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Forward-looking Component in Consumers' Expectations and the Central Bank's Forecast: Some Evidence for European Countries

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Forward-looking Component in Consumers' Expectations and the Central Bank's Forecast: Some Evidence for European Countries

Magdalena Szyszko¹, Aleksandra Rutkowska²

Abstract

Research background: Modern monetary policy should be expectations-oriented. The best way to influence expectations operationally is to use inflation forecasts. As different ways of revealing central bank's intentions exist, a simple research question arises. Does the forward-looking (FL) component of consumers' expectations depend on the way in which the forecast is revealed and used by the central bank?

Purpose of the article: The main purpose of the article is to address the mentioned above question. The research hypothesis assumes that the forecasting system which is more transparent together with a greater central banks' consistency in inflation forecast targeting (IFT) result in more FL consumers' expectations.

Methodology/methods: We quantified inflation expectations of consumers on the basis of survey responses (EC Business and Consumer Surveys) with Carlson and Parkin method. When it was needed we applied its version adjusted for deflation. Then, we checked the rationality of consumer expectations (tests for their unbiasedness and orthogonality) and the degree of their FL by means of regression models. Finally, we used the IFT index, which we have elaborated ourselves in order to assess the transparency of the forecasting system and the central banks' commitment to IFT. The research covers Czechia, Hungary, Romania, Poland, Sweden and the UK and the time span of 2001-2016.

Findings: For Poland, Sweden and the UK more IFT commitment and transparency was related to more consumers' forward-lookingness. For Czechia we found low level of FL in expectations but high level of IFT commitment. We did not succeed in estimating the extent of FL for the two remaining countries due to structural breaks in their monetary policy. The following study contributes to the literature on inflation forecast targeting as it presents the novel empirical application of IFT index for the expectations analysis.

Keywords: *inflation forecast, inflation forecast targeting, consumers expectations, forward-lookingness of expectations.*

JEL Classification: E580, E430,

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Introduction

In this paper we investigate whether the central banks' practice in forecasting inflation, revealing their forecasts and following the inflation forecast targeting (IFT) support the forward-lookingness (FL) of consumers' expectations. The purpose of this study is to answer this question and verify the hypothesis which assumes that both the greater involvement of Monetary Policy Committee (MPC) in IFT (1) and more transparent forecasting system (2) result in more forward-looking consumers' expectations. We focus on the expectations of consumers as their choices are decisive for the economic output. The existing research covers mostly business and professional forecasters. The examination of the associations of the expectations and the central bank's forecasts, which are actually quite scarce considering the importance of the problem, did not deliver unambiguous responses on the possible interrelations. That is why we have decided to cover this matter again by applying an indirect approach to the problem.

The research covers Czechia, Hungary, Romania, Poland, Sweden and the United Kingdom. They are European countries with independent monetary policy held under inflation targeting regime (IT). The time span is 2001-2016.

The paper contains the section with theoretical and empirical findings which underline our assumptions and methodology, then the methodological section, the section with the results and their interpretation and finally – we conclude the findings.

Literature overview

Our paper deals with the expectations of consumers and central banks' possibilities to affect these expectations. The role of expectations in the monetary policy conduct is widely acknowledged in the economic literature (Mankiw, 1990, pp. 358-361, Woodford, 2003, pp. 15-19) similarly as the framework of inflation targeting - recognized to be the best way to implement theoretical premises (Bernanke et al., 2001, pp. 10-16, Mishkin, 2009, pp. 9-15). Despite the post crisis eruption of criticism, neither the monetary theory nor the monetary strategy were discarded (Woodford, 2014, p. 550).

Producing and revealing macroeconomic forecast is an immanent part of IT. If the forecast is an input to MPC deliberations and if it is published, it can enhance monetary policy FL and the FL of economic agents' expectations. Eventually, IFT implementation ensures the central banks' loss function minimization. The literature presents numerous approaches to implementing IFT adjusted to the maturity of monetary policy (Svensson, 1997, pp. 1111-1146, 2000, pp. 155-183, 2002, pp. 771 - 780, 2005, pp. 1-54).

There are a few papers examining whether inflation forecasts actually affect inflation expectations. Such an analysis based on VAR model, covering Canada, Japan, Sweden, Switzerland and the UK, proves the central banks' ability to influence the expectations in three countries: the UK, Sweden and Japan (Hubert, 2011, pp. 1-37). Similar interactions were found for the US (Hubert, 2015, pp. 655-680).

Analogue conclusion was made for the US (Bauer *et al.*, 2006, pp. 2-25). The authors analyzed the forecast errors across a large section of forecasters and several macroeconomic variables. The enhanced Fed's transparency that started in 1994 and covered more explicit information on intentions resulted in the synchronization of private forecasts. This research examines the switch of regime (of communication) impact on expectations. A study for Japanese switch (Fuijwara, 2005, pp. 255-261) covering qualitative and quantitative evaluation found that the Bank of Japan's forecast publication affected forecasts of professional forecasters and reduced their uncertainty.

Other research, including 12 European countries grasps sizable effect of central banks' transparency, including the forecast publication, on forecast disagreement of professionals and non-professionals (Ehrmann, Eijffinger & Fratzscher, 2012, pp. 1018-1052).

The research conducted for Poland finds out that the central bank's projections of inflation affect neither the dispersion nor the median of the individual forecast of professionals. This effect is observable for GDB forecast (Kotłowski, 2015, pp. 432-454). Kowalczyk & Stanisławska (2016, pp. 1-35) find no conclusive result while analyzing the forecasts distributions of the National Bank of Poland and professional forecasters due to sample shortcomings.

Shock response analysis based on the structural VECM presented in Szyszko & Pluciennik (2016) confirms the reaction of consumers expectations in Czechia, Sweden and the UK on inflation forecast change. The strength and lag of the reaction differs among the countries. Expectations react also on the change of other macroeconomic indicators.

Interdependences of the central banks' forecasts of inflation and consumers expectations were found on the basis of statistical analysis for 4 European countries for about 15 years sample (Szyszko, 2017a, p. 9).

To summarize the previous findings related to our research question we conclude that (1) the number of studies is not high. (2) Is mostly due to methodological difficulties. Regardless of the methodology applied, the authors remain cautious while interpreting the results. (3) More research is produced to assess the central banks' strategy or their general transparency impact on expectations or their dispersions. (4) Most of the examination covers professional forecasters.

We focus on the consumers expectations as they proxy business (price setters) expectations better than those of professional forecasters (Coibion & Gorodnichenko, 2015 pp. 198-199). The same individuals who are responding as consumers in one survey may express business expectations in another as small and medium businesses do not hire economic experts. From the monetary policy point of view price setters and consumers expectations are more relevant than forecasts of professionals. We are aware that, according to Carrolls' epidemiological expectations (Carroll, 2003, pp. 269-298), the link between the central banks' forecast and consumers' expectations is not direct. Nonetheless, it should exist.

Method of the Research

The 4-step methodology is presented in Tab. 1.

Table 1. Steps of the research

Step	Description of the procedure	Result	Literature
I	Expectations quantification with adjusted Carlson and Parkin method. For deflation longer than 3M method with scaling factor is applied.	Time series with consumers expectations	(Carlson, Parkin, 1975, 123-138), (Łyziak, 2010, pp. 8-11)
II	Tests for unbiasedness and orthogonality.	Rejection of rational expectations hypothesis	(Gerberding, 2001, pp. 26-28)
III	Estimations of regression models in which independent variables represent forward and backward-looking components of expectations	Estimation of the forward-looking component in consumers' expectations	(Łyziak, 2014, pp. 17-19)
IV	Index-based inflation forecast targeting and its transparency	Evaluation of the CBs' transparency	(Szyszko, 2017b)

	assessment	and commitment to IFT	
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Source: own

As consumers' expectations are examined in qualitative surveys, we commence with their quantification. Except for standard quantification procedure, we apply a novel approach prepared for the periods when standard scaling factor, which is actual or perceived inflation rate (in this research we apply objectified version of the method with actual inflation), is non-positive. In the episodes of non-positive scaling factors the problem with surveys' responses interpretation in the light of Carlson and Parkin method's assumptions occurs. Łyziak (2013, pp. 77-98) proposes the suspension of the unique scaling factor assumption for the whole population and finds the solution to probabilistic approach with two scaling factors. Although we find it more proper methodologically to apply scaling factor method, we also quantified the expectations in a standard way. The details of the sample description are given in Tab. 2.

Table 2. Sample and the data

CB	CZ	HU	PL	RO	SE	UK
Time span*	01-16	01-16	05/01-16	04-16	01-16	01-16
Scaling factor**	No	No	Yes	Yes	Yes	No
Forecast	Inflation Reports or equivalent documents					
Expectations	European Commission Business and Consumers Surveys; fractions of responses on qualitative questions; monthly data					
Macroeconomic indicators	Central banks and national statistical offices. Monthly data for inflation, unemployment, industrial production index, broad money. Daily quotations of exchange rates (vis-à-vis EUR and USD) and 3M interbank offer rates averaged					
Oil prices	Macrobond. Brent oil. Monthly averages of spot prices. USD per barrel					

* 2001-2016 is the basic time span of the research. It is shortened for PL and RO due to time series on expectation accessibility

** Expectations quantified with scaling factor procedure for deflation episodes

Source: own

Tab. 3 presents the tests held under the 1th and 2nd step of the research. Tests for expectations rationality must precede the analysis of the expectations hybrid nature: if the expectations were rational, further estimations would not be justified. We follow standard procedures presented in the literature (examples of which are presented in Tab. 1). In order to test the orthogonality we used the macroeconomic variables presented in Tab. 2.

Table 3. Regression models

Test for:
Unbiasedness:
$\pi_{t t-12}^e = \alpha + \beta\pi_t + \varepsilon_t \quad (1)$
where:
$\pi_{t t-12}^e$ is expected at time t inflation rate formed 12 months earlier,

π_t is actual inflation at period t .
 ε_t is white noise error.

H0: $\alpha = 0$ i $\beta = 1$

Orthogonality:

$$e_t = \alpha_0 + \alpha_1 \Omega_t + \varepsilon_t \quad (2)$$

$$e_t = \alpha_0 + \alpha_1 \Omega_t + \alpha_2 e_{t-1} + \varepsilon_t \quad (3)$$

where:

$e_t = \pi_{t|t-12}^e - \pi_t$ is expectation error

Ω_t is macroeconomic variable affecting inflation

H0: $\alpha_1 \neq 0$

Hybrid nature of expectations:

$$\pi_{t+12|t}^e = \alpha_1 + \alpha_2 \pi_{t+12} + (1 - \alpha_2)[\pi_{t-2|t-14}^e + \alpha_3(\pi_{t-2|t-14}^e - \pi_{t-2}) + \alpha_4(\pi_{t-2} - \pi_{t-14})] + \varepsilon_t \quad (4)$$

$$\pi_{t+12|t}^e = \alpha_1 + \alpha_2 \pi_{t+12} + (1 - \alpha_2)\pi_{t-2} + \varepsilon_t \quad (5)$$

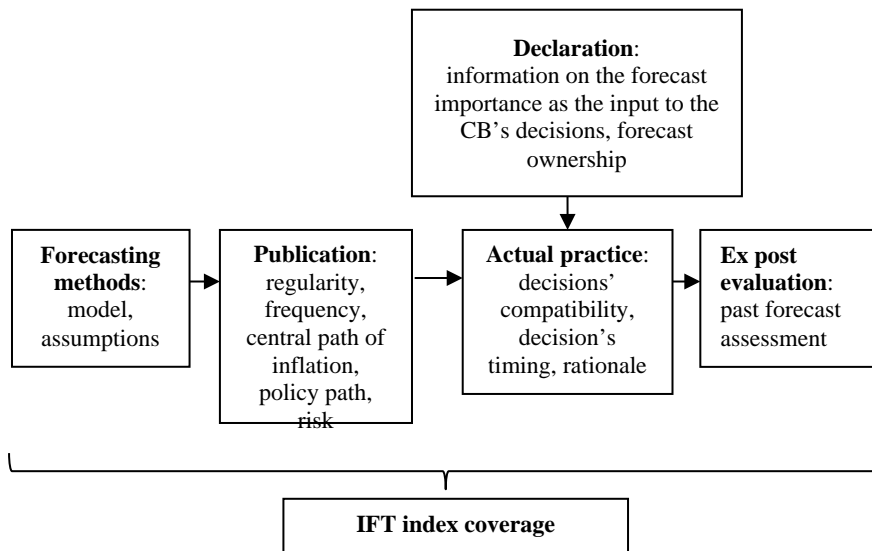
H0: $\alpha_2 = 1$

Source: equations specification after Łyziak (2014, pp. 14-19); same procedures with different quotations widely applicable

Equations (4) and (5) investigate the hybrid nature of the inflation expectations. Equation (4) presents a mixture of FL and adaptive expectations, whereas equation (5) incorporates the FL and the static approach. In both equations α_2 represents the degree of forward-lookingness.

Finally, we use an index of IFT implementation in order to assess the CBs commitment in IFT implementation. The index is presented in Szyszko (2017b). We present its novel application. The index makes it possible to assess whether the central bank implements the IFT: it checks the transparency of forecasting systems and the MPC consistency in following its own forecast. Except for the calculation of the complete index we calculate subindex which detects solely the forecasting system transparency (IFT_{trans}). This index excludes the declaration and actual practice aspects from the IFT index. Our hypothesis relates FL of expectations to both IFT implementation and forecast transparency, which is why we need two indices at this point of the research.

Graph 1. IFT index aspects



Source: (Szyszko, 2017b)

The final step of the research consists in joint analysis of the level of FL and IFT implementation and the forecast transparency. As the sample covers only 6 countries, it will be done qualitatively.

Results and their interpretation

Tab. 4 presents the results of the FL estimations and IFT/IFT_{trans} indices. For FL we have chosen to present the α_2 and R^2 of the hybrid equation with better adjustment. It is static specification for most of the cases.

Table 4. Results: forward-lookingness and IFT implementation

	CZ	HU	PL	PL _{SF} ⁻	RO	RO _{SF} ⁻	SE	SE _{SF} ⁻	UK
Eq.	5	x	5	5	x	x	4	5	4
α_2	0.100 2		0.081 5	0.083 2			0.1452	0.149 2	0.130 7
p-value	0.000 0		0.000 0	0.000 0			0.0000	0.000 0	0.000 0
R²	0.974 0		0.957 2	0.953 1			0.9733	0.969 4	0.888 6
IFT	0.88	0.67	0.52		0.56		0.88		0.77
IFT_{trans}	0.89	0.81	0.60		0.68		0.87		0.71

Source: own

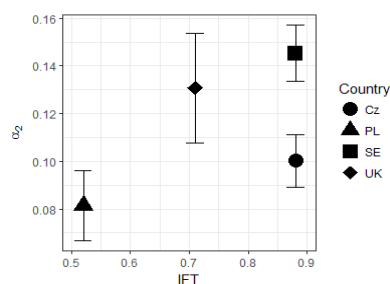
The starting point of the results interpretation refers to Hungary and Romania where we did not manage to estimate the hybrid expectation equation. It is in our opinion, it is due to the structural breaks in the monetary policy in these countries. In general, they both implement IT. In contrast to remaining 4 countries, the monetary policy of the National Bank of Hungary (NBH) and the National Bank of Romania (NBR) changed a lot during the research period.

Up to February 2008 the NBH conducted quite eclectic monetary policy: IFT together with HUF stabilization. During the research period the NBH lowered its inflation goal remarkably. The NBR adopted inflation targeting in 2005 so the time span covers regime switch. There was no continuous disinflation process in Romania. The inflation goal was also lowered there. These changes could affect expectations formation and the learning process of the economic agents.

The results for 4 remaining countries are more obvious to interpret. The FL of expectations varies from about 8% for Poland to about 14% for Sweden. It is higher for the developed economies where the consumers have had more time to learn how the monetary policy is conducted. The application of scaling factor for expectations quantification did not bring remarkably different results. Nonetheless, it was more proper methodologically.

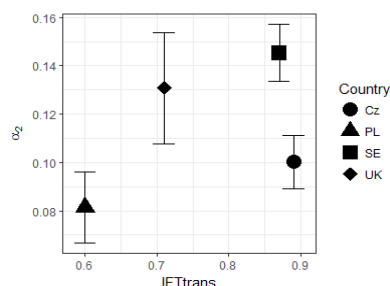
The IFT index and its transparency subindex are the highest for the Czechia and Sweden. They are the most transparent inflation forecast targeters worldwide as they are in the group of several countries which reveal explicit policy path of the monetary policy. The index for the UK shows its moderate consistency in IFT implementation and the system transparency. The Bank of England remains reluctant to endogenize and publish its interest rates. Diminished index value for Poland can be simply explained by the fact that in their cases at the beginning of the research period the IFT/IFT_{trans} equaled 0 – the forecast was not revealed.

Fig 1. FL and IFT implementation



Source: own

Fig 2. FL and IFT transparency



Source: own

In Fig. 1 we present the results of FL and IFT implementation while Fig. 2 presents the relation of FL of expectations and IFT transparency. The joint analysis of FL and IFT/IFT_{trans} shows that more IFT commitment (1) or more transparency of forecasting system (2) is associated with higher consumers' FL for Poland, UK and Sweden. The results are mixed for Czechia (lower FL of expectations but the most transparent forecasting system and the most IFT committed MPC). The results for this sample show that it is rather the monetary policy experience that matters for expectations FL.

Conclusion

Our paper provides the analysis of consumers' expectations FL in the light of central banks' consistency in IFT implementation. The FL is measured with the use of standard procedures: after rejection of rational expectations hypothesis we regressed the hybrid specification of expectations. Then, we used the index of IFT which assesses various aspects of inflation forecast targeting implementation including central bank's transparency in this field. We conducted the examination for 6 countries and in 2 cases – due to some strategical changes in the monetary policy we did not manage to estimate the level of FR. For the remaining 4 countries we cannot simply state that more IFT means more FL. However, in the broader sample we may find this relation.

The paper contributes to the literature on expectations as we used the novel approach of their quantification and the indirect approach to verify the hypothesis of the research. We see the possible extensions of the research: 30 other inflation targeters are out of sample. Except for IFT implementation and forecast transparency we can search for the explanatory factors for FL in central banks' effectiveness and their credibility. These paths of examination are on our research agenda now.

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