MEASURMENET OF INFLATION FORECAST TARGETING. A PROPOSAL OF METHODOLOGICAL SOLUTION

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Introduction

Modern monetary policy focuses on inflation expectations. It is consistent with modern monetary theory: new neoclassical synthesis (NNS). NNS gives the background of monetary transmission mechanism. New Keynesian Phillips Curve, IS curve (production equation) as well as central bank's reaction function include economic agents' expectations. The NNS and its implications for monetary policy are broadly described in the literature (Goodfriend & King, 1997; Galí, 2008; Woodford, 2003). Central bankers are continuously searching for the tools that would enhance their opportunity to influence inflation expectations. Inflation targeting (IT) framework of monetary policy is an optimal solution for the central bank's functioning within the frames of NNS. IT constitutes various possibilities for shaping expectations of the public that is focusing on numerically set inflation target, **producing and publishing inflation forecast**, setting floating exchange rate regime, and, finally, ensuring central bank's independence and transparency. Possibility of shaping inflation expectations in the frameworks of IT is confirmed in theoretical (Eusepi & Preston, 2010) and empirical research (Strohsal & Winkelman, 2015). However there are also research questioning such it (Kumar et al., 2015). Regardless some papers suggesting the central bank's ineffectiveness in shaping expectations, IT is perceived as the best way of implementing modern monetary policy.

One argues that the central bank's inflation forecast is one of the most important tools of supporting inflation expectations (Skořepa & Kotlán, 2003). Empirical research proves that there are interdependences between inflation forecast and inflation expectations (Szyszko, 2015). Other research (i.e. Brzoza-Brzezina & Kot, 2008; Geraats, 2009; Faust & Svensson, 2001) confirms the impact of the

forecast publication on the economy and its performance as well as on the central bank's ability to achieve its goals. The forecast also supports the Monetary Policy Committee (MPC) decision-making process. It offers at least concise framework for policy analysis but it can be even intermediate target for monetary policy.

The context of the central bank's inflation forecast is, however, quite complicated. It covers methodology of forecasting, the way in which the forecast is published and a possible impact of the forecast result on the central bank's decision on the interest rates. The forecast of inflation may even become intermediate target of monetary policy when the central bank implements inflation forecast targeting (IFT). There is wide research into the field of possible use of inflation forecast in monetary policy (presented in next section). The central banks' practice here also varies substantially.

The following paper is of methodological nature and it introduces the inflation forecast targeting index (hereafter: IFT index). It has been designed to measure IFT implementation. Verification of various hypotheses on the existence of the relation between the IFT and other aspects of monetary policy with the use of such index is possible. The IFT index gives also a concise framework of practical aspects of IFT. Such an index has not been presented in the literature up to now. The elaboration of IFT index is thus the main purpose of the following paper. Another goal is to discuss its possible implementations in the research as the index opens the possibility to further research on forecast usefulness in monetary policy.

One may ask a question at this point: the question on the validity of qualitative aspects measurement. The arguments in favor of such a measurement refer to the inflation forecast

importance for monetary policy, both in the decision making process and communication. This measurement makes it possible to draw profound conclusions on the relations and causality. It also opens the field for territorial and over-time comparison of the central banks' practice. That is why the literature gives numerous examples of qualitative aspects measures.

The following paper is divided into four sections. The first one presents the literature overview of the inflation forecast targeting, which is the basis for designing the IFT aspects. It also highlights the importance of inflation forecast for a modern central bank. The second section presents details on measuring transparency of the central bank. The literature in this case gives some solutions to the accepted ways of qualitative aspects measurement, including transparency. The third section is of methodological nature and it describes the tool (IFT index). The last section is on possible index implementation in empirical research.

The paper contributes to the literature on inflation forecast targeting and broadly on inflation targeting strategy. It also contributes to the discussion on measurement of qualitative aspects of monetary policy.

1. Inflation Forecast Targeting: Literature Review

The inflation forecast is an immanent part of a fully-fledged inflation targeting. A central bank produces its own forecasts, uses them in the decision-making process and reveals them to the public. Inflation targeting, which is perceived to be the best monetary policy strategy by the consensus of NNS, may become **inflation forecast targeting** (IFT), where inflation forecast is an intermediate objective of monetary policy. It is by definition a current variable which is the most correlated with the final goal, it is more controllable than the final goal, and it can be made more observable. It can also be made very transparent and facilitate the central bank's communication with the public (Debelle, 1997). Moreover, inflation forecast integrates a broad set of historical and current data as well as the expectations. It means that one variable – the forecast – includes the idea of analyzing various data, simultaneously giving the simplicity of following an intermediate target commitment. One argues that subscribing the
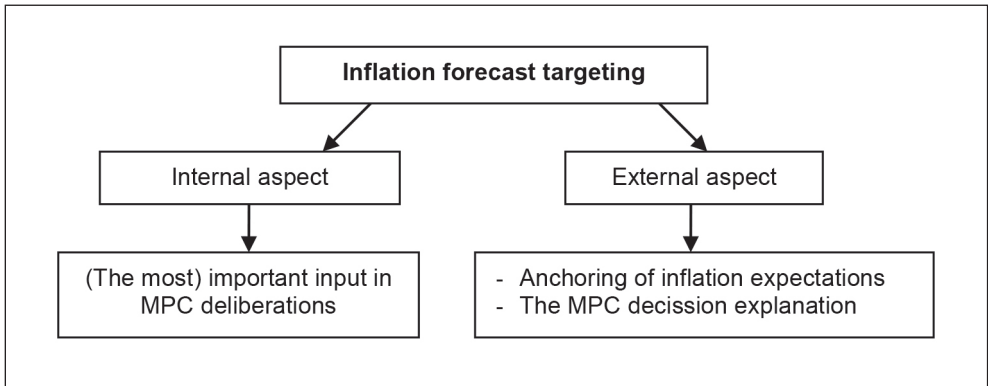
function of an intermediate target to the inflation forecast simplifies both implementing and monitoring monetary policy (Svensson, 1997). The idea of IFT has been broadly described in the literature. The main threads of this discussion are presented below.

The central bank's inflation forecast for the period of inflation forecast targeting horizon becomes an intermediate target. Hence the instrument should be set so as to make the inflation forecast equal to the inflation target. Following this rule is claimed to be the best central bank's practice. Ex post inflation may differ from the targeted level because of forecast errors (Svensson, 1996). The decision-making procedure of IFT is repeated by the monetary committee at any decision meeting. The forecasts and interest rate level are brought up to date if it is necessary. That is why IFT becomes a dynamic optimization procedure (Szyszko, 2013). The inflation forecast may become the input to the decision-making process of the central bank, even when the forecast is not published (implicit IFT). Revealing inflation forecast makes it possible to fulfill the external forecast function: the explanatory one – regarding the decision that has just been made and enhancing the central banks' ability to influence economic agents' expectations. This broader approach to IFT constitutes a concise framework for both the decision and its communication. That is why from the practical point of view, inflation forecast targeting encompasses two aspects (Fig. 1).

Inflation forecast targeting may also be perceived as a monetary policy rule (Woodford, 2012). As a rule, the IFT makes the decision making process more systematic and concise. It also facilitates the introduction of new members into decision-making body. Declaration on IFT implementation limits the possibility to influence the central banks' decision as such an influence, if in contradiction with the rule, can be easily captured by the public. Finally, any monetary policy rule makes the MPC decisions anticipation easier, which supports expectations formation.

The central bank may produce the inflation forecast under the assumption of constant central bank's rates (CIR) and the central bank's interest rates consistent with market expectations (ME). Such a forecast is called conditional (projection). Alternative option is interest rates endogenisation (unconditional

Fig. 1: **Extended approach to IFT**

Inflation forecast targeting

Internal aspect

External aspect

(The most) important input in
MPC deliberations

- Anchoring of inflation expectations
- The MPC decission explanation

Source: own

forecast). Forecasting methodology has been evolving over time from constant rate assumption to unconditional forecast. It is embodied in the discussion on the optimal level of the central bank's transparency and the way of signaling its intentions. Producing and revealing policy path – the central bank's interest rates consistent with the forecast is the next frontier in the central bank's transparency. Overruling the assumption on the constant central bank's rates brings the necessity to elaborate the MPC reaction function. It is mostly in line with the Taylor Rule which is an instrument rule. Its genuine specifications determine the changes of the central bank's interest rates as the result of the actual inflation deviation from the inflation target (inflation gap) and the deviation of the product from its potential level (output gap) (Taylor, 1993). Modern specification refers to inflation forecast or inflation expectations instead of actual inflation, which makes the rule forward-looking. The other possibility is a specific targeting rule which specifies condition for the forecasts of the target variables (inflation and output). The policy path should be set to ensure the equality of the marginal rates of transformation of the combination of output-gap forecast into the two-period-ahead inflation forecast and the marginal rates of substitution of inflation in period $t+j$, for the output gap in period $t+k$. Then, the monetary-policy problem consists of finding the combination of forecasts and instrument path consistent with the central bank's forecasting model (Svensson, 2003),

(Woodford, 2013). The specific targeting rule is used in the Bank of Sweden. Regardless of the severe criticism, the Taylor Rule or similar specifications of reaction functions are more often used by the central banks.

The discussion on revealing a policy path, especially in a numerical way (on the fan chart usually) is still quite vivid. Only several central banks do so, that is central banks of: The Czech Republic, New Zealand, Israel, Norway, and Sweden.

Decision making rule depends on the way how the central banks' interest rates are captured by the economic model. However, the starting point is the same: the instrument should be set to stabilize inflation on the targeted level in the monetary policy horizon (Leitemo, 2006). The simplest version is just a rule of thumb applicable to conditional forecasts: if the inflation target is above (below) the target within the monetary policy horizon, the main rate of the monetary policy should be raised (lowered). If the central path of inflation in the monetary policy horizon is on the targeted level – no interest rates change is required. This is how the IFT was described in the earliest literature on the subject (Svensson, 1997). When the forecast is produced, the central bank makes a decision on the next change of the interest rates and nothing else. It is conceptually easier than giving the whole path of interest rates. This approach is still used by the central banks producing conditional forecasts. However, a more developed rule requires optimal policy

path for the entire forecast horizon. It is possible, in the way consistent with the model, only with the interest rates endogenisation. Moreover, the MPC may discuss several interest paths for one forecast. It chooses the one that in its opinion is the best solution from inflation (and output) stabilization point of view (Svensson, 1999). When the policy path for a longer horizon is produced, the central bank's decision in line with the forecast means following the path. As it is relatively easily when the forecast is up to date, the policy paths for longer term is not obeyed. There is empirical research which confirms that the forecasts of interest rates had little or no informational value when the horizon exceeded two quarters (six months), although they were good in the next quarter and reasonable in the following one (Goodhart & Bin Lim, 2011). The reasons are obvious: in time the forecast and the policy path itself become stale. A new forecast with a new solution on interest rates appears. The central bank's decision procedures are not designed to make decisions on interest rates for subsequent periods as well.

The discussion on the central bank's transparency and its optimal level means nowadays deliberations on central bank's forecast relevance as well as publishing other information connected with forecasting procedures (assumptions, model, errors, risk assessment, policy path). Transparency is beneficial when it serves to simplify communication with the public and helps generate support for central banks to conduct the monetary policy optimally with an appropriate focus on the long-run objectives. However, it can complicate the communication process and weaken support for a central bank

focus on the long-run objectives (Mishkin, 2004). The optimal level of transparency cannot be easily determined. The theoretical discussion on this issue is still in progress. The central banks' practices in this field are not unique and their choices are justified differently. However, the transparency level of the monetary policy is largely aligned. The public knows the main goal, instruments and main premises of the decision making process, including forecasts. Moreover, the monetary authority explains the decision which has just been made. The differences are mainly connected with the intentions of future actions demonstration.

The point of view presented in the paper is as follows: the more information on the forecast revealed, the better. This is institutional approach to transparency (Winkler, 2000). The understanding of the information is not examined. Focus on institutional transparency is commonly used in the research.

2. Measuring Transparency of Monetary Policy: Literature Review

A section on the transparency measurement offers a brief explanation of the need and the ways of such a measurement. Inflation forecast targeting is also a qualitative procedure. It is related to the central bank's transparency which is one of the institutional (qualitative) aspects of modern monetary policy together with independence, accountability and credibility. As transparency is of qualitative nature and is not directly observed, the problem of the measurement appeared here. Descriptive analyses are not enough as they are

Fig. 2:   Measurement of qualitative aspects of monetary policy
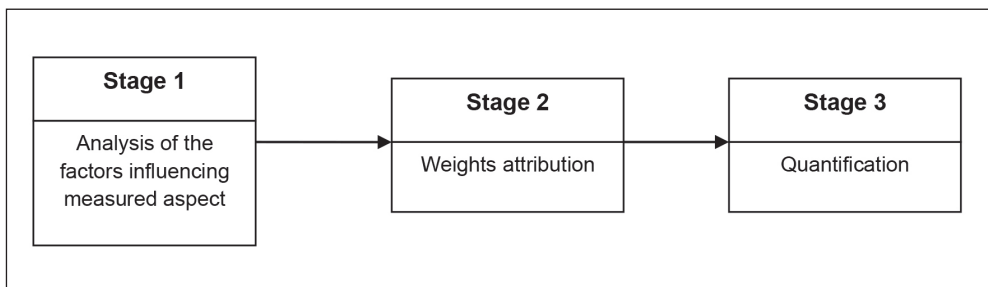
Source: own

not sufficient for developed research, finding interdependences and causalities. Elaboration of the qualitative aspect measure facilitates the analysis of the relations between the level of their implementation and the central bank's effectiveness or the economic performance. That is why, regardless of the reproaches of non-objectivity, measures of qualitative aspects are described in the literature and used in the research.

Tab. 1:	Transparency measures – the examples	
Authors	**Factors coverage**	**Comment**
Fy et al. (2000)	▪ prompt public explanation of policy decision, ▪ frequency and form of forward-looking analysis provided to the public, ▪ frequency of bulletins, research papers, speeches	Quite narrow approach to transparency. First approach to the measurement in the literature.
Bini-Smaghi & Gros (2001)	▪ objectives, ▪ strategy, ▪ publication of data and forecasts, ▪ communication strategy	Analysis of transparency and accountability.
Fracasso, Genberg, & Wyplosz (2003)	▪ assumptions about key macroeconomic variables, ▪ the presentation of the policy-making process, ▪ the executive summary; ▪ expertise, completeness, writing style and information	On the basis of Inflation Reports analysis; the authors delivered an overall rating of Inflation Reports; quantity, quality and accessibility of information is assessed.
Eijffinger & Geraats (2006)	▪ political transparency (openness about policy objectives), ▪ economic transparency (openness about data, models and forecasts), ▪ procedural transparency (openness about the way decisions are taken, achieved mainly through the release of minutes and votes), ▪ policy transparency (openness about the policy implications, achieved through prompt announcements and explanation of decisions), ▪ operational transparency (openness about the implementation of those decisions, in other words about control errors and macroeconomic disturbances affecting their magnitude)	This approach is frequently used in the literature (Dincer & Eichengreen, 2007), (Siklos, 2010) to cross-country and over-time comparison. Geraats taxonomy for transparency analysis was its background (Geraats, 2001). This measure is popular due to wide coverage of different aspects of transparency, consistency with inflation targeting and detailed description of the points attribution, which facilitates measurement. It is also inspiration for other measurements (Bajalan Raei, & Tehrani, 2012) and the basis for regression analysis (Crowe & Meade, 2008), (Dincer & Eichengreen, 2014).
Bajalan, Raei, &Tehrani (2012)	▪ openness of the policy (based at the Eijffinger-Geraats index), ▪ clarity referring to presentation and analysis of information, ▪ honesty referring to the intentions of the information sender, ▪ common understanding referring to the linguistic code of both, the sender and receiver.	More developed conceptual framework of the index. It tries to capture the possible gap between intentions of the sender and understanding of the information by the receiver.

Source: own on the basis of the literature given in the table

The way how the measurement is conducted is similar regardless of the authorship of the measure (Fig. 2). It starts with the identification of the factors that influence the measure. The empirical and theoretical research gives a background of such an analysis. Usually a broad set of factors is enumerated here. It makes it possible to capture the changes more exactly in comparison with a simple one to one identification. Then, the weights are attributed. Finally, the measurement itself takes place. Tab. 1 presents several examples of such measures.

IFT procedure is connected with the central banks' transparency in the field of revealing forecasting methods, decision-making proce- dures, decisions explanations and signaling central bank's intentions. This is why Tab. 1 presents several transparency measures. They refer to general transparency. They are all survey based measures – a questionnaire with factors affecting the transparency is used to quantify the level of transparency. Alternative measures of transparency refer to the market data: if the monetary policy is transparent, the news on central banks actions drive to less remarkable shifts in yields curves. This kind of measurement refers also to the central banks' news understanding. Standard measures do not capture understanding.

Transparency measures differs with the authors' different point of view and the goal of the research. This subjectivity is most remarkable reproach to qualitative aspects measurement. Not the only one. It is also difficult to describe precisely whet the points should be attributed. For example, one of the questions in Eijffinger-Geraats index is: *Does the central bank regularly provide an evaluation of the policy outcome in light of its macroeconomic objectives?* And the ½ point answer is: *yes, but superficially.*

The qualitative indices are also not resistant to the changes. When Fry et al. (2000) index was developed there was no discussion on revealing the central banks' policy path. Nowadays the transparency on the field of goals is quite obvious. The discussion on the optimal transparency focuses on the central bank's intentions. Inflation forecast and IFT is in the center of the debate on optimal decision rules and communication of future actions. In the literature, there is no complex measure of IFT implementation to capture and compare it.

However, there is a proposal of measuring transparency of inflation forecast with a Guttman scale. Guttman scale makes it possible to discover intensity structure between several aspects (features, statement describing a variable). It is commonly used in sociological research. The starting point in scale elaboration is an assumption that a respondent that accepts advanced level (or aspect) of variable accepts the lower one as well. The scale offers

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Fig. 3: Guttman scale for transparency of forecasting system
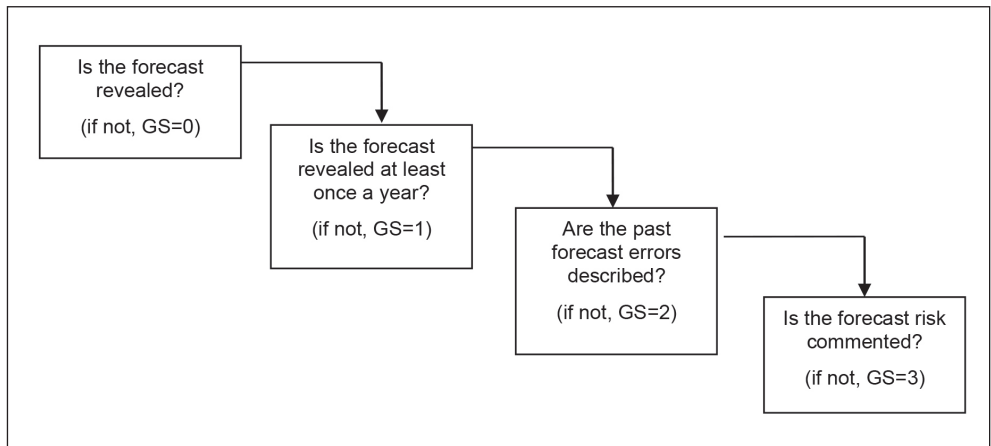
Source: Chortareas et al. (2002)

hierarchic arrangement of the variable' features. It is monotonic which means that the probability of accepting a statement on the scale is higher than accepting subsequent statement and lower than accepting the previous one. The scale organizes the features in such a sequence, that acceptance of a statement at any level means the acceptance of any statements which are on upper levels. The example of Guttman scale for transparency of inflation forecast is presented in Fig. 3.

The scale may be modified and enlarged with respect to its monotonic character. Main reproach to this measure is that forecasting procedures and the way how the forecast is published do not impose any hierarchy. The central bank may publish any element of forecasting system except the forecast. Capturing the sequence of the element is not necessary and may be binding. IFT elaborated in the following section offers alternative approach to measuring IFT, conceptually closer to monetary policy transparency measures.

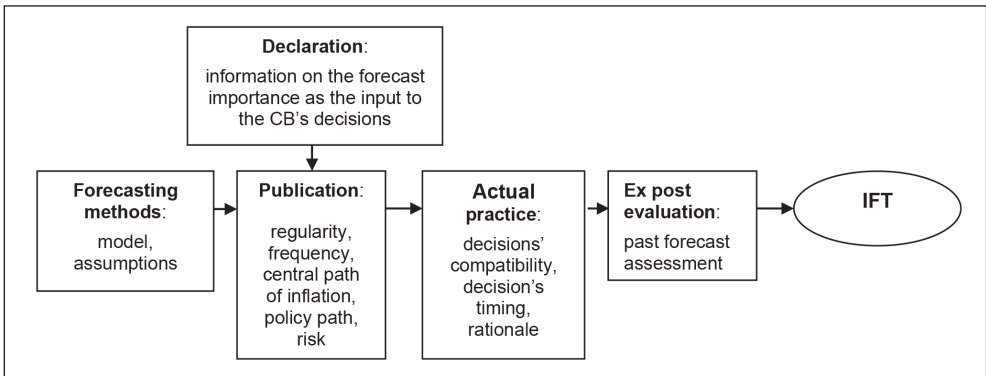## 3. IFT Index – Conceptual Frameworks

The IFT index elaborated here distinguishes 5 aspects of IFT. They are presented in Fig. 4. While designing the components of IFT, it was assumed that IFT means several aspects of revealing the forecast as well as using the forecast as the input into MPC deliberations. That is why the aspects cover:

- *forecasting methodology*: including model that reveals the framework of the MPC analysis as it describes transmission mechanism of the monetary policy, and information on the assumptions for the cut-off day of the forecast; producing the forecast is the first step in IFT implementation;
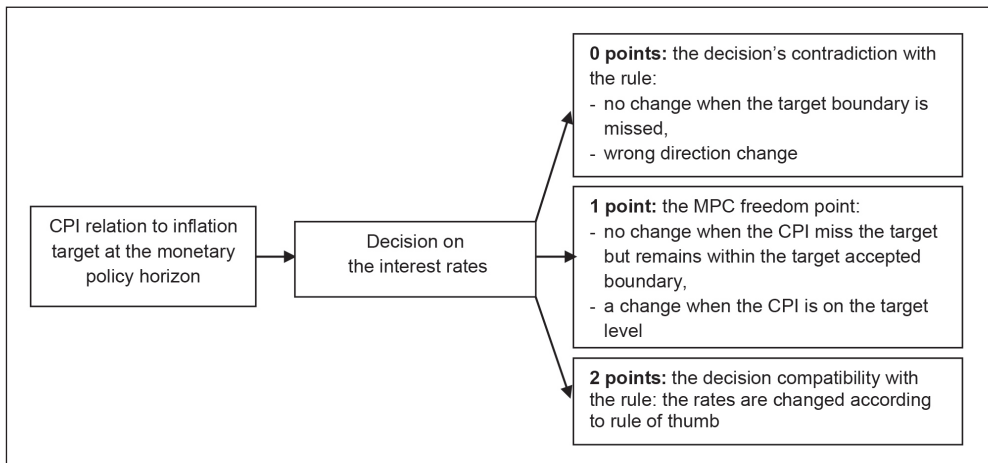- *declaration*: just prior to publishing the first forecast (usually in the same document), the central bank should inform the markets what is the role of the forecast in the monetary policy; public announcement opens the field for treating the forecast as the intermediate target;
- *publication*: to shape inflation expectations or to become intermediate target (for the MPC and under the public control) the forecast should be revealed; the regularity of the publication and its higher frequency enhance the possibility to influence expectations; it also means that the central banker has the most up to date forecast possible; the way how the forecast is published (central path of inflation alone or with the policy path) depends on the central banks' interest rate endogenisation and the central bank's will to reveal its next possible steps;
- *actual practice*: crucial aspect of IFT, it checks the central bank's decisions consistency with the inflation forecast, in other words, it verifies whether the rule is actually implemented, the way how the decision compatibility with the forecast is checked is described in Fig. 5 and 6; this aspect covers also decision timing – the analysis whether the central bank takes

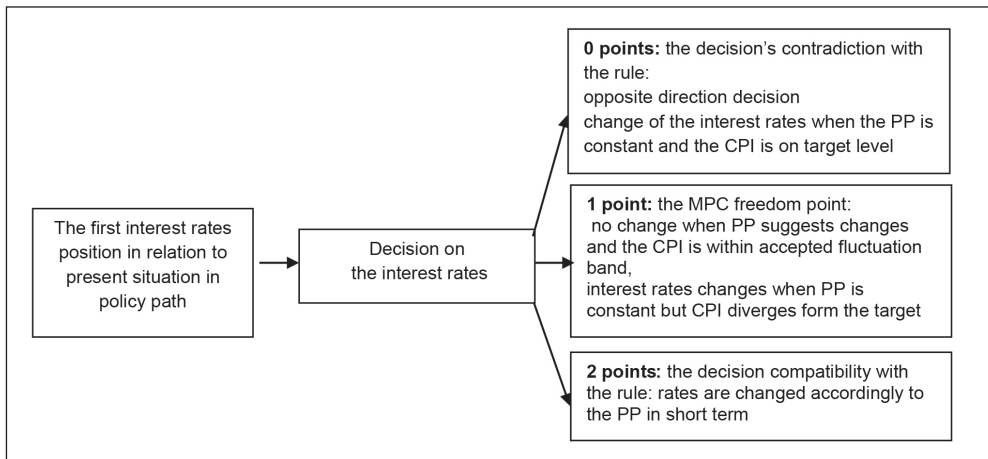Fig. 4: IFT index aspects

Source: own

Fig. 5:   **The MPC's decisions compatibility for conditional forecast**

CPI relation to inflation target at the monetary policy horizon	→	Decision on the interest rates	→	**0 points:** the decision's contradiction with the rule: - no change when the target boundary is missed, - wrong direction change
				1 point: the MPC freedom point: - no change when the CPI miss the target but remains within the target accepted boundary, - a change when the CPI is on the target level
				2 points: the decision compatibility with the rule: the rates are changed according to rule of thumb

Source: own

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

Fig. 6:   **The MPC's decisions compatibility for unconditional forecast**

The first interest rates position in relation to present situation in policy path	→	Decision on the interest rates	→	**0 points:** the decision's contradiction with the rule: opposite direction decision change of the interest rates when the PP is constant and the CPI is on target level
				1 point: the MPC freedom point: no change when PP suggests changes and the CPI is within accepted fluctuation band, interest rates changes when PP is constant but CPI diverges form the target
				2 points: the decision compatibility with the rule: rates are changed accordingly to the PP in short term

Source: own

Note: CPI – central path of inflation – the most probable inflation level during the forecast horizon
   PP – policy path

the wait and see position, and the forecast in decision explanation (press releases, minutes, rationale of the decision);

- *ex post evaluation*: refers to the past forecasts and may be done either by

comparison of the two subsequent forecasts or by ex post forecast errors; it explains why the decision made previously was not optimal (shocks), what happened in the economy between two forecasting rounds

Tab. 2: IFT index points' attribution rules – Part 1

	Evaluation	Possible options	How to attribute the points
Forecasting methodology	Forecasting model	0 – none ½ – general or partial description 1 – published	Points are attributed for forecasting model's publication in any central bank's document. 1 point – transmission equations are published (without parameters). Actualization when the model's change occurs. When there are several models employed – the main medium-term forecasting tool is considered.
	Assumptions	0 – none ½ – some/different 1 – published	0 – there is no information on interest rate assumption. 1 – the central bank publishes also regularly the other assumptions on exogenous variables. ½ – the way of presenting assumptions changes over time.
Publication	Regularity	0 – no 1 – yes	1 – the same publication schedule in subsequent years. If the schedule is changed, point is not attributed at the first time when the change occurs.
	Frequency	0 – once a year ½ – 2-3 times per year 1 – at least quarterly	If the forecast is produced with higher frequency, the MPC has more up to date input to decision making deliberations.
	Central path of inflation	0 – no 1 – descriptively 2 – numerically	The most important information. Qualitative information refers to the relation of the forecast in monetary policy horizon to the inflation target. Quantitative publication of the central path of inflation (CPI) may be presented on the chart.
	Policy path	0 – no ½ – descriptively 1 – numerically	Qualitative information: description of the next change of the interest rates. Quantitative information: a fan chart with policy path (PP).
	Risk analysis	0 – no 1 – yes	One point is attributed in case of: fan chart with the central path of inflation publication, probability distribution publication, risk description (qualitative), alternative scenario.
Declaration	Information on the forecast importance for the MPC	0 – none ½ – not explicitly 1 – yes	Information on the forecast role in monetary policy. ½ – when it is given descriptively (ex. *forecast is one of the inputs…*). 1 – for the declaration on the greatest forecast importance or more detailed description of information relevant to decision-making process.

and it presents the forecasts accuracy (which has the impact on their credibility).

The IFT index covers a broad context of IFT implementation. Central banks are free to draw their own solutions in this field, that is why, to enable the same way of points attribution, the detailed way of attributing points with the explanation is given in Tab. 2.

Points attribution for decisions comparability depends on the assumption on the interest rates. It should also consider that the IFT is just a flexible rule for the monetary policy. It means that there is no formal obligation of following the message of the forecast. For many reasons the MPC may ignore the message of the forecast. This may happen when the staff owns the forecast. It means that the MPC is not engaged in the forecasting

Tab. 2: **IFT index points' attribution rules – Part 2**

	Evaluation	Possible options	How to attribute the points
Actual practice	Decision compatibility	0 – no 1 – partial 2 – yes	Information with the highest weight. The way of compatibility assessment depends on the forecast. For 1 point answer: not following the message of the forecast when it is accepted in terms of the target definition (the MPC freedom point). Detailed solution for describing points at that stage is given below the table.
	Decision timing	0 – when the forecast is produced 1 – in subsequent months	1 point is attributed for: ▪ making decision when the forecast is up to date, ▪ no interest rate change in the period between two forecasting rounds. If the decision follows the message of the forecast but in subsequent months – no points 0 – the decision is not in line with the forecast regardless of the decision timing.
	Forecasts in decision's rationale	0 – none ½ – only CPI 1 – communication focused on the forecast	Reference to forecast in decision rationale: ½ if only the central path for inflation is described, 1 for dominating role of the forecast in communication (CPI, risk, alternative scenarios).
Ex post evaluation	Past forecast assessment	0 – none ½ – one out of two possibilities 1 – both descriptions	½ is attributed for publication of: ▪ two subsequent forecasts comparison, ▪ past forecast errors analysis.

Source: own

process. Due to extraordinary shocks, the model inadequacy may be temporarily higher in MPC opinion. The qualitative approach to data analysis may prevail during the MPC deliberations. The system of goals of the central bank embodies also the output. Inflation targeting is implemented in a flexible way. Temporarily, the output stabilization may become main concern for the central bank. Finally, the MPC may take wait and see position and observe economic situation. Therefore, there is no naive and automatic reaction of the central bank in line with the forecast. The points attribution must also consider the fact that no change of the interest rates is also a decision. Fig. 5 and 6 present the points attributing schemes. The first one refers to the conditional forecast (constant interest rate) and the second one covers endogenous interest rates case.

If considering central path of inflation it is necessary to compare it to the inflation target in the monetary policy horizon (MPH): 4 to 6 quarters ahead from the forecast starting point. CPI may vary during the monetary policy horizon. In order to calculate the IFT index it is necessary to choose the exact point of time for assessing CPI/target relation. Considering the beginning of MPH is necessary when the examination covers also expectation as it is consistent with the survey question on expectations. The second approach refers to the further part of the MPH. Comparing CPT/target relation here means that the central bank has more time to influence economy and the economy has more time to absorb shock occurring when the forecast is produced.

The IFT index due to its division into 5 aspects makes it possible to produce an additional measurement. When ignoring *actual practice* aspect, it delivers the possibility to measure only transparency of the forecasting

system. Additional analysis of the *decision compatibility* (according to Fig. 5 and 6) alone, shows the central bank's commitment to the rule.

The IFT index offers the opportunity to cross-country and over-time comparison. It delivers

consistent framework of IFT implementation analysis. It is a useful tool of verification of the relationships between IFT implementation and central bank's effectiveness and credibility or its ability to influence expectations of consumers, business and experts. It makes it possible to

Tab. 3:	Sample description	
Feature	**BoE**	**CNB**
Inflation targeting introduction	1992 (since 1998 independence in decisions on interest rates)	1998
First forecast publication	January 1998	April 2001
Research period	Jan 1998 – Dec 2014	Apr 2001 – Dec 2014
Interest rate assumption	CIR, ME, both are published, ME as the first one since Aug 2004	CIR, since July 2002 endogenous
Number of forecast	68	55
Number of decisions	203	136

Source: own

Tab. 4:	Mean results on IFT index	
Feature	**BoE**	**CNB**
Mean IFT index	9.38 (67%)	11.85 (85%)
IFT σ	1.1	1.6
Mean transparency	7.36 (74%)	8.27 (83%)
Decisions compatibility	0.84 (42%)	1.80 (90%)

Source: own

compare the decision-making procedures and the central bank's attachment to IFT. Thus, it offers the possibility for further research.

4. Possible Implementation of the IFT Index

The final section presents briefly the IFT index for two central banks: the Bank of England (BoE) and the Czech National Bank (CNB). They are both inflation targeters with quite a long history of inflation forecast implementation. The sample is described in Tab. 3. Both central banks refer to the forecast in the monetary policy. They use different interest rate assumptions.

Tab. 4 presents mean values of the index for both countries. The CNB was more consistent in IFT implementation with the

mean index value of 85%. It also outperforms the BoE on the field of forecasting system transparency. The difference in decisions' compatibility between the central banks' is remarkable: according to the methodology presented in section 3, the BoE decisions covered IFT logic only in 42% in comparison to 90% in the case of the CNB.

Fig. 7 presents the evolution of the IFT index of the BoE during the research period, Fig. 8 – IFT index for the CNB. Fig. 7 does not capture any substantial change in IFT implementation. Its fluctuations are due mainly to decisions' compatibility or non-compatibility with the forecast and irregular publication of additional information. Fig. 8 captures remarkable institutional change in inflation forecast targeting. At the beginning of 2008

Fig. 7: **IFT index of the Bank of England in 1998-2014**
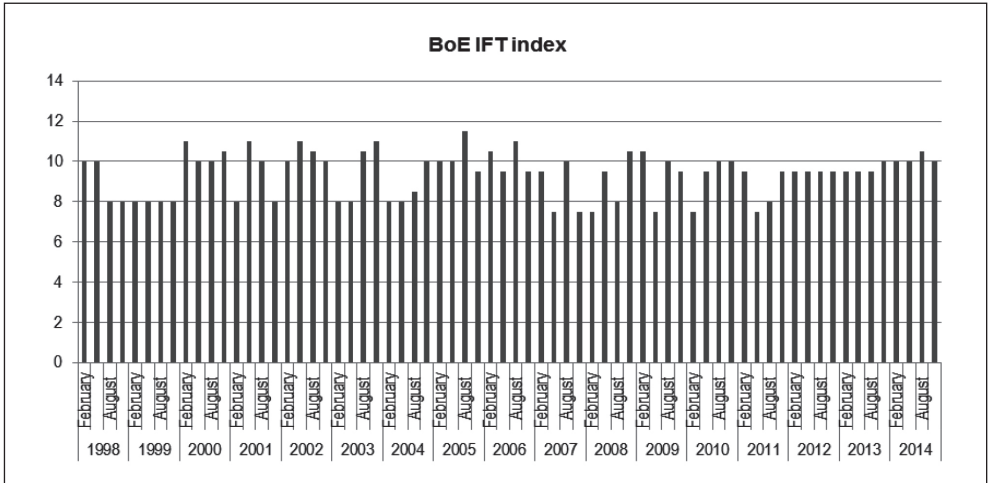
BoE IFT index

Source: own

Fig. 8: **IFT index of the Czech National Bank in 2001-2014**
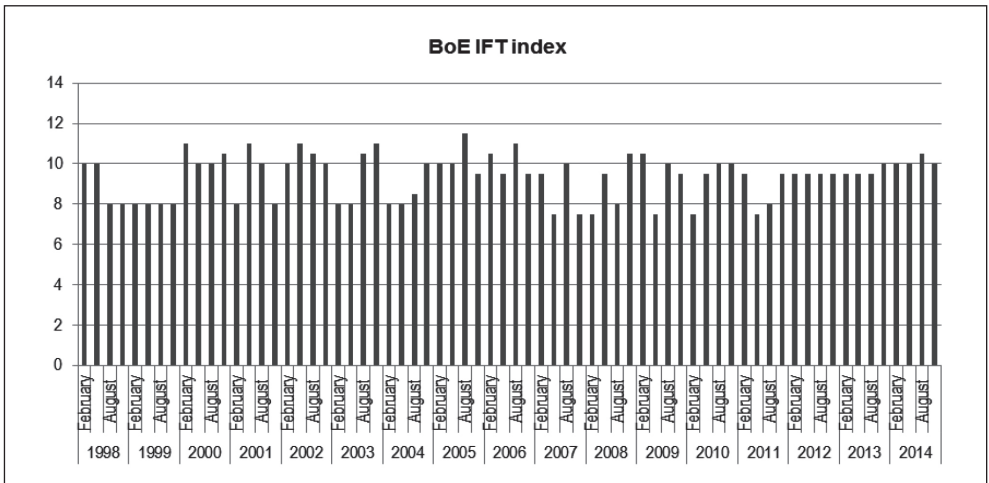
BoE IFT index

Source: own

the CNB switched to DSGE model (Dynamic Stochastic General Equilibrium Model) at the same time revealing numerically policy path. The enhanced transparency (covering also risk description) resulted in higher IFT index.

The Bank of England used the forecast in the research period in a similar way. The level of IFT was just in line with its declaration on the forecast importance in the monetary policy. The BoE did not switch to interest rates endogenisation. Its communication after the MPC meeting covered the message of the forecast, however, the forecast never gained a central position in the decision explanation.

The CNB commitment to IFT was really strong. The central bank followed the message of the forecast even in the most turbulent period of financial crisis eruption in Europe. Its attitude is confirmed by the analysis of the point attribution to the timing. The CNB made decisions on the interest change (if such a change was necessary) just after producing the forecast. It did not take wait and see position. The CNB communication on the decision also focused on the forecast. Not only was the central path of inflation and policy path presented but also balance of risk. During the MPC meetings in the months in which there was no forecast, the MPC discussion focused on the assumption divergence from the starting point level and its possible impact on the central path for inflation.

Conclusions

The paper presents a conceptual framework of the analysis and measurement of inflation forecast targeting. No consistent IFT index has been presented in the literature up to now. The need for such a measurement is obvious as according to the modern monetary theory, monetary policy needs to be forward-looking. The best way to implement forward-lookingness is the reference to the forecast in the monetary policy. The central bank's forecast of inflation (and other variables) facilitates a decision-making process. It may even become the monetary policy intermediate target, at least implicitly (without such a declaration). It also draws the framework for the central banks discussion. On the other hand, publishing the forecast and information on forecasting system may enhance the central bank's impact on expectations.

The IFT index covers all aspect of the forecast use. However, it is possible that after some time additional questions will be needed. The first proposal on measuring central bank transparency covered goals and decisions publication. Nowadays this seems obvious. The policy path publication differentiates the central banks. The next step in transparency is also possible. The example is publication of bilateral exchange rate forecast done by the CNB since 2009. The index may evolve with the evolution of the monetary policy.

The researchers have always searched for tools for verification relations existence. IFT index is such a tool. It is easily applicable as the way of point attribution is consistent with the practice of modern central banks. Up to now the index has been used to compare the level of consistency in the inflation forecast targeting and the interdependences of the forecast and inflation expectations of consumers (Szyszko, 2015). Measurement of the IFT requires the reading of Inflation Reports (or equivalent documents) and central bank's statements. It draws a broader context for monetary policy and its implementation in the central bank covered by the examination.

The need of IFT index elaboration is obvious also in the light of the on-going discussion on the central bank's options for signaling its intentions. Various versions of forward guidance are discussed including quantitative forward guidance which takes form of policy path publication in a numerical way (Svensson, 2015; Woodford, 2013). This paper opens the discussion not on the need of IFT measurement but on possible improvements of the index.

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Abstract

MEASURMENET OF INFLATION FORECAST TARGETING. A PROPOSAL OF METHODOLOGICAL SOLUTION

Magdalena Szyszko

The paper offers a methodological solution to measuring inflation forecast targeting (IFT). IFT is a central bank's procedure which consists in: producing its own inflation forecast, revealing its results and making interest rates decisions on the basis of the forecast. Inflation forecast targeting is implemented, to some extent, by any central bank implementing inflation targeting framework. It facilitates the forward-looking attitude of the central banker. This forward-lookingness facilitates the expectations shaping and goals achievement. The literature on IFT is broad but it does not cover a concise framework for IFT analysis and measurement. The following contribution fills in this gap. It presents the IFT index. The idea of its elaboration is in line with any monetary policy qualitative aspects measurement: 5 aspects of IFT are distinguished, each of which having a system of points attribution described. These aspects are: forecasting methodology, declaration on the forecast role in the monetary policy, forecast publication, actual central bank's practice and ex post forecast evaluation. Actual central bank's practice covers the assessment of the central bank's decision compatibility with the message of the forecast. The multivariate scheme of assessment which considers central bank's flexibility in the decision making process – guaranteed by the framework of the inflation targeting – is elaborated. The other IFT aspects' evaluations consist in the analysis of the information revealed. The IFT can be divided into two sub indices: one covering only the forecasting system transparency and the other one – for decisions compatibility check. The IFT index and sub-indices are universal in the sense of considering the IFT broadly on the basis of various central bank's practice. The index can be used to cross-country and over time comparison – such an example is also presented in the paper. It also makes it possible to verify the hypotheses on the central banks' consistency in implementing IFT – measured by IFT index – and the central banks' performance.

*   **Key Words:** *Inflation forecast, inflation forecast targeting, inflation forecast targeting measurement.*

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