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Time-varying asymmetries in central bank preferences: The case of the ECB

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ABSTRACT

This paper examines the asymmetric preferences of the European central bank (ECB) as identified by Surico (2007a, 2008). Under asymmetric preferences, a central banker places different weights on the losses associated with positive and negative deviations of economic variables such as inflation or output from their target values. Although asymmetry is conventionally estimated by the generalized method of moments, we use the bias correction Kalman filter suggested by Kim (2006), introducing the concept of time-varying asymmetry in central bank preferences. Estimates of the interest rate reaction functions suggest asymmetries in preferences for both output gap and interest rate. These asymmetries indicate that the ECB increases its interest rate aggressively when there is a surge in output but does not sustain an interest rate above its reference value.

1. Introduction

In conventional monetary policy analysis, the central banker's objective – in particular, price and output stability – is often specified using a quadratic functional form. Linear-quadratic analysis is a tractable framework that can be used to examine the dynamic features of an optimal monetary policy. In addition, Rotemberg and Woodford (1998) and Woodford (2003) provide a micro-foundation for the quadratic objective as a second-order approximation to a representative agent's utility function. With the justification of a micro-foundation, a large number of studies have employed the quadratic objective.

On the other hand, an increasing number of studies attempt to introduce more flexibility into the central bank's objective function despite the theoretical weakness of the lack of a micro-foundation. These studies provide empirical results for preferences that have been estimated using a reduced form derived from the central banker's optimization problem and are more general than the quadratic objective. Moreover, practitioners often do not favor the use of a quadratic objective for the central bank and suggest that the symmetry of the quadratic form around the origin is not realistic as it implies that central bankers put equal weights on losses from output expansion and contraction.[1] In reality, it is also likely that policymakers adjust their attitudes to the losses associated with various economic variables over time.

Surico (2007a) investigated the asymmetric preferences of the ECB. The asymmetric preference model provided by Surico (2007a, 2008) assumes a Linex (linear exponential) loss function, which includes the quadratic objective as a special case. The Linex function allows for asymmetry in the loss function around the target values of the central bank. As a result, the central banker sets different weights for losses associated with positive and negative deviations of economic variables from

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[1] See Blinder (1998) for such criticisms.

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their targets. The remarkable advantage of this approach is that the hypothesis of symmetric preferences can be tested by imposing restrictions on the estimated Euler equation of the central banker's optimization problem. If the restriction is rejected, the assumption of asymmetric preferences is statistically justified. With this approach, Surico (2007a), using a sample from January 1999 to December 2004, highlighted the ECB's aversion to output contraction and to the interest rate exceeding a reference level but found no asymmetry for inflation.

Although there is a large body of empirical literature on the ECB, only Surico (2003, 2007a) and Aguiar and Martins (2008) have examined its asymmetric preferences. Aguiar and Martins (2008) utilized a threshold quadratic loss function, which also allows for the application of different weights to the positive and negative deviations of economic variables, and found that the ECB has an aversion to higher inflation. The differences between their results and Surico's (2007a) findings stem from the differences in the data sets and assumed models (Aguiar and Martins, 2008, 1660).[2] Their approach differs from ours in that the threshold loss function limits its functional form to a quadratic. This paper adopts Surico's (2007a, 2008) framework in order to investigate the ECB's policy, using a more general form of the objective.

The most important contribution of this paper is the estimation of time-varying asymmetry in central bank preferences using the bias correction Kalman filter (Kim, 2006). In previous studies, average asymmetries in preferences were estimated using the generalized method of moments (GMM). In contrast, the time-varying asymmetry introduced in this paper changes over time; the estimator can describe how the central bank updates its preferences in each period.

This paper obtains the following three results. First, the estimated ECB's objective function exhibits a positive asymmetry for output over the whole sample. In contrast to the results in Surico (2007a), this implies that the ECB places a larger emphasis on losses from output expansion than on those from output contraction. Second, the result in Surico (2007a) remains intact if the same sample period as in his study is considered. Third, the interest rate policy of the ECB is characterized by bilateral asymmetry for both output and interest rate. The ECB increases its interest rate aggressively when there is a surge in output but does not sustain interest rates above a range of 3.5–4%.

This paper proceeds as follows. Section 2 reviews the earlier contributions to the literature on asymmetric preferences of central banks, including investigations of other general specifications of the loss function. Section 3 introduces Surico's (2007a, 2008) model, consisting of inflation and interest rate reaction functions. Section 4 describes the strategy for estimating time-varying asymmetry in central bank preferences. Section 5 reports the results of both GMM estimation and Kalman filtering. In particular, we follow the time-varying nature of the ECB's policy preferences during the first decade of its existence. Section 6 concludes the study.

2. Literature review

The primary motivation for the generalization of central bank preferences originates from two seminal papers, Kydland and Prescott (1977) and Barro and Gordon (1983). Their discussion on inflation bias, generated by the central banker's ambition to increase output above its potential level, stimulated subsequent research on the central bank's objectives. Cukierman (2002) provided a comprehensive investigation of the functional form of the central banker's objective function, and analyzed the theoretical implications of a general functional form that allows for asymmetry under various economic structures. In particular, if the private sector believes that the central bank reacts less aggressively to expansions than to contractions of output,[3] average inflation bias occurs. This bias differs slightly from that observed by Kydland and Prescott (1977) and Barro and Gordon (1983) in that it depends entirely on the asymmetry in central bank preferences. Orphanides and Wilcox (2002) and Aksoy et al. (2006) investigated the opportunistic approach of the central bank with a non-quadratic loss function. Orphanides and Wilcox (2002) showed that an opportunistic central bank responds aggressively to output expansion when inflation exceeds its tolerance zone. Aksoy et al. (2006) numerically confirmed such responses within realistic economic structures.[4]

These studies investigated the preferences of the central banker in general, and therefore did not estimate asymmetric preferences explicitly. Nobay and Peel (2003) first introduced the Linex-type specification for the central bank objective function, providing parametric estimations of asymmetric preferences.

Ruge-Murcia (2004) presented evidence on the aversion of US monetary policy to positive unemployment deviations from the 1960s to the 1990s. In addition, Surico (2007b) revealed that while the Fed preferred output expansion in the pre-Volcker period, this preference disappeared in the post-Volcker period, and also indicated that this shift in monetary policy contributed to the "great moderation" in the US economy.

Other empirical results on asymmetric preferences include Karagedikli and Lees (2007), who reported output expansion asymmetry in Australia but no asymmetry in New Zealand, and Boinet and Martin (2008), who indicated asymmetric preferences around the inflation target in the United Kingdom.[5]

[2] Aguiar and Martins (2008) used quarterly data from the European Central Bank's Area Wide Model Database (AWM12up5) for the period 1995 to 2005.

[3] Cukierman and Muscatelli (2002) called this situation "precautionary demand for expansions."

[4] Their small open economy considered habit persistence in consumption, adjustment costs in investment, and overlapping wage contracts.

[5] Doyle and Falk's (2010) GARCH model represents the most recent research on the relationship between inflation and conditional economic volatilities. They stressed the spurious nature of the above relationship in OECD countries. However, they neither directly estimate asymmetric preferences nor follow Surico's (2007a, 2007b, 2008) approach, as acknowledged by Doyle and Falk (2010) themselves. In fact, their focus is on the long-run relationship between trend inflation and economic volatilities rather than on estimating asymmetric preferences so that our purpose does not compete against theirs.