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New evidence on the puzzles: Results from agnostic identification on monetary policy and exchange rates ☆

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ABSTRACT

Past empirical research on monetary policy in open economies has found evidence of the 'delayed overshooting puzzle' and the 'forward discount puzzle'. We revisit the effects of monetary policy on exchange rates by applying Uhlig's [Uhlig, H., 2005a. What are the effects of monetary policy on output? Results from an agnostic identification procedure. Journal of Monetary Economics 52(2), 381–419.] identification procedure that involves sign restrictions on the impulse responses of selected variables. In a first step, we leave the response of the exchange rate agnostically open and find sizeable evidence for both puzzles. In a second step, we additionally rule out the delayed overshooting by construction. Our results indicate that the forward discount puzzle is robust even without delayed overshooting.

1. Introduction

What are the effects of monetary policy on exchange rates? For the answer, there is a sharp conflict between baseline theory and baseline evidence. Dornbusch's (1976) well known overshooting hypothesis predicts that an increase in domestic interest rates relative to foreign interest rates leads to an impact appreciation followed by a persistent depreciation of the domestic currency. Following the lead of Sims (1972, 1980), however, empirical studies have found different results employing vector autoregressions (VARs) in open economy settings.

To study the effects of monetary policy on exchange rates, e. g. Eichenbaum and Evans (1995) and Grilli and Roubini (1995, 1996) use recursive identification strategies and find a persistent appreciation of the domestic currency for periods up to 3 years. This finding is known as the 'delayed overshooting puzzle', see Fig. 1, and is also reported in Leeper et al. (1996), Clarida and Gali (1994), and Kim (2001, 2005). It is often called the 'forward discount puzzle', see Fig. 2, since a violation of the uncovered interest parity (UIP) condition is implied. More generally, there may be a forward discount puzzle even without delayed overshooting.

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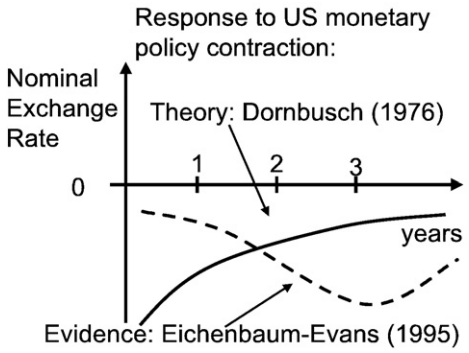

Fig. 1. A stylized representation of the delayed overshooting puzzle.

Recently, this conventional view has come under attack, see e.g. Cushman and Zha (1997), Kim and Roubini (2000) and Faust and Rogers (2003).[1] Faust and Rogers (2003) argue, that one needs to "relax dubious identifying assumptions" stemming from e.g. recursive identifications and impose at most rather mild sign restrictions or shape restrictions a priori. In response to monetary policy shocks they find no robust results regarding the timing of the peak response of the exchange rate, but robust evidence in favor of large deviations from UIP due to monetary policy shocks. Like Faust and Rogers (2003), Farrant and Peersman (2006) use sign restrictions to investigate the sources of exchange rate movements.

This paper re-examines these issues by using Uhlig's (2005a) identification strategy of imposing sign restrictions on selected impulse response functions for a certain period following the shock. We focus on two questions. First, is there robust evidence of a delayed overshooting of the exchange rate in response to monetary policy shocks? Second, does the forward discount puzzle still survive or is it just a 'twin appearance' of delayed overshooting?[2] This question is of interest, since the delayed overshooting observation may be interpreted as a sign of failing to appropriately identify monetary policy shocks, see Cushman and Zha (1997).

To analyze the first question, our identification procedure assumes that domestic contractionary monetary policy shocks do not lead to decreases in the domestic short-term interest rate, increases in the domestic price level and increases in the ratio of nonborrowed to total reserves during the first year following the shock. Hence, by construction our identification procedure avoids the price puzzle that is often implied by recursive identification strategies. Note that at this stage we do not impose any restrictions on the exchange rate to leave the central question agnostically open. We argue that these sign restrictions are plausible because they most directly reflect what economists have in mind when thinking about monetary policy shocks. For the second question, we rule out delayed overshooting by construction. More precisely, we additionally impose that the difference between the domestic interest rate and the foreign interest rate is positive, that the exchange rate moves strongest on impact and that its impulse response is monotonously declining for a few periods afterwards. Our restrictions only concern the shape and not the size of the exchange rate response.

Similar to Faust and Rogers (2003), we apply our identification method to the VAR specification used by Eichenbaum and Evans (1995). Following the arguments of Sims and Uhlig (1991) we use a thoroughly Bayesian procedure. We provide posterior distributions regarding the parameters of interests, like the time and the size of the peak response.

While the focus in Faust and Rogers (2003) is on a robustness analysis using minimal assumptions, we view the sign restrictions as a means to identifying monetary policy shocks, imposing a uniform prior on all suitably normalized impulse vectors satisfying the sign restrictions, see Uhlig (2005a). Faust and Rogers (2003) impose most of their restrictions on-impact only, occasionally complemented by shape restrictions on the exchange rate response, see the bottom half of page 1419 in their paper. As a result, they allow for the possibility that expansionary monetary policy shocks and a surprise drop in interest rates trigger falling rather than rising prices during the first year following the shock, followed eventually by increased interest rates and rising prices, see their Fig. 2. By contrast, we impose sign restrictions on the impulse responses for prices as well as key monetary policy variables during a full year or, alternatively, half a year after the shock. We argue that the larger set of sign restrictions is reasonable, as it avoids by construction the price puzzle and delayed liquidity puzzle visible in their figure.

With our larger set of sign restrictions, we narrow down the range of possible monetary policy shocks considerably, as has already been argued in Uhlig's (1998) discussion of Faust (1998). Thus, and in contrast to Faust and Rogers (2003), who argue that delayed overshooting is a fragile finding, we restore the puzzle originally stated by Eichenbaum and Evans (1995). We find sizeable and robust evidence in favor of a delayed overshooting of the US–German, the US–UK and the US–Japanese bilateral exchange rates as well as confronting the US with an aggregate of the other G7 countries. In line with Eichenbaum and Evans (1995) and Faust and Rogers (2003) we find a robust forward discount puzzle implying a large risk premium conditional on monetary policy shocks.

We exploit the Bayesian perspective to ask questions concerning the risk a Bayesian investor faces when betting on violations of UIP. We calculate an implied Sharpe ratio conditional on the monetary policy shock and show it to be considerably higher than the Sharpe ratios conventionally observed on US equity markets. Even if we rule out the delayed overshooting puzzle by construction, we do find strong posterior evidence for sizeable risk premia across all country pairs. Thus, the forward discount puzzle seems to be robust even without delayed overshooting. Notably, our findings are in contrast to Cushman and Zha (1997) and Kim and Roubini (2000) who

[1] Other papers that do not find evidence of the delayed overshooting puzzle are e.g. Kalyvitis and Michaelides (2001) and Bjørnland (2006).

[2] We are grateful to an anonymous referee for this suggestion.