

# Exchange rate stabilization in the ERM: identifying European monetary policy reactions

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## Abstract

We develop the structural VAR models for European countries (France, Denmark, and Germany) during the ERM period, to examine the monetary policy reactions, especially the within-ERM exchange rate stabilization. In addition to analyzing the impulse responses and variance decomposition, we present the full monetary reaction function in an interpretable manner, without introducing additional assumptions. The results suggest some asymmetry in exchange rate stabilization (non-German exchange rate stabilization is stronger than German exchange rate stabilization), but do not support the hypothesis that German monetary policy was independent of the ERM. © 2002 Published by Elsevier Science Ltd.

*Keywords:* Exchange rate stabilization; Monetary policy; Structural VAR; ERM; Monetary reaction function

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## 1. Introduction

This paper develops the structural VAR models for European countries (France, Denmark, and Germany)<sup>1</sup> during the ERM period to examine the monetary policy reactions, especially the stabilization of within-ERM exchange rates.

We improve on the previous studies on identifying monetary policy actions for

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<sup>1</sup> We consider only two non-German countries which had been within the ERM without much trouble since the following model postulates a stable monetary reaction function during the estimation period. Only France and Denmark escaped unscathed in the ERM crisis in the early 1990s. See Eichengreen and Wyplosz (1993) for details. We briefly discuss results for Italy in Section 6.

European countries (Sims, 1992; Grilli and Roubini, 1994; Kim, 1999; Kim and Roubini, 2000) by considering monetary policy interactions within the ERM based on the asymmetry hypothesis; the Bundesbank, as the leader of the ERM, set its own monetary policy, possibly by reacting to the exchange rate against the other ERM currencies as a whole, while each non-German central bank pegged its exchange rate against the D-Mark or reacted to the exchange rate against the D-Mark.

Based on this asymmetry, we develop different models for Germany and non-German countries to identify monetary policy actions. We include the exchange rate against the D-Mark and the German interest rate explicitly for the non-German model, while we include the exchange rate against the ECU for the German model. We allow the contemporaneous monetary policy reactions to the exchange rate for the non-German model, while we do not for the German model. But we do not impose any further restrictions on the lagged policy reactions in both models. These models deliver reasonable dynamic responses to the monetary policy shocks.

Using the models, we also identify systematic monetary policy reactions (in addition to monetary policy shocks) to answer some interesting questions on the European monetary policy reactions or interactions. The first question is the general evidence on the within-ERM exchange rate stabilization of each European country. Did each country stabilize the within-ERM exchange rate? In particular, did Germany stabilize the within-ERM exchange rate? Did the monetary authority of each country react to the shocks destabilizing exchange rates? Did non-German countries react to the German interest rate shocks? The second question is the relative size, speed, and the persistency of the stabilization among countries. Does each European country stabilize the exchange rate to the same degree? In particular, did Germany and non-German countries stabilize the exchange rate to the same degrees? How quickly did each monetary authority react to stabilize the exchange rate? Did each monetary authority also stabilize domestic variables? In particular, did non-German monetary authorities stabilize domestic variables? Was the stabilization persistent?

To infer the monetary policy reactions from the VAR models, first, we analyze impulse responses and variance decomposition of the monetary instrument, and the exchange rate to the shocks destabilizing the exchange rate. Second, we present the full monetary policy reaction function in an interpretable manner. From the model, we recover the monetary authority's reactions of the monetary instrument to changes in each variable over time, especially to changes in the exchange rate (and the German interest rate for the non-German countries).

Many previous studies which attempted to answer similar questions examined simple relations among a few monetary variables (such as Granger-Causality or/and Cointegration), for example, Cohen and Wyplosz (1989); DeGrauwe (1989); Karfakis and Moschos (1990); Katsimbris and Miller (1993), and Hassapis et al. (1999). However, those studies are limited in answering all these questions, since they did not present the full monetary policy reaction function formally. There are some past studies that presented the monetary reaction function, for example, Artus et al. (1991), Fratianni and von Hagen (1990), and von Hagen and Fratianni (1990). However, as in most past studies on monetary reaction function, those studies assumed that the monetary instrument is exogenous to all other domestic variables, which is

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