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How the central bank makes decision on interest rates? A comparative analysis of forecast importance

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Abstract

Research background: Most of the modern central banks (CBs) acknowledge the role of economic agents' expectations in monetary policy. To shape these expectations and to overcome the lags occurrence, CBs produce and reveal macroeconomic forecast and declare that it is the input into their deliberations and monetary policy adjustments. This is how central banks implement inflation forecast targeting. The formal assessments of actual forecast importance in central banks' decisions is not presented in the literature — to the best author's knowledge.

Purpose of the article: The paper is of methodological nature. It presents the index that compares inflation forecast importance in the central banks decisions. The elaboration of such index is the main goal of the paper. The index is tested empirically for Czechia and Sweden.

Methods: Comparably to other research presenting the tools that approximate some qualitative variables, the methodological part of the paper offers the description of the factors covered by the index with their justification and point attribution. The index is suitable to assess CBs decision's accordance with the forecast produced under constant rate assumption as well as under endogenous interest rates. It is designed to cover low quality data as the time series on the central path of the forecast are not always accessible. In this cases only the relation of the forecast to the inflation target is revealed on the fan charts.

Findings & Value added: The index elaboration and its calculation for Czechia and Sweden is presented in the paper. It thus contributes to the literature on ex post assessment of the central bank's actions. This formalized assessment opens the field for making further con-

clusions on inflation forecast targeting implementations and possible impact of the forecast on the economic agents' expectations.

Introduction

Monetary policy has become more and more transparent since the nineties of the 20th century. Central bank's transparency should enhance the formation of private agents' expectations, which is in line with modern monetary theory. Despite rising transparency of the central banker, some opacity in the central bank's practice persists. The decision-making procedure of the monetary policy committee (MPC) is a good example of the central bank's ambiguity. Should the uncertainty about central bank's decisions and its motivations be reduced, it would possibly have a positive effect on the expectations formation.

The following paper is of methodological nature. It introduces a concise framework for the ex post MPC decisions' analysis. This framework refers only to the decisions' compatibility with the inflation forecast of the central bank. First of all, it makes it possible to assess whether the MPC decisions are in line with the inflation forecast targeting (IFT) procedures. Secondly, it assesses the wait and see position of the MPC.

The paper contributes to the literature on the central bank's decision assessment. It presents ex post analysis, but focuses on the decisions premises. The appropriateness of the decision from the monetary policy point of view is not evaluated here. The analysis covered in this paper is not presented in the literature. Having a simple and concise index of decision compatibility makes it possible to answer some further research questions.

The research covers a 5-year period: 2011–2015 and two central banks: Sverige Riksbank (SR) and the Czech National Bank (CNB). They have both produced and revealed forecasts with endogenous interest rates path for several years (SR since 2007 and CNB since 2001) and they both declare inflation forecast targeting (IFT) implementation. That should be indicated by relatively high values of the index in question. The research period starts in 2011 in order to avoid covering the eruption of the latest financial crisis.

Theoretical background

Economic agents' expectations are in the very center of the central bank's discussion as they are the driving factor in the modern monetary transmis-

sion (Galí, 2008, pp. 71–95; Goodfriend, 2007, pp. 47–68). Inflation equation (New-Keynesian Phillips curve) is derived from the staggered prices model (Calvo, 1985, pp. 383–398). In the basic equation of inflation, today's inflation depends on the inflation expectations of future inflation and today's output gap. The central bank may influence inflation directly — by stabilizing inflation expectations and via interest rate, which drives the output. As summarized in Woodford (2003, pp. 15–18) the optimizing model implies that private sector behavior should be forward-looking. Therefore, the expectations about future economic conditions should be a significant determinant of the current behavior. If the central bank is able to affect expectations, it will have more opportunities to achieve the goals which have been set. The monetary transmission given by the New Neoclassical Synthesis (NNS) briefly described above, is reflected in the central banks' analytical (and forecasting) models. It proves that the central banks accept the framework that enhances stabilization of the expectations.

Inflation targeting (IT) is such a framework. Its most important feature is numerically set inflation target being the central bank's priority. It constitutes a nominal anchor for economic agents. Institutional arrangements: independence, accountability and transparency, enhance the central bank's focus on the main goal. A central bank which implements IT should be exempted from other commitments, such as, for example, exchange rate stabilization. Neither a formally preannounced automatic monetary rule nor the intermediate target exists. Central banks implementing inflation targeting are not obliged to focus their decision-making process on any variable. It is the information inclusive strategy in which many variables are used in order to set the policy instruments (Bernanke *et al.*, 2001, pp. 31–35). At the same time, bearing in mind the necessity of forward-looking, expectations-centered monetary policy, inflation forecasts produced by the central bank on the basis of the predefined transmission mechanism may play a crucial role in the decision-making process of a central banker. IT may become inflation forecast targeting. Findings on the IFT are summarized in Table 1.

If the central bank uses the forecast as an intermediate target, it implements inflation forecast targeting (IFT). It is also argued that subscribing the function of an intermediate target to the inflation forecast simplifies both implementing and monitoring the monetary policy (Svensson, 1997, p. 1117). The forecast may support the decision-making procedure even when it is not revealed. However, in the context of the expectations formation, the forecast should be published. As expectations of economic agents are not rational, the central bank's forecast may be quite important in their for-

mation. Biasedness of inflation expectations is broadly confirmed in the literature (Forsells & Kenny, 2004, pp. 25–26; Dias *et al.*, 2010, pp. 600–602; Mitchell & Weale, 2007, pp. 13–15; Łyziak, 2003, pp. 30–34). Public information issued by the central bank may influence expectations both directly and indirectly. Indirect linkage refers to consumers — the least qualified group of economic agents. Epidemiological expectations theory argues that consumers form their expectations taking into consideration professional forecasts distributed by the media. They do it imperfectly, as they need time to absorb the economic content of the news stories, so it takes some time to change economic conditions (Carroll, 2003, pp. 271–272). One of such professional forecasts which is highlighted by the media and considered in the professional forecast is the central bank's inflation forecast.

However, it is not enough to publish the inflation forecast to steer the inflation expectations. The forecast should be an immanent part of the central bank's strategy. If the central bank follows the message of the forecast for some time, the public will assess the forecast as an important factor in their decisions.

As there are several versions of the inflation forecast, the assessment of central bank's behavior regarding the role of the forecast in the decision-making process is not simple. It requires a measurement of qualitative procedure. Measuring qualitative aspects of the monetary policy with the use of a simple index is broadly accepted. It is enough to mention transparency measures developed by Fry *et al.* (2000, pp. 1–16), Bini Smaghi and Gros (2001, pp. 7–12), Eijffinger and Geraats (2006, pp. 6–11), Bajalan *et al.* (2012, pp. 14–30).

This is why elaboration of the index which constitutes a concise framework of the decision assessment is justified. The index can be to evaluate the decisions' compatibility with the central bank's own forecast. It is the first step to examine whether the relationships of the decisions consistency and expectations formation exist.

Prior to the introduction of the methodology, some explanation of its nature is needed. Qualitative index elaboration instead of application of econometric models is chosen, as it better fits the research goal and time series quality. The index mirrors the rules of central banks' decision making that are a part of IFT. So, it directly checks to what extent the rule is implemented, decision by decision. Moreover, the index applied in this research is designed to cover low quality data, as the quality of the time series expressing inflation forecast is poor. Some central banks refuse to publish numerically expressed central paths of inflation forecast. They reveal the fan charts with the central path of inflation within monetary policy horizon:

it is possible to analyze the divergence of the forecast from inflation target existence, but not its exact level. Some CBs have recently launched publication of time series with forecast. Should the research cover a broad sample and long time span, it would be necessary to apply a simplified methodology (as the index presented in this paper) instead of some formal econometric model.

Research methodology

Methodology of the research presents a simple index for assessing the MPC decisions compatibility with the inflation forecast. Its components are presented in Fig1. This three-step procedure results in the creation of the index which varies from 0 to 3, and a descriptive component which explains decision's inconsistency with the inflation forecast.

Decision compatibility with the forecast indicates that the central bank follows the message of the forecast. It can be analyzed narrowly — with regard to the interest rate change. Due to the recent economic situation, zero lower bound hit by many central banks and enhanced non-standard measures application, decision compatibility can cover also non-standard monetary policy measures.

The first step of the assessment depends on the way in which the forecast is produced. A conditional forecast is usually produced under constant central bank rate assumption throughout the entire forecast horizon. In this case, while setting the monetary policy instrument, the central bank analyses the relation of the inflation forecast with the inflation target in the monetary policy horizon. The interest rate should be set so as to make the inflation forecast equal to the inflation target in the monetary policy horizon. If the inflation target is above (below) the target, the main rate of the monetary policy should be raised (lowered). The MPC freedom point refers to the situation when the central path of inflation deviation from the inflation target does not exceeds the 1 p.p. which is usually accepted deviation from the inflation target. In such a situation the MPC might not follow the exact forecast message while not being in contradiction with it. Figure 2. presents the rules of attributing points for the conditional forecast.

If the central bank produces an unconditional forecast, its interest rates path is an immanent part of the forecast. The central bank's reaction function implies such a policy path (a set of current and subsequent interest rates) that should bring the inflation (and the forecast) to the target in the monetary policy horizon. If the reaction function is used, it is usually con-

sistent with the forward-looking version of Taylor rule, which is an instrumental one. It is possible to replace the reaction function with the targeting rule. Svensson (2002, pp. 776–778), elaborated the optimal specific targeting rule which expresses the equality of the marginal rates of transformation and the marginal rates of substitution between the forecasts of the target variables (inflation and output). In an operational way, the selected instrument path should equalize the marginal rate of transformation (MRT) of the output gap into inflation and the marginal rate of substitution (MRS) of inflation into the output gap. MRT refers to the combination of output-gap forecasts into the two-period-ahead inflation forecast. MRS denotes the marginal rate of substitution of inflation in period $t+j$, for the output gap in period $t+k$. MRT and MRS are derived from transmission mechanism framework which is in line with NNS.

Regardless of the optimization rule applied, when unconditional forecast is produced, the central bank produces the central path of inflation (and output) and the policy path which represents the forecast consistent interest rate path for the forecast horizon. Fig. 3 presents the central bank's decisions compatibility scheme for the case of the unconditional forecast.

Even if the policy path is produced for the forecast horizon, the central bank introduces only one decision on interest rates. The whole interest path may guide expectations of the next decision, however, it is not the commitment. It is conceptually easier than making decisions on the whole path of the interest rates. Over time, the forecast and the policy path itself become stale, which is confirmed by empirical research: forecasts of interest rates had little or no informational value when the horizon exceeded two quarters, although they were good in the next quarter and reasonable in the following one (Goodhart & Bin Lim, 2011, pp. 144–153). This is why decisions' accordance covers the shortest end of policy path.

Paths of decision-making (for conditional and unconditional forecast) refer mainly to the change of the central bank's interest rate. However, under special circumstances, as zero lower bound (ZLB) occurrence, the central bank's actions might take a form of forward guidance or quantitative easing. Forward guidance is nowadays' commitment to keep the rates low in the future. The horizons of instant interest rate change and forward guidance are different, but they both mean loosening of monetary policy. Once extraordinary actions are announced, they are treated by the index analogously to the interest rate change. Thus the index incorporates monetary policy loosening and tightening rather than just interest rate adjustment.

Decision timing assessment is presented in Fig. 4. Timing criterion is needed, as the forecast is produced with lower frequency than the MPC

meeting occurrence. Usually the forecast is produced quarterly, the MPS meets monthly or 8 times per year. It means that the same forecast is discussed at a few meetings. If the MPC finds the forecast accurate, it makes decision in line with the forecast when the central path for inflation and policy path are the most up-to date. IT framework gives the possibility to postpone decision as IFT is a flexible rule of the monetary policy. The central bank may wait to assess whether the forecast assumptions are accurate. It may neglect the forecast message for any other reason. While assessing the central bank's accordance with IFT procedure it is assumed that it is better to make decisions just after the forecast preparation.

Decision compatibility index ranges from 0 to 3. Additional stage of the research is the qualitative analysis which should be performed if 0 point is attributed to the decision (step 1).

Research results

The following part of the paper presents empirical application of the index for the Czech National Bank and the Bank of Sweden. Table 2 presents a sample description.

The mean value of the central bank decisions' compatibility with the IFT for the CNB is 87%, and for SR 89%. Relatively high values are not surprising, as both central banks declare that they implement IFT, which is confirmed by the conducted research (Szyszko, 2015, pp.139–156; 2017, pp.1–14). Neither CNB nor SR registered 0 value of the first component of the index. In the case of both central banks, the MPC owns the forecasts. It means that MPC is involved in the forecasting process and accepts the final version of the forecast prior to its publication. Fig. 5 and 6 present the index components for the CNB and SR, respectively.

Bank of Sweden's engagement in IT is reflected also by the adjustment of the MPC meeting schedule to forecasting round. The Executive Board meets six times per year just after a forecast is produced. It means that this central bank implements a rarely applied solution: new (or largely updated) forecast for each decision meeting. As a consequence, in the case of SR decision timing is always given 1 point.

Conclusions

Central bank's decision-making procedures are not completely transparent. This is the point at which the MPC creates ambiguity. This is in line with

the monetary framework described as inflation targeting — there is no formal obligation to choose intermediate target and control it. Some central banks present a more detailed description of the decision-making procedures, some of them — do not. At the same time, the need for shaping expectations of the economic agents is broadly acknowledged. Inflation forecast of the central bank is public information which may facilitate the impact on expectations. If the forecast is revealed, economic agents align their expectations more quickly and the expectations are more homogenous. If the MPC uses the forecast as the main premise in the decision-making process, its role in shaping expectations may be more important.

The paper presents a simple methodological solution for assessing the role of the forecast in the decision-making procedures of the central bank. The index has some disadvantages: it is a simple, qualitative tool that may be questioned by econometricians. But it offers the possibility that — to the author's best knowledge — is not presented in the literature: to evaluate the forecasts importance in MPC deliberations within formalized framework. The index of decisions' compatibility with the forecast is general — it can be applied to both conditional or unconditional forecasts. The index may be used regardless of the territorial scope of the research, its time coverage and — what is the most important argument in favor of qualitative index — the quality of the time series that proxy the inflation forecast. This tool opens the field for further research, the example of with is given below.

The example of the index application is given in the last part of the paper. Empirics cover two highly transparent central banks: the Czech National Bank and the Bank of Sweden. They both proved to be consistent in IFT implementation if analyzed by presented index.

Calculation of the index is just the first step of its possible usage in empirical research. Assessing the decisions compatibility with the forecast allows for the verification of the hypotheses concerning the relations of the forecast and expectations of different groups of economic agents expectations as well as decisions' compatibility with the forecast and forward lookingness of these expectations.

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Annex

Table 1. IFT – literature review

Inflation forecast has proprieties of properly set intermediate goal	correlation with the final goal, controllability by the central bank, measurability, transparency
The forecast: one variable instead of the panel of data	the forecast incorporates a set of historical and current data including expectations, one variable includes the idea of analyzing various data; the MPC may discuss only (or mainly) the forecast
IFT as a simple policy rule	forecast targeting involves the commitment to a particular decision-making procedure for monetary policy and distinctive approach to communication policy (regular publication of quantitative projections together with extensive discussion of the reasoning underlying these projections)
IFT makes monetary policy forward-looking	due to monetary policy lags, today's decisions have to consider future economic development; the forecast can also directly shape expectations of economic agents
MPC procedures simplification	it constitutes the discussion frameworks for the MPC, it facilitates introduction of the new members to decision-making procedures

Source: own on the basis of: Svensson (1997, p. 1121), Szyszko (2011, pp. 12–17), Woodford (2012, pp. 186–190).

Table 2. Data and the sample

Feature	CNB	SR
Research period	Jan 2011- Dec 2015	
Source	Inflation Reports	Monetary Policy Reports/ Updates
Forecasts	20	30
MPC meetings	40	30

Figure 1. Stages of the research

Figure 2. The MPC’s decisions compatibility for the conditional forecast

CPI – central path of inflation – the most probable inflation level during the forecast horizon

Figure 3. The MPC’s decisions compatibility for unconditional forecast

CPI – central path of inflation PP – policy path

Figure 4. Decision timing assessment

Figure 5. Index values for CNB

Figure 6. Index values for SR