On the formation of inflation expectations in turbulent times: The case of the euro area☆

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ABSTRACT

Studying formation of inflation expectations in the euro area we propose a novel method, integrating rational, adaptive and sticky-information models. We find that in recent turbulent times, formation of inflation expectations by professional forecasters has displayed less inertia with the increased role of the perceived inflation target. Despite its slightly negative trend observed recently, the perceived target has remained broadly consistent with the ECB's announced inflation target. The direct impact of ECB inflation projections on expectations is minor, but growing marginally. However, inflation expectations remain consistent with the views and preferences of the ECB, which suggests effective management of expectations. Our results have implications for the conduct of ECB monetary policy, emphasising the need to monitor risks for price stability and expectations' de-anchoring in the context of complex models of their formation and for macroeconomic modelling, stressing the need to analyse monetary policy communication and changes in expectation formation over time.

1. Introduction

Management of inflation expectations is crucial in monetary policy-making, since expectations are important determinants of actual inflation and they affect monetary policy effectiveness. In order to increase monetary policy transparency and reduce economic uncertainty, central banks seek to manage expectations not only by monetary policy decisions, but also by announcing their medium-term inflation targets and communicating with the public. Qualitative communication refers to formal statements and reports and to informal speeches and interviews, whereas quantitative communication refers to publication of central bank macroeconomic projections.

The global financial crisis and low inflation regime contributed to huge forecasting errors and an increased complexity in monetary policymaking as the standard interest rate policy approached its effective lower bound and new monetary policy measures were introduced. Effective managements of expectations with different means is challenging for central banks especially in such times of economic turbulences, when the way inflation expectations are formed is likely to change (Yellen, 2016).

The failure of macroeconomic models to explain recent puzzling price developments in the euro area and other economies may partly reflect insufficient understanding of expectation formation and their impact on inflation. As both the assumptions of rational (Muth, 1961) and adaptive expectations seem not to fully capture the process of expectation formation, hybrid models including forward- and backward-looking determinants have been used in the empirical literature (e.g. Gerberding, 2001; Carlson and Valev, 2002). Recently, the way economic agents process available information has become central in analysing expectation formation. For example, in the sticky-information model by Mankiw and Reis (2002), expectations are assumed to be based on different information sets, and in Carroll's (2003, 2006) epidemiological model the focus is on slowly spreading information from professionals to consumers. Furthermore, Sims (2003) and Woodford (2002) have proposed

noisy information models, in which economic agents continuously update their information sets, but they observe only noisy signals about the actual state of the economy. In spite of many alternative models developed in recent years, the debate on the appropriate model for expectation formation has not yet been settled.

Several authors who analyse the effects of inflation targeting on the formation of inflation expectations argue that announcing the medium-term inflation target helps to anchor the long-term inflation expectations of the private sector (Gürkaynak et al., 2010; Pierdzioch and Rülke, 2013; Łyziak, 2013; Baxa et al., 2015). At the same time, central banks can influence short- and medium-term inflation expectations with their decisions and with the inflation projections they publish (Pedersen, 2015). The impact of the latter factor on private sector expectations is typically explained in two alternative ways – either with the observation that the central bank makes more accurate predictions than the private sector (Romer and Romer, 2000) or that central bank projections include signals about future monetary policy actions (Hubert, 2015a, 2015b, 2015c). Hubert (2017) claims that speeches by central bank officials may strengthen the impact of central bank projections on inflation expectations.

Many recent papers have focused on inflation dynamics and inflation expectations in a persistently low inflation regime (e.g. ECB, 2017). Łyziak and Paloviita (2017a) show that this regime has contributed to changes in expectation formation in the euro area, as the ECB inflation projections have become more important for short- and medium-term expectations in the private sector. According to Ehrmann (2015), a low inflation regime leads to weaker anchoring and stronger sensitivity of expectations to negative inflation surprises, although Hattori et al. (2016) argue that a low inflation regime does not change the effects of inflation projections published by the central bank.

This study continues our earlier analysis of the formation of inflation expectations in the euro area (Łyziak and Paloviita, 2017a), enlarging the set of factors that can determine them. Using the ECB Survey of Professional Forecasters (ECB SPF), we propose a general model integrating two theoretical concepts: the hybrid model, including rational and simple adaptive (static) expectations, and the sticky-information (epidemiological) model.[1] Our focus is on two means of ECB communication: inflation projections and the inflation target.

Typically, when modelling expectations, central bank inflation projections have been treated as the only forward-looking factor affecting expectations. Within our new analytical framework, we are able to analyse simultaneously the importance of the rational expectations hypothesis and ECB inflation projections for private sector expectations. Specifically, we examine whether ECB inflation projections are still important in expectation formation once the impact of the forward-looking nature of economic agents has been taken into account. On top of that, we derive implicit (perceived) inflation targets in order to assess their consistency with the announced ECB inflation target, and we also consider whether the recent turbulent times have evoked changes in expectation formation.

Another contribution to the literature is our interpretation of similar forecasting accuracies of the central bank and the private sector often found in the empirical literature. We stress that similar forecast performances may indicate that, when forecasting inflation, private sector forecasters either rely on inflation projections released by the central bank or process available information in a way similar to monetary authorities. In both cases, private sector expectations are consistent with the preferences of the central bank.

Our analysis indicates that the recent turbulent times have contributed to changes in expectation formation in the euro area, as the importance of backward-looking mechanisms has decreased while the

importance of the perceived inflation target has increased. We also find that the perceived inflation target has remained broadly consistent with the announced inflation target in the medium term. The importance of ECB inflation projections for medium-term private sector inflation forecasts has increased over time, but the magnitude of this effect is still rather small. However, SPF inflation forecasts remain consistent with the ECB communication, being either close to ECB projections or between ECB projections and the inflation target.

Our findings have two major implications for monetary policy-making, especially in the euro area. Firstly, central banks can efficiently use their communication tools, particularly the announced inflation target and published inflation projections, in the management of short- and medium-term inflation expectations, which are relevant for wage and price setting. Secondly, when assessing possible risks to price stability, monetary policymakers should continuously monitor inflation expectations and perceived inflation targets for different forecast horizons. For macroeconomic modelling, our findings stress the need to focus on monetary policy communication and changes in expectation formation over time.

Our paper is structured as follows. Section 2 describes our data and examines the relative forecasting accuracy of the SPF forecasts and ECB inflation projections. Models and estimation results are reported in Section 3. The final part of the paper presents our conclusions.

2. Data analysis

2.1. Data description

Our data set, which covers the period 1999Q1–2016Q3, includes the euro area HICP inflation rate, ECB SPF inflation forecasts and ECB inflation projections. The ECB SPF has been conducted quarterly since 1999Q1.[2,3] It is always conducted in the first month of every quarter after the HICP inflation rate for the previous month has been released, and its results are published in the middle month of the same quarter. In every survey round, forecasters are asked to report, inter alia, their expectations for the euro area HICP inflation rate. Six different forecast horizons are distinguished. In addition to the current and next two calendar years, inflation is forecast for a longer-term horizon. Inflation is also forecast for short- and medium-term fixed horizons, i.e. one year and two years ahead, relative to the month for which the latest official release of the HICP inflation rate is available.[4] We analyse inflation expectations one year and two years ahead.[5] Before 2014, when inflation expectations for the second calendar year (i.e. the year after the next one) have been surveyed only in quarters Q3 and Q4, we use linear interpolation in order to determine the expectations for quarters Q1 and Q2.

The ECB inflation projections for the euro area are prepared four times a year: either by the ECB staff and the Eurosystem National Central Banks in the context of the Eurosystem Staff Broad Macroeconomic

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[1] By combining different models we allow for heterogeneity of inflation expectations. From this point of view our study contributes to the literature that explains different aspects of heterogeneity existing in the euro area economies (e.g. Rafiq and Mallick, 2008).

[2] In every quarter, the survey panel consists of around 50 professional forecasters who represent both financial and non-financial institutions in the European Union. Euro area inflation expectations based on the ECB SPF have been analysed in many recent studies. See, for example, van der Cruijsen and Demertzis (2011), Frenkel et al. (2011), Conflitti (2012), Rich et al. (2016), Tsenova (2012), Andrade and Le Bihan (2013), Kenny et al. (2014) and Dovern and Kenny (2017).

[3] Data source: http://www.ecb.europa.eu/stats/prices/indic/forecast/html/index.en.html. The ECB SPF is described in detail in Bowles et al. (2007). See http://www.ecb.europa.eu/stats/pdf/spfquestionnaire.pdf?a9c65f6e4b965a8832693dcb0aebff66 for a survey questionnaire in January 2013 and http://www.ecb.europa.eu/stats/prices/indic/forecast/shared/files/dataset_documentation_csv.pdf?76c07dc372dffabc3fec09d8cefbf682 for a description of the ECB SPF data set.

[4] For example, in the 2015Q1 survey (after release of the HICP inflation rate in December 2014) the forecasters were asked to report their expectations for the HICP inflation rate in December 2015 and December 2016.

[5] Since the ECB does not publish long-term inflation projections, we do not include long-term SPF forecasts in our analysis. Analysis of the anchoring of short- and medium-term inflation expectations seems to us even more important given their role in price and wage formation in the euro area (ECB, 2017).