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Goods market arbitrage and real exchange rate volatility

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Abstract

This paper studies the economic determinants of real exchange rate volatility within a goods market arbitrage framework. We show that high volatility of the real exchange rate can be explained by relevant real factors such as trade costs, output ratio volatility and intertemporal elasticity of substitution. We also provide empirical evidence to support our model's predictions for real exchange rate volatility. We view our framework as complementary to those that emphasize the role of sticky prices.
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1. Introduction

The Law of One Price states that international relative price differentials should be arbitraged away so that identical goods in different countries should sell for the same price, when expressed in a common currency. Yet the evidence from the empirical literature shows that not only are relative prices quite different across countries, but also such

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deviations are highly volatile and persistent. These characteristics of the real exchange rate have been the central puzzle in international macroeconomics literature, with the source of the puzzling behavior remaining unclear.

In this paper, we study the trade cost model to analyze the resulting equilibrium behavior of the real exchange rate from both a theoretical and an empirical perspective. In particular, we explore the determinants of real exchange rate volatility in the context of a trade cost model and then discuss their implications for the puzzling behavior of the real exchange rate.

Recently, the trade cost models of Dumas (1992), Sercu et al. (1995), Obstfeld and Rogoff (2000), Betts and Kehoe (2001), O'Connell and Wei (2002), Burstein et al. (2003), Crucini et al. (2005) have re-emerged as candidate models to explain the puzzling behavior of international relative prices and trade flows. The genesis of such models has derived from the recognition that sticky price models, while useful in addressing international monetary policy questions, still lack the ability to explain the persistence and unconditional volatility of the real exchange rate (see, for example, Betts and Devereux, 2000; Chari et al., 2002). With emphasis on the role of trade frictions and real shocks, the trade cost model shows that price deviations will be bounded by fixed limits of arbitrage, which are usually treated as proportional transportation costs. In the special case where preferences are separable across time and goods, the theory implies that real exchange rate will be a two-sided censored random variable. The probability that such censoring occurs will be a function of the distribution of the output ratio, the size of the trade costs, and the intertemporal elasticity of substitution in consumption.

In the context of this theory, we explore the determinants of real exchange rate volatility. By establishing the comparative statics properties, we find that real exchange rate volatility is increasing in trade costs and output ratio volatility, but decreasing in intertemporal elasticity of substitution. We then provide empirical evidence to support our model's predictions for real exchange rate volatility.

The remainder of this paper is organized as follows: We begin in Section 2 by discussing goods market arbitrage and key predictions of the stochastic trade cost model by Sercu et al. In Section 3, we derive theoretical expressions for the volatility of the real exchange rate. We conduct comparative statics exercises to show how the volatility is affected by changes in its determinants. Section 4 presents empirical evidence that supports the predictions made from the theoretical propositions by using the implied trade costs estimated from a threshold autoregressive model. Section 5 presents final discussion and conclusions.

2. The theory of goods market arbitrage

The theory of goods market arbitrage predicts that real exchange rate should lie strictly within the bounds of trade costs. According to this theory, measuring the deviations from the Law of One Price is simply a matter of measuring the trade cost for a particular good across two locations. Moreover, as long as trade patterns and trade costs are stable over time, fluctuations in the real exchange rate should be small. In contrast, if the trade costs are large enough to prohibit trade, then arbitrage theory tells us only the support of the distribution of the real exchange rate (literally the closed interval $[1 + \tau, 1/(1 + \tau)]$, where τ is a proportional trade cost). Given that many goods involve non-traded intermediate inputs, trade costs might reasonably be defined to include these additional costs of