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# The Euro and inflation uncertainty in the European Monetary Union

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This paper adopts a time-varying GARCH framework to estimate short-run and steady-state inflation uncertainty in 12 EMU countries, and then investigates their relationship with inflation. The effects of the Euro introduction in 1999 are examined by utilising a dummy variable. Tests for endogenously determined breaks are also employed. We find a considerable degree of heterogeneity across EMU countries in terms of average inflation, its degree of persistence, and both types of uncertainty, whilst the trend component of inflation is generally decreasing. Various breaks in the relationship between inflation and inflation uncertainty are found, frequently well before the Euro introduction.



## 1. Introduction

The introduction of the Euro and of a common monetary policy in 1999 undoubtedly represented a major policy regime shift for the member countries of the European Monetary Union (EMU). This could have affected both inflation expectations and inflation uncertainty, as, at least initially, agents might not have been certain of the objective function and the policy preferences of the European Central Bank (ECB), and of how they might compare to those of the national central banks previously in charge of monetary policy (for instance, the ECB might have been perceived as less credible than the Bundesbank, which had an established anti-inflation reputation). Uncertainty about the policy

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preferences of the new monetary authorities might also result in higher inflation forecast errors. According to the Maastricht Treaty, although the primary objective of the ECB is price stability (which the ECB has interpreted as an annual Euro area inflation rate below, but close to, 2% in the medium run), it should also be concerned with output and employment (albeit without prejudicing its main objective). The monetary policy framework adopted by the ECB to fulfil these tasks is based on two analytical perspectives or two "pillars", namely economic analysis and monetary analysis,[1] and the ECB has repeatedly stated that achieving price stability is the most effective way to contribute to output and employment growth, but nevertheless higher uncertainty might have characterised the new economic environment.

Analysing survey data, Heinemann and Ullrich (2006) do not find significant differences in the inflationary credibility of the ECB compared to the Bundesbank, and hence no permanent change in inflation expectations. However, their analysis suggests that the higher uncertainty characterising the period leading up to EMU led to a temporary change in expectation formation, with agents relying more heavily on backward-looking expectations, before reverting to the normal mechanisms once the ECB had established its inflation credibility.

As for inflation uncertainty, in a recent review of the performance of the ECB in the first few years of the new regime, its President, Jean-Claude Trichet, has expressed the view that "… the ECB has, despite substantial adverse price shocks, successfully kept inflation and inflation expectations at low levels by historical standards. The single monetary policy and its clear focus on the maintenance of price stability have helped to anchor inflation expectations in the Euro area over the medium and the long-term. This has facilitated a reduction of inflation uncertainty and the associated risk premia" (see Trichet, 2004, p. 2).

In this paper, we adopt an appropriate econometric framework to analyse empirically whether the new policy regime with the ECB setting a common interest rate for the EMU countries has in fact different features, in particular whether the link between inflation and inflation uncertainty has changed. Specifically, we use a time-varying model with a GARCH specification for the conditional volatility of inflation, as in Evans (1991), and obtain estimates for 12 EMU countries, over the period 1973–2004, using monthly data. The adopted framework enables us to distinguish between different types of inflation uncertainty which can affect the inflation process. Next, we estimate the relationship between inflation and inflation uncertainty taking into account the possibility of breaks. Dummy variables corresponding to the introduction of the Euro are initially incorporated into the model. However, as the mere announcement of a regime switching from floating to fixed rates at a given future date can determine changes in the behaviour of rational agents prior to the fixing, we also determine endogenously the break dates using a procedure developed by Bai and Perron (1998, 2003). This allows us to investigate whether adjustment took place much before the introduction of the Euro. This type of analysis is motivated by some theoretical literature demonstrating that rational agents will react to the announcement of a regime switch from floating to fixed rates well before the change occurs (see-Wilfling, 2004; Wilfling and Maennig, 2001).

Our empirical findings enable us to shed light on the difficulties encountered by the ECB in fulfilling its mission in the new environment resulting from the introduction of the Euro. In particular, we find that in the post-Euro period there are still significant inflation differentials across countries, implying different real interest rates for the various EMU members given a single nominal interest rate. Further, heterogeneity in both short-run and steady-state uncertainty occurs even in the presence of a common currency: although the former is only to be expected given the well-known lags of monetary policy, the latter clearly makes the ECB's policy objective of long-run price stability hard to achieve. Moreover, the relationship between inflation and inflation uncertainty

[1] Economic analysis aims at assessing the short- to medium-term determinants of price developments focusing on real activity and financial conditions in the economy. Monetary analysis focuses on a longer-term horizon taking into account the long-run relationship between money and prices. A reference value of 4.5% for the growth rate of broad money (M3) that is compatible with price stability has been calculated using the quantity theory equation. The ECB has stated, though that "monetary policy does not react mechanically to deviations of M3 growth from the reference value" (see The Monetary Policy of the ECB, 2004). As Rudebusch and Svensson (1999, p. 1) point out, the ECB strategy "appears to be a combination of a weak type of monetary targeting and an implicit form of inflation targeting".