2015) "On the Accuracy of Blue Chip Forecasts of Interest Rates and Country Risk Premiums", *Applied Economics* 46, 113-122.

Czech National Bank (2007), "The CNB's New Inflation Target and Changes in Monetary Policy Communication", Press realease, March.

Czech National Bank (2018), *Inflation Report* IV/2018.

Diebold, F., and C., Li. (2006), "Forecasting the Term Structure of Government Bond Yields", *Journal of Econometrics* 130, 337-364.

Diebold, F. X. and Mariano, R. S. (1995), "Comparing Predictive Accuracy", *Journal of Business and Economic Statistics* 13, 253-263.

Dincer, N., Eichengreen, B. and Geraats, P. (2022), "Trends in Montary Policy Transparency: Updated Trends", *International Journal of Central Banking* 18, 331-348.

Duffee, G. (2002), "Term Premia and Interest Rate Forecasts in Affine Models", *Journal of Finance* 57, 405-443.

Elliott, J. W. and Baier, J. R. (1979), "Econometric Models and Current Interest Rates: How Well Do They Predict Future Rates?", *Journal of Finance* 34, 975-986.

Frankel, J. and Chinn, M. (1993), "Exchange Rate Expectations and the Risk Premium: Tests for a Cross-Section of 17 Currencies", *Review of International Economics* 1, 136-144.

Fukac, M. (2005), "Do Inflation Expectations Surveys Yield Macroeconomically Relevant Information?", *Czech Journal of Economics and Finance* 55, 344-362.

Ince, O. and Molodtsova, T. (2017), "Rationality and Forecasting Accuracy of Exchange Rate Expectations: Evidence from Survey-Based Forecasts", *Journal of International Financial Markets, Institutions, and Money* 47, 131-151.

Kladívko, K. and Österholm, P. (2021), "Do Market Participants' Forecasts of Financial Variables Outperform the Random-Walk Benchmark?", *Finance Research Letters* 40, 101712.

Kunze, F. (2020), "Predicting Exchange Rates in Asia: New Insights on the Accuracy of Survey Forecasts", *Journal of Forecasting* 39, 131-333.

Meese, R. A. and Rogoff, K. (1983a), "Empirical Exchange Rate Models of the Seventies. Do They Fit Out-of-Sample?", *Journal of International Economics* 14, 3-24.

Meese, R. A. and Rogoff, K. (1983b), "The Out-of-Sample Failure of Empirical Exchange Rate Models: Sampling Error or Misspecification?", In: Frankel, J. A. (ed.), *Exchange Rates and International Macroeconomics*, University of Chicago Press, Chicago.

Melecký, M. and Komárek, L. (2007), "The Behavioral Equilibrium Exchange Rate of the Czech Koruna", *Transition Studies Review* 14, 105-121.

Mitchell, K. and Pearce, D. K. (2007), "Professional Forecasts of Interest Rates and Exchange Rates: Evidence from the Wall Street Journal's Panel of Economists", *Journal of Macroeconomics* 29, 840-854.

Newey, W. K. and West, K. D. (1987) "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix", *Econometrica* 55, 703-708.

Ren, Y., Wang, Q. and Zhang, X. (2019), "Short-Term Exchange Rate Predictability", *Finance Research Letters* 28, 148-152.

Rossi, B. (2013), "Exchange Rate Predictability", *Journal of Economic Literature* 51, 1063-1119.

Appendix

In this section, we test whether the forecasts are biased. The test is based on the regression

$$e^{x}_{t_i+h|t_i} = k + \omega_{t_i+h} \quad \text{(A1)}$$

where the forecast error $e^{x}_{t_i+h|t_i}$ is defined in equation (2) in Section 3.1, k is an intercept and ω_{t_i+h} is an error term. In Tables A1 to A3, a point estimate of k is given by a mean forecast error (MFE). The null hypothesis of no bias is tested by assessing the significance of the intercept using a standard *t*-test, where Newey-West standard errors (Newey and West, 1987) are used to account for potential heteroscedasticity and autocorrelation. Since the forecast error is defined as the difference between the actual value and the forecast, a positive estimate of k implies that forecasts on average have been lower than the actual outcome. Looking at the results for the full sample (Table A1), we find that the survey data have significantly overestimated the five-year interest rate swap rate at the one-year horizon and the ten-year interest rate swap rate at both the one-month and one-year horizons.

Table A1. MFEs for all financial variables in the CNB survey – full sample.

	Sample (forecast error count)	MFE FMIE	*t*-stat	MFE RW	*t*-stat
Repo rate					
1-month ahead	2001M12-2022M07 (248)	-0.010	-1.19	0.007	0.31
1-year ahead	2001M12-2021M08 (237)	-0.250	-1.55	0.023	0.13
PRIBOR 12M					
1-month ahead	2001M12-2022M07 (248)	0.015	0.87	0.010	0.47
1-year ahead	2001M12-2021M08 (237)	-0.215	-1.26	0.062	0.33
IRS 5Y					
1-month ahead	2001M12-2022M07 (248)	-0.031	-1.49	-0.001	-0.06
1-year ahead	2001M12-2021M08 (237)	-0.439	-2.93[a]	-0.021	-0.15
IRS 10Y					
1-month ahead	2001M12-2022M07 (248)	-0.043	-2.24[b]	-0.006	-0.38
1-year ahead	2001M12-2021M08 (237)	-0.514	-3.81[a]	-0.088	-0.69
CZK/EUR					
1-month ahead	2001M12-2022M07 (248)	-0.049	-1.53	-0.028	-1.09
1-year ahead	2001M12-2021M08 (237)	0.284	1.70	-0.315	-1.80

Note: "IRS 5Y" is the five-year interest rate swap rate. "IRS 10Y" is the ten-year interest rate swap rate. Sample dates refer to when the survey was conducted. "MFE FMIE" and "MFE RW" are the mean forecast errors of the survey data and random-walk forecast respectively. "t-stat" provide the bias test's t-statistic calculated using Newey-West standard errors. a and b indicate significant results of a two-tailed test at the 1 and 5 percent level respectively. Number of observations (that is, forecast errors), N_h, in parentheses ().

Table A2. MFEs for all financial variables in the CNB survey – first subsample

	Sample (forecast error count)	MFE FMIE	*t*-stat	MFE RW	*t*-stat
Repo rate					
1-month ahead	2001M12-2009M12 (97)	-0.016	-1.25	-0.044	-1.69
1-year ahead	2001M12-2009M12 (97)	-0.699	-4.33[a]	-0.366	-1.88
PRIBOR 12M					
1-month ahead	2001M12-2009M12 (97)	0.012	0.44	-0.027	-0.96
1-year ahead	2001M12-2009M12 (97)	-0.538	-3.05[a]	-0.238	-1.21
IRS 5Y					
1-month ahead	2001M12-2009M12 (97)	-0.052	-1.75	-0.022	-0.77
1-year ahead	2001M12-2009M12 (97)	-0.689	-4.04[a]	-0.265	-1.58
IRS 10Y					
1-month ahead	2001M12-2009M12 (97)	-0.061	-2.21[b]	-0.022	-0.87
1-year ahead	2001M12-2009M12 (97)	-0.691	-4.13[a]	-0.303	-1.90
CZK/EUR					
1-month ahead	2001M12-2009M12 (97)	-0.134	-1.98[b]	-0.062	-1.13
1-year ahead	2001M12-2009M12 (97)	-0.070	-0.25	-0.713	-2.34[b]

Note: "IRS 5Y" is the five-year interest rate swap rate. "IRS 10Y" is the ten-year interest rate swap rate. Sample dates refer to when the survey was conducted. "MFE FMIE" and "MFE RW" are the mean forecast errors of the survey data and random-walk forecast respectively. "t-stat" provide the bias test's t-statistic calculated using Newey-West standard errors. a and b indicate significant results of a two-tailed test at the 1 and 5 percent level respectively. Number of observations (that is, forecast errors), N_h, in parentheses ().

Table A3. MFEs for all financial variables in the CNB survey – second subsample.

	Sample (forecast error count)	MFE FMIE	*t*-stat	MFE RW	*t*-stat
Repo rate					
1-month ahead	2010M01-2022M07 (151)	-0.005	-0.54	0.040	1.33
1-year ahead	2010M01-2021M08 (140)	0.061	0.27	0.293	1.19
PRIBOR 12M					
1-month ahead	2010M01-2022M07 (151)	0.018	0.77	0.034	1.15
1-year ahead	2010M01-2021M08 (140)	0.010	0.04	0.269	1.00
IRS 5Y					
1-month ahead	2010M01-2022M07 (151)	-0.017	-0.62	0.012	0.50
1-year ahead	2010M01-2021M08 (140)	-0.267	-1.25	0.149	0.76
IRS 10Y					
1-month ahead	2010M01-2022M07 (151)	-0.032	-1.24	0.004	0.17
1-year ahead	2010M01-2021M08 (140)	-0.392	-2.05[b]	0.062	0.36
CZK/EUR					
1-month ahead	2010M01-2022M07 (151)	0.005	0.20	-0.006	-0.27
1-year ahead	2010M01-2021M08 (140)	0.531	3.15[a]	-0.040	-0.24

Note: "IRS 5Y" is the five-year interest rate swap rate. "IRS 10Y" is the ten-year interest rate swap rate. Sample dates refer to when the survey was conducted. "MFE FMIE" and "MFE RW" are the mean forecast errors of the survey data and random-walk forecast respectively. "t-stat" provide the bias test's t-statistic calculated using Newey-West standard errors. a and b indicate significant results of a two-tailed test at the 1 and 5 percent level respectively. Number of observations (that is, forecast errors), N_h, in parentheses ().