

International asset markets and real exchange rate volatility[☆]

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Abstract

The real exchange rate is very volatile relative to major macroeconomic aggregates and its correlation with the ratio of domestic over foreign consumption is negative (Backus–Smith puzzle). These two observations constitute a puzzle to standard international macroeconomic theory. This paper develops a two country model with complete asset markets and limited enforcement for international financial contracts that provides a possible explanation of these two puzzles. The model performs better than a standard incomplete markets model with a single non-contingent bond unless very tight borrowing constraints are imposed in the latter. With limited enforcement for both domestic and international financial contracts, the model's asset pricing implications are brought into line with the empirical evidence, albeit at the expense of raising real exchange rate volatility.
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1. Introduction

This paper analyzes the interplay of three classic puzzles about the real exchange rate and asset prices:

1. the high volatility of the real exchange rate relative to the volatility of consumption (real exchange rate volatility puzzle),
2. the negative correlation of the real exchange rate with the ratio of domestic over foreign consumption (Backus–Smith puzzle),
3. the low correlation of consumption across countries.

I develop a two country model with complete asset markets and limited enforcement of international financial contracts that provides a possible explanation of the these puzzles.

[☆] The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or any other person associated with the Federal Reserve System.

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In their simplest form these three puzzles can be stated as follows.¹ If preferences over consumption are given by the power utility function and all financial markets are complete, the real exchange rate between two countries is determined by the ratio of domestic and foreign consumption. This immediately implies that the correlation between the real exchange rate and relative consumption equals unity. Since there are no wealth effects under complete markets, consumption is highly correlated across countries. Therefore, the real exchange rate hardly fluctuates.

Given this apparent contradiction with the data, most international macroeconomists have concluded that international financial risk sharing is not complete. Lewis (1996) provides also direct empirical evidence that international risk sharing is incomplete. Although it is nowadays standard to assume that there are frictions in international financial markets, there has been little progress in explaining the first two puzzles. Two notable exceptions are Corsetti et al. (in press) and Benigno and Thoenissen (in press).

Brandt et al. (2003) have recently challenged the view that international consumption risk sharing is very limited. Their analysis draws on the high volatility of asset prices and the implied high volatility of the intertemporal marginal rate of substitution. Real exchange rates between industrialized economies fluctuate by as much as 10% per annum. However, the intertemporal marginal rate of substitution estimated using asset returns varies by 40%. As the real exchange rate depreciates by the difference between the domestic and foreign intertemporal marginal rates of substitution, these estimated volatilities imply that the intertemporal marginal rates of substitution are highly correlated between countries. Brandt et al. interpret this finding as evidence, that international risk sharing is very good.²

This paper attempts to clarify these contradictory conclusions about international risk sharing. I first follow Kehoe and Levine (1993) in assuming that international financial markets are complete but enforcement of international financial contracts is limited.³ Contracts are sustainable only to the extent that they can be enforced by the threat of permanent exclusion from trade in international financial markets if an agent reneges on her obligations.⁴

The production/trade side of the economy is modeled as in Corsetti et al. (in press). The distinguishing feature of their model is that the implied elasticity of substitution between traded goods is low since non-traded goods are used in the distribution of traded goods. This feature implies that absent international financial markets the real exchange rate is very volatile and the correlation between the real exchange rate and relative consumption is negative.

The key finding of my paper is that the model with complete asset markets and enforcement constraints can resolve the real exchange rate volatility puzzle and the Backus–Smith puzzle provided that agents are sufficiently impatient. If agents are impatient, only limited risk sharing can be sustained and the model behaves close to a model without international financial markets. If agents are very patient, contract enforcement works well and agents can share risk efficiently across countries. In this case consumption is highly correlated across countries, the real exchange rate is very smooth, and the correlation between the real exchange rate and relative consumption is close to unity. I also compare the model with limited contract enforcement to a model with a single non-contingent bond. The latter model fails to deliver substantial exchange rate volatility and a negative correlation between the real exchange rate and relative consumption unless tight constraints on international borrowing are imposed.⁵

Because I follow the international finance literature in assuming complete and frictionless domestic asset markets and standard preferences, the model inherits all the puzzles of domestic asset pricing. In particular all asset prices are

¹ See Obstfeld and Rogoff (1996) for the volatility puzzle and Backus and Smith (1993) for the consumption–real exchange rate correlation puzzle.

² While Brandt et al. (2003) strongly advocate this interpretation of their findings, the following interpretation puts their results more in line with the general consensus in the literature. With complete markets and additive power utility over consumption the high correlation of the intertemporal marginal rates of substitution that Brandt et al. document implies highly correlated consumption growth. However, consumption and consumption growth are not very correlated across countries at business cycle frequencies. I am thankful to an editor of this journal for suggesting this interpretation of Brandt et al. (2003).

³ Models with limited contract enforceability have been applied to a number of questions: Krueger and Perri (2006) address the question of consumption inequality in the US, Kehoe and Perri (2002) analyze the implications for the international business cycle, Lustig (2004) and Alvarez and Jermann (2001) investigate asset pricing implications.

⁴ Kehoe and Perri (2002) analyze a two country model with limited contract enforcement. However, since there is only one good in their model all trade is intertemporal and the real exchange rate is constant and equal to 1.

⁵ This finding is at odds with the results in Corsetti et al. (in press) and Benigno and Thoenissen (in press). However, there are several differences between their works and mine: I assume (i) an endowment economy in contrast to their production economies, (ii) a somewhat higher elasticity of substitution between traded goods, and (iii) I solve the model using non-linear methods as opposed to a method that is based log-linearization of the first order equations around the deterministic steady state.

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