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Real exchange rate dynamics revisited: A case with financial market imperfections

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A B S T R A C T

In this paper, we investigate the relationship between real exchange rate dynamics and financial market imperfections. For this purpose, we first construct a New Open Economy Macroeconomics (NOEM) model that incorporates staggered loan contracts as a simple form of the financial market imperfections. Our model with such a financial market friction replicates persistent, volatile, and realistic hump-shaped responses of real exchange rates, which have been thought very difficult to materialize in standard NOEM models. Remarkably, these realistic responses can materialize even with both supply and demand shocks, such as cost-push, loan rate, and monetary policy shocks. This implies that the financial market development is a key element for understanding real exchange rate dynamics.

1. Introduction

Empirical studies have been showing that real exchange rate dynamics are very volatile, persistent, and hump-shaped against shocks, as shown in Eichenbaum and Evans (1995), Cheung and Lai (2000), Faust and Rogers (2003), and Steinsson (2008). Thus far in international finance, there has been intense debate as to whether theoretical dynamic general equilibrium models can reproduce such realistic exchange rate dynamics. Chari et al. (2002), focusing on the first two features, insist that New Open Economy Macroeconomics (NOEM) models may account for the volatility but not for the persistence to a monetary policy shock. In response to this critique, several studies such as Bergin and Feenstra (2000), G. Benigno (2004), and P. Benigno (2004) have attempted to solve these three puzzles by introducing such features as strategic complementarity, non-optimizing monetary policy, and optimal

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monetary policy into otherwise standard NOEM models. These newly introduced mechanisms mitigate the persistence puzzle of the real exchange rate dynamics to some extent, but have not yet solved it completely. Actual persistence of real exchange rates is still higher than that simulated in those models. Furthermore, the mechanisms do not explain the significant hump-shaped responses of real exchange rates found in data. Steinsson (2008) stresses the importance of generating hump-shaped responses based on his autoregressive estimation of real exchange rates and shows that realistic levels of volatility, persistence, and hump-shaped responses of real exchange rates can be generated with NOEM models when the cost-push shock is added to the economy, where the home bias is very strong.[1]

Analyses on the role of financial market imperfection for the real exchange rate dynamics, however, are very limited, even though Bernanke et al. (1999) and Christiano et al. (2008) emphasize the role of a financial market imperfection to explain the business cycle tendencies found in data. In this paper, therefore we shed light on a sticky loan rate adjustment as a financial market imperfection for the real exchange rate dynamics. The loan rate stickiness is reported in Slovin and Sushka (1983) and Berger and Udell (1992) for the United States (US), Sorensen and Werner (2006) and Gambacorta (2008) for the euro area, and Bank of Japan (2007, 2009) for Japan.

We construct a NOEM model with an explicit role of banks. We incorporate sticky loan interest rate contracts as in Teranishi (2008), which assumes it in the closed economy.[2] In our model, following Gadanecz (2004), McGuire and Tarashev (2006), and Lane and Milesi-Ferretti (2007, 2008), banks make loans to both domestic and foreign firms. The loan rate stickiness stems from imperfect (monopolistic) competition among banks, importance of which is stressed by Sander and Kleimeier (2004), Gropp et al. (2007), and Gropp and Kashyap (2009).

We first estimate the loan interest rate stickiness for the United Kingdom (UK), the euro area, and Japan. Results show that banks, on average, take three quarters to adjust loan rates in these countries. Then we show that our model with such an estimated loan interest rate stickiness can replicate persistent, volatile, and realistic hump-shaped responses of real exchange rates even with both supply-side disturbances through cost-push and loan rate shocks, and demand-side disturbances through a monetary policy shock. In particular, the fact that we can reproduce such a realistic response via a monetary policy shock merits attention. Previous studies, such as Chari et al. (2002) and Steinsson (2008), demonstrate that it is impossible to produce hump-shaped real exchange rate dynamics with such a shock. These results of hump-shaped real exchange rate dynamics are obtained in our model with sticky prices solely due to staggered loan contracts. Interestingly, by further incorporating the staggered price setting, which has been considered the important element for realistic real exchange rate dynamics in former studies, the hump-shaped real exchange rate dynamics to the monetary policy shock disappear. We also show that the welfare cost stemming from such staggered loan contracts is not very large.

This paper is structured as follows. In the next section, we show the outline of the model. In Section 3, after a brief survey of previous studies related to sticky loan rates, we estimate the degree of loan rate stickiness for the euro area, the UK, and Japan. Section 4 shows that realistic responses of real exchange rates are produced in our model with staggered loan contracts. We also discuss the case with the staggered price in addition to staggered loan setting and the size of the welfare cost stemming from these frictions. Finally, Section 5 summarizes the findings in this paper.

2. Model

The model consists of two symmetric countries. There are four types of agents in each country, household, firm, private bank, and the central bank as shown in Fig. 1. In this section, we only show the outline of the model. A detailed derivation of the model is shown in Appendix A.

[1] The importance of reproducing the hump-shaped responses are emphasized in, for example, Chrsitiano and Vigfusson (2003) and Gust and Vigfusson (2009).

[2] Graham and Wright (2007) also incorporate sticky loan interest rates into a closed economy general equilibrium model. Contrary to Teranishi (2008), stickiness in interest rates is imposed for consumers in Graham and Wright (2007). Thus, the loan interest rate in the IS curve is sticky in Graham and Wright (2007), while that in the Phillips curve is sticky in our model.