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Evaluating an estimated new Keynesian small open economy model

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Abstract

This paper estimates and tests a new Keynesian small open economy model in the tradition of Christiano et al. [2005. Nominal rigidities and the dynamic effects of a shock to monetary policy. Journal of Political Economy 113(1), 1–45] and Smets and Wouters [2003. An estimated stochastic dynamic general equilibrium model of the Euro area. Journal of the European Economic Association 1(5), 1123–1175] using Bayesian estimation techniques on Swedish data. To account for the switch to an inflation targeting regime in 1993 we allow for a discrete break in the central bank's instrument rule. A key equation in the model – the uncovered interest rate parity (UIP) condition – is well known to be rejected empirically. Therefore we explore the consequences of modifying the UIP condition to allow for a negative correlation between the risk premium and the expected change in the nominal exchange rate. The results show that the modification increases the persistence in the real exchange rate and that this model has an empirical advantage compared with the standard UIP specification.

JEL classification: E17; C11; C53

Keywords: DSGE; VAR; VECM; Open economy; Bayesian inference

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1. Introduction

During the last years there has been a growing interest from academia and especially central banks in using dynamic stochastic general equilibrium (DSGE) models for analyzing macroeconomic fluctuations and to use these models for quantitative policy analysis. Smets and Wouters (2003, 2004) have in a series of influential papers shown that the forecasting performance of the new generation of (closed economy) DSGE models in the tradition of Christiano et al. (2005) compare very well with both standard and Bayesian vector autoregressive (VAR) models. Adolfson et al. (2007a) report similar results for an open economy DSGE model. However, even if these models appear to be able to capture the development of some key macroeconomic time series, there are still challenges to make them fulfill the observed properties in the data. Often the cross-equation restrictions implied by the DSGE model are simply too strict when taken to the data. One example is the inability of open economy models to account for the persistence and volatility in the real exchange rate, another is the failure of accounting for the international transmission of business cycles (see, e.g., Chari et al., 2002; Lubik and Schorfheide, 2005; Justiniano and Preston, 2005; de Walque et al., 2005).

A key equation in open economy DSGE models is the uncovered interest rate parity (UIP) condition, which in its simplest formulation suggests that the difference between domestic and foreign nominal interest rates equals the expected future change in the nominal exchange rate. The UIP condition is a key equation in open economy models not only for the exchange rate but also for many macroeconomic variables, since there is a lot of internal propagation of exchange rate movements working through fluctuating relative prices. There is, however, strong empirical evidence against the standard UIP condition. VAR evidence suggest that the impulse response function for the real exchange rate after a shock to monetary policy is hump-shaped with a peak effect after about 1 year (see, e.g., Eichenbaum and Evans, 1995; Faust and Rogers, 2003), whereas the standard UIP condition imply a peak effect within the quarter followed by a relatively quick mean reversion. Moreover, a DSGE model with a standard UIP condition cannot account for the so-called 'forward premium puzzle' recorded in the data, i.e. that a currency whose interest rate is high tends to appreciate which implies that the risk premium must be negatively correlated with the expected exchange rate depreciation (see, e.g., Fama, 1984; Froot and Frankel, 1989).

In an attempt to account for these empirical shortcomings, we alter the structural open economy DSGE model developed in Adolfson et al. (2007b) and modify the UIP condition to allow for a negative correlation between the risk premium and the expected change in the exchange rate, following the vast empirical evidence reported in for example Engel (1996). In the log-linearized version of the model, our suggested modification of the risk premium introduces a lagged dependence between the exchange rate and the domestic interest rate (which is absent using a standard UIP condition), and this may help the model to account for the hump-shaped impulse response functions to a policy shock found in VARs. To explore the quantitative role