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Tobin's Q channel and monetary policy rules under incomplete exchange rate pass-through ☆

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ABSTRACT

This paper focuses on the role of the Tobin's Q channel in a two-country framework in which exporting firms set their prices on the basis of local currency pricing. Incomplete exchange rate pass-through significantly affects the Tobin's Q channel in each country compared with the case of complete exchange rate pass-through. We explore whether different specifications of monetary policy enhance social welfare. Regardless of the degree of home bias, a monetary policy rule that stabilizes domestic asset prices attains preferable outcomes to several alternative policy rules considered in our analysis. Notably, there are large gains from employing a domestic asset price rule when the home bias is large. A monetary policy rule that stabilizes the asset prices of both countries results in worse outcomes. Our simulation results suggest that stabilizing asset prices is important in an open economy with incomplete exchange rate pass-through.

1. Introduction

Should central banks respond to asset price fluctuations? The literature discusses how the central bank should conduct its monetary policy when asset prices fluctuate in a closed economy framework. Bernanke and Gertler (1999, 2001) stress that the central bank should not react to asset price fluctuations because a monetary policy rule that incorporates asset prices may destabilize the economy if asset prices respond to a non-fundamental shock.[1] Alternatively, others argue that an interest rate rule with asset price stabilization results in preferable outcomes even if the monetary authority cannot precisely observe the deviation of asset prices from their fundamental values (e.g., Cecchetti et al., 2003).[2] In particular, the recent financial crisis, which originated in the US, might reveal that asset price fluctuations in one country affect other countries, and that central banks should at least consider asset price fluctuations from a global perspective.

Therefore, exchange rate fluctuations matter when we consider the role of asset prices at a global level. The standard new open economy macroeconomics (NOEM) model assumes that exchange rate pass-through is complete. Thus, the NOEM model is based on the assumption of producer-currency pricing (PCP) in which firms set prices on the basis of their own national currency (e.g., Clarida et al., 2002; Gali and Monacelli, 2005). Conversely, previous studies refer to the presence of pricing-to-market (PTM) in which firms differentiate their prices in each export market (e.g., Corsetti and Pesenti, 2001; Corsetti et al., 2011; Engel, 2011; Obstfeld and Rogoff, 2000). This is also referred to as local-currency pricing (LCP). In the LCP model, the exchange rate does not immediately respond to changes in international relative prices, implying that the exchange rate pass-through is incomplete. Engel (2011) shows that when exporting firms set their prices based on local currency, currency misalignment that is defined as the deviation of the exchange rate from purchasing power parity weakens international consumption risk-sharing between countries. In this case, it is desirable that central banks target consumer price index (CPI) inflation (Corsetti et al., 2011; Engel, 2011). However, these studies do not focus on the role of asset price fluctuations. If such fluctuations are important in an open economy framework, the presence of the PTM strategy may result in different prescriptions for asset price stabilization from those suggested in the existing literature.

This paper explores monetary policy when asset prices fluctuate in a two-country economy in which exporting firms differentiate their prices in each country. Several studies argue that the central bank that stabilizes asset price fluctuations can improve social welfare

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[1] See also Gilchrist and Leahy (2002) and Carlstrom and Fuerst (2007).
[2] See also Chadha et al. (2004) and Haugh (2008).

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when exchange rate pass-through is complete. Under the PCP model, asset price fluctuations in one country spillover into other countries due to the presence of an international consumption risk-sharing condition. Giorgio and Nistico (2007) find that the domestic central bank can attain preferable outcomes if it introduces the stabilization of foreign stock prices into its monetary policy rule when asset prices fluctuate in the foreign country. In addition, according to Ida (2011), the central bank can reduce welfare loss when it reacts to both domestic and foreign asset prices. These studies may indicate that the gain from stabilizing asset prices is not negligible as long as exchange rate pass-through is complete.

It is ambiguous, however, whether an interest rate rule that incorporates the stabilization of asset prices can enhance social welfare in a two-country model with LCP. As noted earlier, incomplete exchange rate pass-through weakens consumption risk sharing between countries. Hence, an incomplete exchange rate pass-through may dampen a spillover of the asset price channel through an international risk-sharing condition. In such a case, does a monetary policy rule that stabilizes asset prices lead to preferable outcomes? To our knowledge, very few studies have examined the role of asset price stabilization in a two-country economy with incomplete exchange rate pass-through.

This paper addresses the importance of asset price fluctuations in a two-country model with LCP. To investigate the role of asset prices under incomplete exchange rate pass-through, we extend a two-country sticky price model developed by Engel (2011) to incorporate asset price fluctuations. This paper focuses on the Tobin's Q channel proposed by Tobin (1969). This channel is referred to as one in which an increase in Tobin's Q creates a boom through an increase in investment. Thus, the Tobin's Q channel can be regarded as an indirect asset-price channel of monetary policy.[3] Indeed, the Tobin's Q channel significantly changes the performance of monetary policy rules under complete exchange rate pass-through (Ida, 2011). We question how an incomplete exchange rate pass-through affects the Tobin's Q channel in each country. Accordingly, it is worth analyzing whether a monetary policy rule that reacts to asset prices achieves preferable outcomes in a two-country economy in which exporting firms differentiate their product prices in each country.

The contributions of this paper are as follows. First, this paper studies the role of the Tobin's Q channel under incomplete exchange rate pass-through. According to our simulation results, an incomplete exchange rate pass-through significantly influences the Tobin's Q channel in each country compared with the model in which there is a complete exchange rate pass-through. Second, we explore whether different monetary policy specifications can produce preferable outcomes. Our model shows that, regardless of the degree of home bias, an interest rate rule that includes the stabilization of domestic asset prices can enhance social welfare in the home country. In particular, a domestic asset price rule results in a much smaller welfare loss than alternative monetary policy rules when the home bias is large. In contrast to the PCP model, however, there are no gains from employing a rule that stabilizes the asset prices of both countries under an incomplete exchange rate pass-through. Summing up, our simulation results suggest that the central bank should consider the stabilization of asset prices in a two-country economy in which exporting firms set their prices on the basis of local currency.

The remainder of this paper is organized as follows. Section 2 describes a two-country economy in which asset prices fluctuate under an incomplete exchange rate pass-through. Section 3 introduces the deep parameters used to calibrate the model. Section 4 reports our simulation results. We examine how incomplete exchange rate pass-through affects the Tobin's Q channel in each country, and explore whether different monetary policy specifications result in preferable outcomes. Section 5 briefly concludes.

2. Model

Apart from the Tobin's Q channel, the model is based on a framework developed by Engel (2011). Consider an economy with two large symmetric countries: home and foreign. Firms in each country face monopolistic competition and set their prices according to the Calvo pricing rule. In addition, they set their prices for export based on the PTM strategy. We assume that there are complete markets in both countries, and that only final goods are traded. Since both countries are symmetric, the economic structure of the foreign country is identical to that of the domestic country. Hence, unless otherwise noted, analogous equations hold for the foreign country.

2.1. Households

Preferences for consumption in the home country, C_t, are given by

$$C_t \equiv C_{H,t}^{\gamma} C_{F,t}^{2-\gamma}, \tag{1}$$

where $C_{H,t}$ is the consumption of domestic goods and $C_{F,t}$ is the consumption of foreign goods. $C_{H,t}$ and $C_{F,t}$ represent CES aggregates over a continuum of goods produced in each country. The elasticity of substitution for individual goods in each country denotes $\theta_t > 1$. Thus, as in Steinsson (2003), we assume a time-varying elasticity of substitution for individual goods. This assumption allows us to introduce cost-push shocks into the model.[4] Also, the parameter γ denotes the degree of home bias. This parameter satisfies $\gamma \in [0,2]$. There is home bias in the home country when the parameter γ is above unity.

There are two stages of a household's optimization problem. First, households consider the intra-temporal cost minimization problem and derive the demand function for each good:

$$C_{H,t} = \gamma \left(\frac{P_{H,t}}{P_t}\right)^{-1} C_t, \tag{2}$$

$$C_{F,t} = (2-\gamma)\left(\frac{P_{F,t}}{P_t}\right)^{-1} C_t, \tag{3}$$

where $P_{H,t}$ is the price of domestic goods and $P_{F,t}$ is the price of foreign goods. In this case, the price index in the home country, P_t, is given by

$$P_t \equiv k^{-1} P_{H,t}^{\gamma} P_{F,t}^{2-\gamma}, \tag{4}$$

where the parameter k is constant.

Next, we consider household's dynamic optimization problem. An infinitely lived representative household maximizes the following inter-temporal utility:

$$E_t \sum_{j=0}^{\infty} \beta^j \left(\frac{C_{t+j}^{1-\sigma}}{1-\sigma} - \frac{N_{t+j}^{1+\eta}}{1+\eta}\right), \tag{5}$$

where N_t is the household's labor supply. The parameter β denotes the discount factor. In addition, σ and η are positive parameters. E_t denotes expectations conditional on period t.

The representative household faces the following budget constraint:

$$P_t C_t + E_t D_{t+1} + P_t I_t = W_t N_t + R_t^k K_t + R_t D_t + \Pi_t(F) - T_t, \tag{6}$$

where D_t is the nominal bond. W_t and $\Pi_t(F)$ are the nominal wage and dividend from firms, respectively. I_t is investment, K_t is capital stock in

[3] In contrast to our model, Giorgio and Nistico (2007) examine the role of asset price stabilization in an open economy in which the direct wealth effect of asset prices exists.

[4] See also Woodford (2003) for a detailed discussion of this issue.