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IS CENTRAL BANKS' EFFECTIVENESS RELATED TO THEIR TRANSPARENCY? A CASE OF EUROPEAN ECONOMIES

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Abstract

This article presents a novel transparency measure and examines forward-looking transparency of six European central banks. It aims at evaluating whether the higher degree of transparency is related to better economic stabilization expressed in terms of output and inflation gap minimization. The methods used are based on data and a statistical analysis. To extract the cyclical component of time series, the Hodrick-Prescott filter is employed. The research covers the Czech National Bank, the National Bank of Hungary, the National Bank of Poland, the National Bank of Romania, the Bank of England, and the Sveriges Riksbank during 1997–2016. Firstly, we develop an index of forward-looking transparency that focuses on signalling intentions by the central banks. It is one of the main contributions of our article. Secondly, we compare transparency in the field of signaling intentions within our sample, which is another aspect of originality of this study. The results indicate that the Czech National Bank and the central banks of developed economies outperform the other central banks from our sample in terms of openness. Finally, under some caveats, we relate the degree of transparency to the levels and volatility of output and inflation gaps. We find the existence of the relationship between the central banks' transparency and their effectiveness mainly for Czech Republic and the UK, but also, although to a lesser extent, for Poland and Romania.

Keywords: central bank transparency, forward-looking communication, inflation gap, output gap, Hodrick-Prescott filter

JEL classification: E52, E58

Introduction

Rising central banks' transparency has been a fact since the nineties of the 20th century. Openness is a part of modern monetary policy strategy. Transparency should facilitate economic agents' expectations formation, and thus–policy goals achievement and central banks' accountability. A.C. Cukierman and A.H. Meltzer (1985) provided a theoretical model of central bank's ambiguity and credibility under the assumption that the central bank acts discretionally under information asymmetry. They launched the discussion on central bank transparency: its pros and cons. Their general conclusion was that the ambiguity may be beneficial for the policy makers when they want to support the economic growth. Over a thirty years after the canonical paper by Cukierman and Meltzer, the conclusion on central banks transparency has remained unchanged: there are pros and cons of monetary policy transparency. Despite the existence of some transparency drawbacks, nowadays, institutional arrangements differ substantially from the situation that occurred in the 1980s. A starting point of the discussion on the central bank transparency was whether policy makers should present their goals to the public. Right now, economists dispute how (not whether) a central bank should reveal its intention.

In this paper we would like to discuss central banks' transparency in the light of their goals achievement. We aim at comparing the transparency degree and economic performance for six European economies and their central banks: the Bank of England (BoE) and the Sveriges Riksbank (SR), which represent developed economies, as well as the Czech National Bank (CNB), the National Bank of Hungary (NBH), the National Bank of Poland (NBP), and the National Bank of Romania (NBR). The latter group represents emerging market economies. The economies in our sample are inflation targeters (IT) and the European Union member states with an independent monetary policy. Thus, they share similar monetary frameworks including the approach to the central bank's goals. The starting point of the research varies across the countries and is related to the moment when the modern monetary strategy was implemented and the extent of revealed information was sufficient to conduct this examination. The research period ends with the end of 2016.

We assume that higher transparency in the field of signaling intentions, which we call forward-looking transparency, is related to more effective achievements of the central bank's goals: lower both inflation and output gaps.

The contribution of this paper covers the application of transparency measure focused on the most recent developments in the central bank's communication – the way how central banks reveal their intentions. We develop, on the basis of our own methodology, the index that proxies

forward-looking transparency. It is described in the methodological section. It is one of the aspects in which the current research is distinguished from the other studies. The prevalence of our index over standard transparency measures consists in the inclusion of intentions publication only. The very standard set of information revealed (as the one about the goals) is removed. Thus, the index is adjusted to the up-to-date practice of the central bankers. The limits of the transparency shift quite quickly, especially in times when the central banks are looking for some additional tools to respond to various unexpected economic shocks, both internal and external. This quickly evolving central bank practice motivated us to this research exercise and the application of intention-focused transparency measure.

We correlate the analysis of the central bank transparency with their ability to achieve their goals. It is another important contribution of the paper making it different from other studies. We consider that the central banks conduct a double mandate policy: they explicitly target inflation, but they also stabilize the output gap as the real sphere creates inflation pressure. This is also reflected in the central bank's quadratic loss function: central bank minimizes both the deviation of inflation from the inflation target (inflation gap), and the deviation of output from its potential level (output gap). To discuss the transparency relation to the goals achievement, we analyze statistical data in the light of central banks' transparency measured in an innovative way.

One of the motivations of the research is that empirical literature supports the advantages of greater transparency. Hence, the analysis of central bank's transparency can be helpful for policy makers to avoid undesirable outcomes in macroeconomic performance. In the economic literature, the advantages of greater transparency were evidenced both for pre-crisis (e.g. Gürkaynak, Levin, Swanson, 2006) and post-crisis periods (Ehrmann, Eijffinger, Fratzscher, 2012; Dincer, Eichengreen, 2014). In this regard, it is interesting to assess the transparency in the selected Central and Eastern European countries, which are new EU member states.

The results should have important policy implications. For example, if the relationship between the central bank's transparency and a macroeconomic performance turned out to be significant, the outcomes of this study would directly show what could be done by the monetary policy makers to reduce the risk of financial and economic crises in the future. Moreover, as indicated e.g. by P. Hubert (2015), the central banks have the ability to influence professional forecasts via their inflation forecasts in advanced economies. The importance of the topic makes this study worth conducting and publishing.

The article is organized as follows. After the introduction, we present a literature review to compare our research against the existing literature on monetary policy transparency. The next

section presents our methodology and a sample. Then, we discuss both our results and our interpretations of those results. The final section concludes.

1. Literature review

The most general approach to monetary policy transparency refers to the extent of information revealed to the public (Geraats, 2002).[1] It does not discuss the quality of information, its usefulness, or understanding by the public. Transparency is a qualitative concept that refers to the scope of information revealed. Therefore, once we aim at comparing central bank's practices in the field of communication and their evolution over time, and relate it to the goals achievement, we need to define a proxy that would measure the transparency. The literature delivers some proxies of transparency. Indices of transparency, the most commonly used in empirical research, are described by M. Fry, D. Julius, L. Mahadeva, S. Roger, and G. Sterne (2000), L. Bini-Smaghi and D. Gros (2001), A. Fracasso, H. Genberg, and Ch. Wyplosz (2003), and S.C.W. Eijffinger and P.M. Geraats (2006). They are index-based measures created on the basis of the factor analysis – possible variables influencing the transparency are identified theoretically and empirically. A broad set of such factors is usually captured by the index, as neither central bank's practice nor legislation vary vigorously. Narrow indices would not capture any change of transparency over time. Slow moving values appear especially in the categories which assess the aspects of transparency related to strategical choices, while they are more changeable when central banks' day-to-day challenges are covered. All the indices listed above were presented in the literature at the beginning of the 21st century, and they refer to the central banks' practices that occurred about twenty years ago. Thus, they become slate over time: it is not possible to forecast all the subsequent steps of central banks' transparency and include them into an index. This downgrading happened also to the indices mentioned above. They mostly cover very basic information about monetary policy that may be reveled: goals, strategical choices, decision announcements, and their rationale. These indices cover a forward-looking analysis only to a lesser extent.

[1] An expression provision to the public is crucial here. In practice, the modalities of information disclosure are numerous, including release of minutes, speeches, interviews, press conferences, written statements, reports (including inflation reports and financial stability reports), background documents and research working papers, website, and most often, blogs or chats with the public. Inflation reports and minutes' contents are frequently analysed (see Blinder, Ehrmann, Fratzscher, de Haan, Jansen, 2008; Montes, Oliveira, Curi, Nicolay , 2016).

However, there are also alternative definitions of transparency. The one developed by A.S. Blinder (2001) describes transparency as providing sufficient information for the public to understand the policy regime.

The index compiled by S.C.W. Eijffinger and P.M. Geraats (2006) is an exception in the group of the indices that are above, as it is a bit more future-oriented. As this is a well-known index, we just mention that it covers five aspects including economic transparency (and a release of forecasts). The index is also widespread in follow-up research. C. Crowe and E. Meade (2008), N.N. Dincer and B. Eichengreen (2008, 2010, 2014), and P.L. Siklos (2011) used it to elaborate on a comprehensive report on central bank(s) transparency. T. Łyziak, J. Mackiewicz and E. Stanisławska (2007) applied the index to the analysis of the IT regime in Poland. S. Bajalan, R. Raei and R. Tehrani (2012) included it into their own index that refers to a more sophisticated definition of transparency. The popularity of the S.C.W. Eijffinger and P.M. Geraats index is related to its perfect grounding in the modern economic theory and concise taxonomy of transparency: both presented by P.M. Geraats (2002).

In contrast to the existing general transparency measures, we elaborate on the index that detects only the forward-looking aspects of the central bank's communication. To the best of our knowledge, such an index has not yet been presented in the literature. A focus on the chosen aspect of transparency instead of its generalized analysis was presented by P.M. Geraats (2014a). She carried out a theoretical model-based analysis of the economic transparency impact on the economic stabilization. G. Coenen et al. (2017) provided an analysis of even more detailed aspects of communication: announcements of asset purchase programmes and the use of forward guidance.

Once we get at our disposal a measure of transparency, we could (1) compare the transparency of the central banks in our sample, and (2) correlate their transparency to the inflation gap and the output gap: their stabilization is the central bank goal. Relating the index of transparency to the economic performance is a standard research exercise undertaken by the researchers that analyze transparency and other institutional arrangements of monetary policy. Some papers provide only a statistical analysis of transparency and other economic variables (Siklos, 2011), whereas some other – model-based results (Dincer, Eichengreen, 2014). Generally, the empirical results suggest a greater increase in transparency in Central and Eastern European (CEE) economies, as well as a closer link between the transparency and other economic variables in these countries. This result – specific to young market economies – could be attributed to many other factors, including the speed of disinflation process in comparison to developed economies. Similarly to the other studies on the subject, we do not control for

the possible set of transparency drivers, remaining aware of this caveat while interpreting out results.

The notable increase in the openness of macroeconomic prospects and the recent advance of forward policy guidance are a fact nowadays (Geraats, 2014b). This is why we decide to cover a forward-looking dimension of the central bank communication. The evolution in signaling central banks' intentions is quite obvious. Firstly, central bankers published inflation outlooks that combined the model-based assessment of the future economic performance with a qualitative analysis of inflation drivers. Secondly, inflation forecasts (or projections) were revealed. Thirdly, the forecasted path of real variables (e.g. GDP, output gap, or unemployment) was publicized. Fourthly, some central banks, not numerous up to now, have recently decided to reveal a quantitatively presented policy path. Analogously to this natural evolution of communication, the global crisis and its implication for the central bankers, triggered a modification of communication. A greater focus on signaling policy intentions should generate boom expectations, and thus replace, to some extent, the interest rate policy which was ineffective at a deflation trap. Forward guidance started to widespread as a novel approach to communication. Contrary to the policy path publication, which simply means an announcement about the prospective path of monetary policy within a horizon beyond the next meeting of its decision-making body, forward guidance should be a commitment (NBP, 2013). Only a binding declaration may encourage economic growth in the country: by committing not to tighten the policy until the economy has used up more of its spare capacity (Fisher, 2014). However, the central bankers themselves avoid declaring that forward guidance is actually a commitment, at least not as a simple commitment to a specific path (Miles, 2014).

Moreover, some authors, such as M. Woodford (2013) and L.E.O. Svensson (2015), perceive a qualitative publication of policy path consistent with a macroeconomic forecast as an obvious way to conduct a forward guidance policy. This is the approach announced by Sveriges Riksbank (SR, 2017). Extension of the communication with the markets in the direction of sending more explicit intention signals has been widely discussed in the literature. The results of such a discussion are not conclusive – pros interlace cons (see Kahn, 2007). Nonetheless, the predictability of monetary policy decisions has improved notably in many countries even before the global crisis. With only a few exceptions, the empirical studies suggest that more and better central bank communication contributed to this improvement (Blinder et al., 2008). Very recent surveys among central bankers and scientists revealed that the central banks of the economies in crisis have resorted to new policies, have had enhanced discussions about mandates, and have communicated more (Blinder et al., 2017). Nowadays, the practice of the central bankers

acknowledges the need of greater openness in the field of intentions (Draghi, 2014). In this examination, we take for granted a long-run one-way move towards greater transparency while avoiding its appraisal.

The remarkable shortcoming of the existing indices of transparency is that they depend on the actual central banks' practice and become out-of-date over time, as they do not capture up to date practices. That is why, there is a room for a methodological development. This article offers such an actualization. We elaborate indices that could be applied, among others, to time comparison. Overtime transparency comparison is a demanding task and there is no commonly used approach to do it (see e.g. de Mendonça, Galveas, 2013, who apply a credibility measure as a representation of transparency to obtain a measure suitable to time series analysis).

2. Data collection and methodology

The data set that we use in this research to compare the transparency and effectiveness of six central banks incorporates: a transparency index, inflation gap, and output gap. We use quarterly data for the 1997–2016 period. However, due to missing observations, time series are shorter for some countries. The most important information about the sample of the countries, time period, and the data used is given in Table 1.

Table. 1. Sample and the data set description

Sample and data	Description
Sample coverage*	UK–Bank of England (1998Q1–2016Q4), Sweden – Sveriges Riksbank (1997Q4–2016Q4), Czech Republic – Czech National Bank (2001Q2–2016Q4), Hungary – National Bank of Hungary (2001Q3–2016Q4), Poland – National Bank of Poland (2004Q3–2016Q4), Romania – National Bank of Romania (2005Q3–2016Q4)
Transparency (FRT) index	The index coverage is described in Table 2; The information to proxy the transparency with the use of an index was derived from: central banks' websites (including the decisions' announcements and rationales) and Inflation Reports (or equivalent documents) where macroeconomic forecasts are published
Inflation gap	Quarterly inflation figures from national statistical offices confronted with central banks' inflation targets (announced in central banks' strategical documents). The inflation gap defined as the deviation of inflation from the targeted level
Output gap	GDP in current prices, seasonally adjusted, from Eurostat database, then smoothed by 5-period moving average. The output gap was calculated as the deviation of smoothed GDP from the trend value (in percentage terms). The trend was estimated by Hodrick-Prescott filter

* Starting and ending point of the research period for each country in parentheses. The time period depends on the moment when a modern strategy was implemented and on whether the scope of information about the future policy actions was sufficient to conduct this examination.

Source: authors' own elaboration.

The inflation gap is calculated by us as the difference between the observed inflation (taken from national statistics) in a given quarter and the inflation target, according to the central bank's policy. The inflation gap is estimated for each quarter separately. The observed inflation in a given quarter is measured on an annual basis that is compared with the analogous quarter of a previous year. The gap is given in percentage points.[2]

The output gap is calculated on the basis of quarterly GDP levels, taken from Eurostat database. The original GDP data, seasonally and calendar adjusted, were smoothed by us with the use of 5-period moving average to avoid irregular fluctuations and to eliminate sharp changes in the data.[3] Such a time series includes trend and cycle. To eliminate the trend, Hodrick-Prescott filter was applied.[4] The output gap for each quarter was then calculated as the deviation of the smoothed GDP time series from the trend. Deviations were calculated in percentage terms: the observed GDP level (after smoothing) minus the trend, divided by the trend. As the result, the output gap shows only cyclical fluctuations. A positive output gap means that the observed GDP exceeds the trend value (which is the proxy of potential GDP), while a negative output gap indicates that the observed GDP is less than the potential (trend) level.

The transparency index is estimated by us on the basis of our own methodology. A simple index of forward-looking transparency (FRT index) in the field of signalling central banks' intention is the transparency proxy that we use in our examination. It is described in Table 2. We exclude from this measure any standard information revealed by the central banks (such as goals and strategy description, and decisions announcements), as we consider them as standardly revealed information (the same level of transparency for the entire sample). From the other hand, we do not incorporate into the index very sophisticated information that could possibly affect the perception of subsequent policy actions by specialists (risk assessment or past

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[2] An alternative approach would be to use an inflation gap expressed in percentage terms, that is the difference between the observed inflation and the inflation target, divided by the inflation target. In the current approach, we use an inflation gap expressed in percentage points, as in the paper by Taylor (1993). Unlike the cited paper by Taylor, we use a consumer price index (CPI) instead of the GDP deflator to show the observed fluctuations in prices.

[3] The length of the moving average is to some extent the Authors' own decision, but it reflects a reasonable compromise between short-run and long-run data averaging. The lower the number of periods included in the moving average, the better fit of time series to actual fluctuations, but also the greater bias caused by irregular changes. However, the number of periods included in the moving average cannot be very high because cyclical fluctuations will not be properly visible. A 5-period moving average seems to be a good solution and it closely corresponds to the number of quarters in a single year.

[4] Since there is some criticism of the Hodrick-Prescott (HP) filter (raised e.g. by Hamilton, 2017), it is still a very popular tool to extract cyclical fluctuations from the trend. Hamilton (2017) suggests that there is a better alternative, namely a regression of the variable at period $t + h$ on the four most recent observations as of date t. This approach achieves all the objectives of the HP filter with none of its shortcomings (it is desirable with seasonal data for h to be an integer multiple of the number of observations in a year – the recommended value for quarterly data is $h = 8$). The other methods of estimating the cyclical component include, *inter alia*, the Baxter-King or the Christiano-Fitzgerald filters (Baxter, King, 1999; Christiano, Fitzgerald, 2003).

forecasts errors discussion). Therefore, our index reflects the communication oriented towards general public rather that specialists.

Table 2. Forward-looking transparency (FRT) index coverage

Information	Points attribution
Model (1)	Describes a general cause and effect relation in the economy. Thus, its description could facilitate the understanding of policy outcome. **One point** – at least general description of the model and its application in monetary policy is published. **No points** – no reference to the model in official central banks' documents
Frequency of forward-looking information publication (1)	Frequency of inflation/macroeconomic forecasts publication. **One point** – the forecasts are revealed with at least quarterly frequency. **Half of the point –** it is published biannually. **No points** – for less frequent publication
Central path of inflation (2)	The information of higher weight: inflation is a central bank's priority. **Two points** are given when the most probable path of inflation throughout the entire monetary policy horizon is presented numerically (or on the fan chart). **One point** is attributed for fixed-event publication (usually at the end of subsequent years). **No points** – when less precise information on inflation outcomes is presented
Real sphere variable forecast (1)	Real sphere outcome affects inflation: flexible inflation targeting incorporates, targeting the output gap as well. **One point** is attributed when a real sphere variable (GDP, an output gap, or unemployment forecasts) is revealed in analogous way to the central path of inflation. **Half of the point** – once a real sphere outcome is treated as the inflation driver rather that the forecast. **No points:** no information regarding future development of the real sphere is revealed
Policy path (2)	Again, higher weight is attributed to this information as it can explicitly guide expectations. **Two points -** for numerically expressed (including a fan chart) policy path for the entire monetary policy horizon. **One point** – for the description of the nearest rates movement. **No points:** once the path is not presented
Announcements (1)	The importance of forward-looking information in decisions announcements and rationale. Once the description of forward-looking components prevails – **one point** is attributed. **Half of the point** – when there is an explicit reference to forecasts, but it does not dominate in communication. **No points:** in the case of no reference to economic outlook
Forward guidance (2)	Any kind of commitment regarding future policy actions: interest rates accommodation, assets purchase programmes, or exchange rate arrangements is accounted as forward guidance. A fixed-date or conditional forward guidance is attributed **two points**, whereas a qualitative declaration is given **one point**. Higher weight is attributed to this component as this is the most binding declaration of the future policy-maker actions. **No points**: no forward guidance policy is conducted

Note: The maximum number of points for criterion is given in parentheses.

Source: authors' own elaboration.

FRT index consists of two main components: the way how the macroeconomic forecasts are revealed, and forward guidance. The former – the macroeconomic forecast – describes the future economic condition in a more general way, giving implicit or explicit information about the prospective policy accommodations. Our index incorporates: the information about transmission model, future inflation (central bank's priority), real sphere variable (as according to the modern economic theory, the output gap is the inflation driver), and the policy path publication, which

is the most direct declaration on the subsequent policy actions in the monetary policy horizon. Additionally, we attribute points for higher frequency of forward-looking publications and the incorporation of forward-looking information into decision rationale.

The latter – forward guidance – refers to any kind of central banks' information about its actions within the horizon, beyond the next policy meeting. We perceive it rather as a commitment, regardless of some restrictions made by central bankers. The forecast (even if a policy path is published) is never a commitment. It simply presents the most probable –according to the central banks – picture of economic outcomes conditional on some forecasts assumptions. It can deliver a forecasts consistent policy path, but still, the path presents the first best option conditional to the set of assumptions at the cut off day, and it might not be followed by the central bank for many reasons. Forward guidance is a much more binding declaration. Nonetheless, as we have already mentioned, it is not a simple and ultimate path of policy. There are at least two reasons why. The first one relates to the way how the forward guidance may be announced: from a less clear qualitative declaration (e.g. "for some time"; "for extended period"), through a fixed-event declaration (e.g. "to mid-2020"), to conditional guidance when some threshold value is given that, once reached, would trigger policy accommodation (e.g. "until the unemployment rate falls below 6%"). The qualitative forward guidance is less obvious than the two other options. However, even when the fixed-event or conditional guidance is conducted, the central bank may relate it to the other conditions as the unchanged risk for the inflation outlook. In our index, we attribute more points for a more explicit declaration about policy accommodation.

We calculate the values of our index quarterly, for each central bank separately. Then we relate the forward-looking component of central banks transparency to the inflation gap and the output gap that actually were registered in our sample. It opens the possibility to conclude on the interdependence of the transparency and the goals achievement under some further restrictions that we mention in the next section. If, due to some reasons, the central bank does not publish information each quarter, and calculating the FRT index for a given quarter is impossible, we have calculated the FRT index as an arithmetic average of the values for the preceding and the subsequent quarter. This refers primarily to Poland. Since the NBP produces three projections per year, three observations per annum have been available since 2008.

The research procedure incorporates:

– the elaboration and interpretation of a simple index of the central bank's intentions which assess the extent of forward-looking communication (forward-looking transparency index),
– a cross-country and over-time comparison of the index values in our sample,

– calculation and the statistical analysis of the inflation gaps and the output gaps, and
– the reference of the gaps values to the central banks' transparency in the field of intentions.

3. Results and interpretation

We start our analysis with the comparison of FRT index values across our sample (Figure 1). In the entire sample, an increase in the transparency of central banks' intention is observed. This is in line with a recent development of the approach to modern monetary policy implementations – more central banks acknowledge the advantages of a more open expectations-oriented policy. It is also consistent with some common practice of central bankers; they show some reserve towards great transparency and accept higher openness after some time. Following the solutions of other central banks is also practiced. Some steps back also occurred, but they do not disturb the general picture of rising transparency over time in our sample.

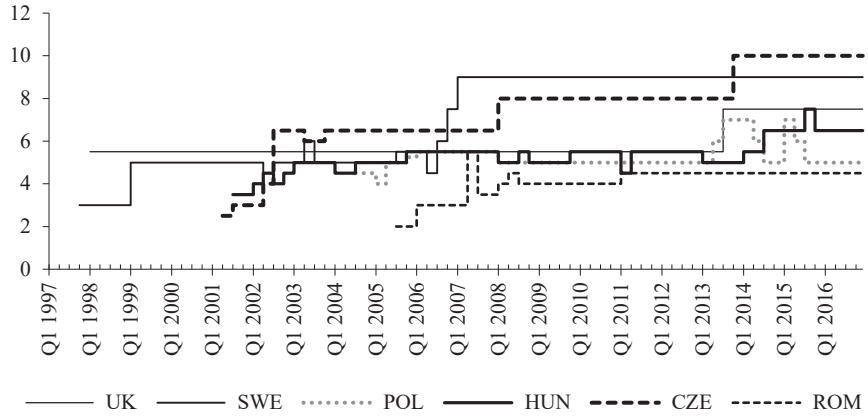


Figure1. Forward-looking transparency indices in the six EU countries

Source: authors' own calculations.

The rise of forward-looking transparency is not necessarily linked to the incidence of the global crisis. Some enhanced communication measures were rather undertaken when a standard toolkit was not sufficient. Forward guidance was implemented in 2013, or even later, and in some cases (as the case of NBP) suspended.

Developed economies outperformed the Central and Eastern European countries in signalling the intentions of policy makers at the beginning of the 21st century. Since in those

days the central banks in the CEE countries had just launched modern monetary strategies, this was a very expectable result. The fact that since 2013 this has been the Czech National Bank that has outperformed the rest of the sample is not quite obvious. This result is due to the exchange rate forward guidance that commenced in 2013. It was also related to the general philosophy of the Czech policy makers, who never avoided extreme transparency. Except for belonging to an exclusive club of several central banks that publish numerical policy path, the CNB has presented since 2009 the forecasts of bilateral EUR/CZK exchange rate evolution. Moreover, it enhances the communication towards a general public with the use of social media. It was awarded a Central Banking Transparency Award in 2015. Such extended transparency of the CNB can be explained by its positive experience with greater transparency, including the application of a forecasts-oriented monetary policy (Clinton et al., 2017). There is no simple conclusion why some central banks pace the path towards greater transparency much faster than the others. Central banks of Romania, Poland, and Hungary conducted a much less transparent monetary policy than the remaining three central banks. Unlike the results of the previous studies that were mentioned in the review of the literature, this analysis does not confirm a more substantial move of the above mentioned central banks towards their greater transparency. Our results can be in opposition to the examinations of general transparency, as we take a publication of some basic facts on a monetary policy for granted, and focus only on the forward-looking communication. Three out of four young market economies' central banks in our sample were quite reserved regarding sending signals of their future actions.

Each time when our index captures a decrease of transparency, it is related to the withdrawal of forward guidance, or the fact that some changes in communication were temporary – as in the case of the NBH, where the policy path was commented in Inflation Reports only for some time. In some cases, the structure of the decisions announcements and their rationale were rearranged – the forward-looking component role was diminished.

Generally, as we observe the increasing forward-looking transparency of the central banks in question, we can expect its relation to their goals achievements. We express the goals in terms of both the inflation gap and the output gap. It is consistent with the central bank loss function. Nonetheless, we do not estimate the function itself.

Descriptive statistics of the time series used in this study are shown in Table 3. As regards the output gap, the data indicate that the most stable dynamics of the output was recorded by Poland. The magnitude of the output gaps in Poland (i.e. the difference between the highest and the lowest output gap) equaled 4.81 percentage points. This outcome results partly from the fact that Poland was the only EU country that avoided recession during the global crisis.

Cyclical fluctuations were also relatively low in the UK, Hungary, and Sweden. On the other hand, Romania was the country that exhibited very large GDP fluctuations with the maximum output gap exceeding 10%.

The behaviour of the inflation gap was similar to that of GDP. The lowest fluctuations in the inflation were recorded by two Western countries and Poland. Romania was characterized by the highest magnitude of inflation fluctuations (the difference between the maximum and minimum deviation of the observed inflation from the targeted level amounted to 11.07 percentage points). The similarity of both the output and inflationary fluctuations, strengthened by the analysis of Figures 2–7, points to the fact that prices behaved rather procyclically in the analysed countries during the studied period.

Table 3. Descriptive statistics of the analysed time series

Statistics	Czech Republic	Hungary	Poland	Romania	Sweden	UK
Output gap						
Minimum	–2.88	–2.16	–2.46	–5.82	–2.92	–2.30
Maximum	4.82	3.67	2.35	10.47	3.21	3.36
Standard deviation	1.93	1.41	1.15	3.55	1.31	1.16
Mean	–0.17	0.01	–0.20	–0.18	–0.04	–0.05
Median	–0.62	–0.28	–0.44	–0.99	–0.24	–0.18
Inflation gap						
Minimum	–3.56	–3.90	–4.00	–5.96	–3.55	–2.00
Maximum	3.50	5.80	2.30	5.11	2.25	2.80
Standard deviation	1.44	2.45	1.87	2.62	1.21	1.25
Mean	–0.53	0.56	–0.48	0.49	–0.90	–0.26
Median	–0.70	0.50	–0.20	0.89	–1.06	–0.50
FRT index						
Mean	7.50	5.30	5.25	4.00	7.50	5.90

Source: authors' own calculations.

The results of our examination are presented in Figures 2–7 for the subsequent central banks from our sample. Prior to their interpretation, we need to make some general remarks. First of all, we incorporate an information lag of two quarters into our analysis (and this is how the values are presented in Figures 2–7). It means, for example, that the level of FRT index registered at 2001Q1 is presented with the inflation and the output gaps registered at 2001Q3 (that is why, the FRT index time series in the figures start two quarters after the beginning of the observation period). Such an information lag is a standard assumption of any research where a set of information is assumed to affect some economic variables. Economic agents need time to process sophisticated information published by the central bank.

Secondly, we need to make some caveats about the results interpretation regarding the scope of variables that it covers. We aim at relating the degree of forward-looking transparency to the central banks' goals achievement. Nonetheless, we are aware that this is not only transparency that affect the economic performance. We do not control other variables. Our research period covers the global crisis. Since 2008 many central banks, including some of our sample, have hit zero lower bound and have adopted a non-standard policy toolkit. In the review of the literature, we presented some examinations that confirmed the effects of transparency on economic output, and in this study we simply check whether the data confirm it. On the other hand, we do not analyse the factors affecting the transparency itself.

Thirdly, the economies that we cover in our study vary depending on the volatility of the inflation gap and the output gaps. It might refer to some extent to the strategical option applied by the central banks – in Czech Republic a standard deviation of the output gap was high in comparison to the other economies in our sample, whereas it was low in the case of the inflation gap. The NBP seemed to focus more on the output stabilization, which means that its strategy was more flexible (aimed more explicitly at output stabilization).

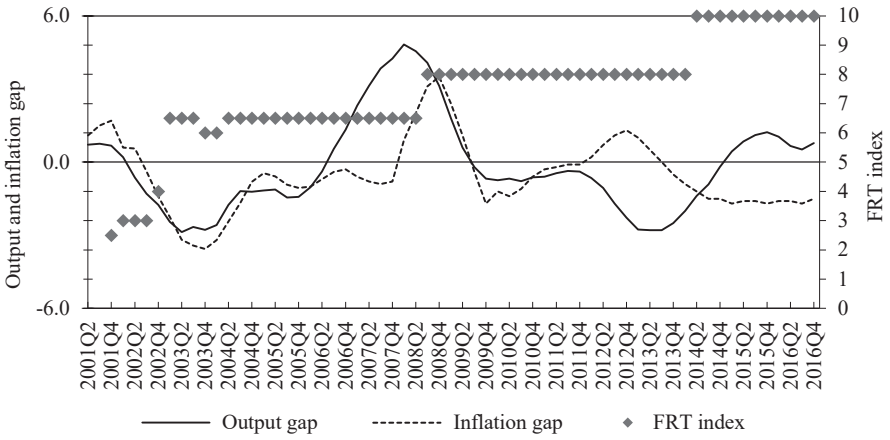
Fourthly, it is necessary to emphasize that the studied variables, notably the output gap and the inflation gap, depend on numerous determinants. For example, economic growth depends on both demand-side and supply-side factors, such as consumption and investment spending, fiscal and monetary policy, financial sector development, and many other determinants that affect the growth rate of GDP. Similarly, there are many causes of inflation which can be driven by excessive demand (demand-side inflation), but also by a negative supply-side shocks (cost-inflation). In this study, we do not exclude the impact of the other factors on both GDP and inflation gaps when examining the relationship between the two gaps and the FRT index.

Fifthly, the output and inflation gaps may be bilaterally correlated. For example, in the case of demand shocks, the positive output gap occurs along with the accelerating inflation, while in the case of a negative demand-side shock, both may appear – a decrease in the inflation and a fall in the output. Quarterly data highly reflect demand-side shocks as they reveal short-run fluctuations in the output.

Despite these issues, the analysis yield reliable results in terms of the relationship between the central banks' forward-looking transparency and both the output and inflation gaps. The results are interesting from both a cognitive and an applicable point of view.

In some cases, a higher degree of FRT index is related to the lower volatility of the output and inflation gap. Such a result meets our expectations. It is especially visible for the Czech National Bank (Figure 2) and the Bank of England (Figure 7). The lower volatility of economic

performance in Czech Republic started about 6 quarters after the explicit interest rate path had been published. In the UK, it started after the introduction of forward guidance. The CNB outperforms the BoE in transparency, but in both cases the change of communication occurred prior to the change of gaps volatility.



Note: The value of transparency index is 2Q lagged in relation to gaps.

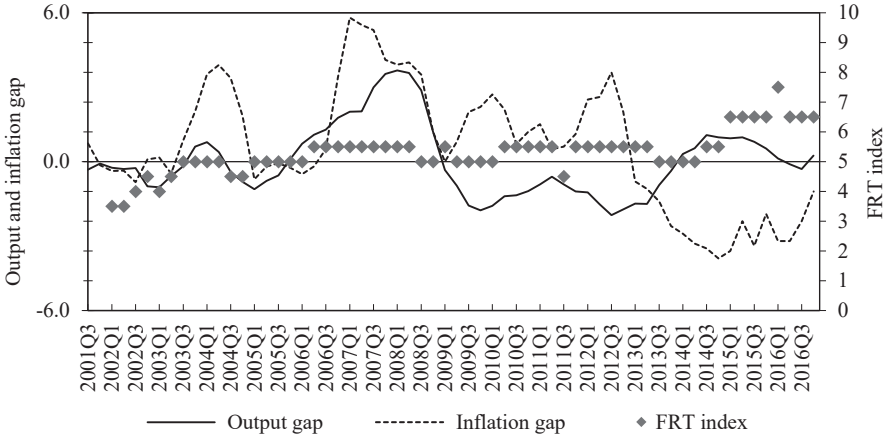
Figure 2. FRT index, inflation gap, and output gap – Czech Republic

Source: authors' own calculations.

The NBH forward guidance (see Figure 3 and increased index value since 2014) was accompanied by the extended period of the relatively low output gap. At the same time, the inflation gap was negative and quite deep. Since 2014, Hungarian economy has experienced deflation or a close-to-zero inflation figure. Forward guidance introduction was a response to such circumstances. A decline in the inflation gap accompanied by constrained economic growth (the output approached a potential level) could be assessed ambiguously – formally, it meant more exact goals achievement. However, forward guidance was introduced to support the economic growth.

The case of the National Bank of Poland (Figure 4) is a far cry away from a clear interpretation of the transparency and its relation to economic performance. The NBP has not yet launched a straight, one-way move towards greater transparency. It does not announce any further enhancements of forward-looking communication; its own projections have limited importance in decision-making, what is reflected in decisions rationale. The NBP does not undertake the publication of policy path even though some public debate about it was held in 2010. The increase in FTR index values registered in 2013–2014 was due to the forward

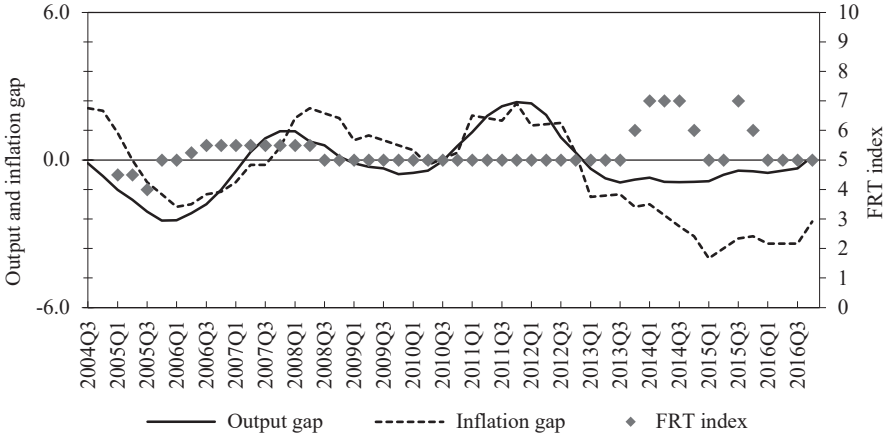
guidance that was temporarily introduced to communication. The efficacy of this short term unconditional measures cannot be assessed via a gaps analysis. However, in the case of Poland, it can be seen that at the end of the analysed period the output gap was relatively small (much lower than in the previous years in absolute terms), accompanied by temporary better forward-looking transparency performance. It cannot be excluded that a decrease in GDP fluctuations was partly linked with the improvements in the NBP's transparency.



Note: The value of transparency index is 2Q lagged in relation to gaps.

Figure 3. FRT index, inflation gap, and output gap – Hungary

Source: authors' own calculations.

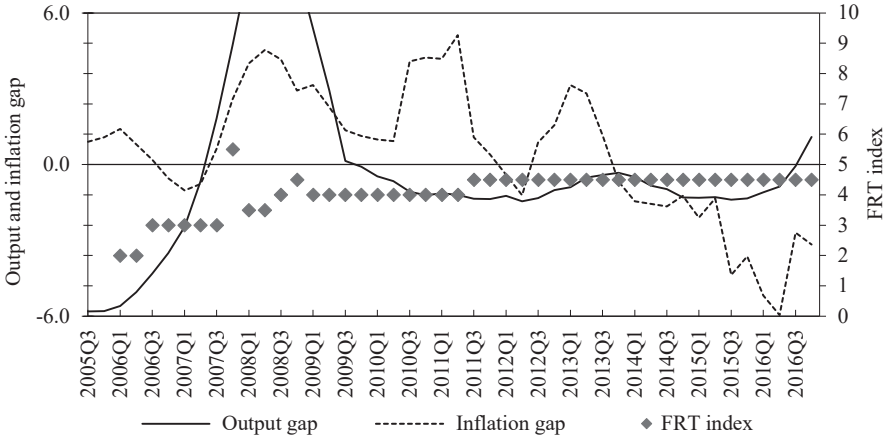


Note: The value of transparency index is 2Q lagged in relation to gaps.

Figure 4. FRT index, inflation gap. and output gap – Poland

Source: authors' own calculations.

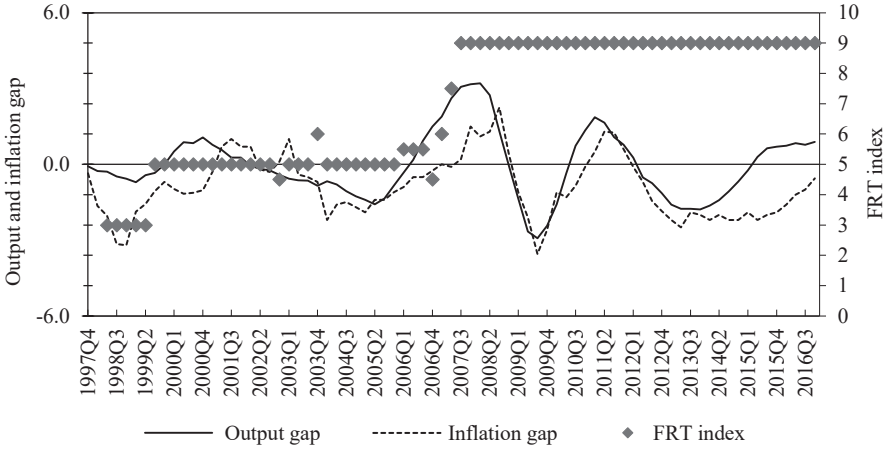
The National Bank of Romania (Figure 4) presents the higher volatility of the output and inflation gaps in our sample. It is also quite a specific case – a modern monetary strategy was introduced in Romania relatively late, in mid-2005. The NBR fulfilled the standards of modern transparency (publication of strategy, goals, instruments, and decisions), but its forward-looking transparency is constrained. At the same time, Romanian economy registered the most uneven



Note: The value of transparency index is 2Q lagged in relation to gaps.

Figure 5. FRT index, inflation gap, and output gap – Romania

Source: authors' own calculations.



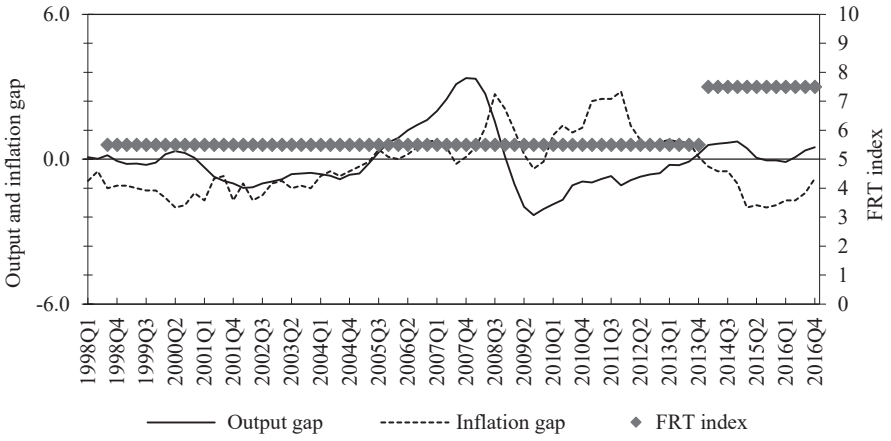
Note: The value of transparency index is 2Q lagged in relation to gaps.

Figure 6. FRT index, inflation gap, and output gap – Sweden

Source: authors' own calculations.

economic performances; the volatility of the output and inflation in relation to the targeted levels was the highest in our sample. A disinflation process was interrupted there, and the NBR lowered its inflation target a few times and quite remarkably (from 8 to 2,5% during the research period). The economic fluctuations accompanied by cautiousness in signalling central banks' actions make the conclusions rather ambiguous in this case. However, as in the case of Poland, one may observe a fall in the output gap (after 2009) together with the increase in the value of FRT index. It is likely that the stabilization of the economic fluctuations in Romania was partly related with the improvement in the transparency of the Romanian central bank.

Finally, the case of Sweden offers different conclusions; the volatility of economy was the highest during the period of high forward-looking transparency. It is likely caused by the fact that high forward-looking transparency covers quite a long period (about 10 years). During this period, GDP fluctuations were highly influenced by the effects of the global crisis. Since the level of transparency was constant in these years, it is very difficult to assess its relationship with the output and inflation gaps. New communication measures including policy path publication were introduced at the turn of 2006 and 2007. These days, Swedish economy registered a high growth rate accompanied by the inflation above the SR target. Then, the incidence of the global crisis enforced the volatility of the economy – both the output and inflation dropped remarkably below the targeted levels. Economic recovery in 2011 was temporary. In the case of Sweden, the increased transparency impact on the economic performance was somehow constrained. On the other hand, the Sveriges Riksbank assesses the experience with the repo rate forecasts



Note: The value of transparency index is 2Q lagged in relation to gaps.

Figure 7. FRT index, inflation gap, and output gap – UK

Source: authors' own calculations.

publication positively (SR, 2017). In its evaluation, the SR refers more to the internal benefits of such a publication: the repo rate forecasts facilitated and improved Riksbank's analyses, and provided a better basis for the evaluation and discussion of the monetary policy. Moreover, the dependence of the repo rate forecasts and market rates exists. Thus the first step towards its transmission into the output and inflation has been made.

The above analysis of the data set that relates the way how the central banks speak in advance about their future policy decisions to the stabilization of economic output brings some more general conclusions. They are as follow: (1) even if theory suggests the benefits of greater transparency, the central banks do not always push towards crossing some transparency frontiers. Some of them find a lower level of forward-looking communication satisfactory even if nearby central banks increase their transparency. (2) The road towards greater transparency is mostly, but not always, one-way. Once the extraordinary situation that supports greater openness ends, forward guidance is abandoned (the case of Czech Republic, but besides the research period). Some central banks may switch to standard measures as the NBP did. In mid-2013, its interest rates reached a historically low level and the NBP launched forward-guidance. As over a year later, it continued interest rate accommodation, additional communication measures were abandoned. Moreover, sometimes a signalling intentions policy is withdrawn without any explanation (the case of policy path description in Hungary). (3) As so many additional factors affect the economies, a simple conclusion relating more FRT index values with better stabilization of the economy cannot be drawn. We discern it in some cases, still remaining cautious about their cause and effect interpretation. In the other cases, the economic situation or the central bank's practice itself were so particular that we do not corroborate the relation. Nonetheless, we do not reject its long run existence.

Conclusions

In our examination, we presented a novel measure of forward-looking transparency. Contrary to standard measures, it does not cover basic information on the monetary policy. Forward-looking transparency index captures whether and how the central bank reveals its intentions. Our further analysis is based on this methodological solution. It was aimed at the comparison of the extent to which central bankers of the six European economies signal intentions. We delivered such a comparison finding that the most transparent central banks in our sample at the end of the research period were those in Czech Republic, Sweden, and the UK. While preparing the data to index calculation, we perceived that there is no a simple clue that

could boil down the transparency to some specific feature. It is rather the central banks' or the monetary policy committee's attitude towards transparency that is decisive.

The second aim of our paper was to verify whether a higher degree of transparency was related to the more effective stabilization of both the output and inflation gaps. We found that this relationship holds mainly for Czech Republic and the UK. However, in some other countries, such as Poland and Romania, there were also periods when the increased central bank's transparency existed with lower cyclical fluctuations of output.

Some methodological development of this examination could be applied in the future to account for the other determinants of economic growth and inflation. For example, it might cover a model-based analysis and the introduction of some other controls that affect the output and inflation. Having in mind the above restrictions, we find the contribution of our paper in the development and calculations of the FRT index, as well as the novel comparative analysis of forward-looking transparency among the six European central banks.

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