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Exchange risk and asset returns: A theoretical and empirical study of an open economy asset pricing model

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ABSTRACT

This study develops a consumption-based asset pricing model in which domestic consumers can buy goods from domestic and foreign markets but can only invest in domestic markets. In this model, the exchange rate influences asset prices through the marginal utility of consumption and increases the risks investors face. We find that our model can successfully price the 25 Fama–French portfolios and industry portfolios in the Chinese market, and the exchange rate is an important pricing factor in the unconditional linear model. We also find that the exchange risk is time-varying and countercyclical, which can help to explain the countercyclicality in equity premium.

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1. Introduction

The question whether exchange risk should be priced has drawn the attention of economists studying international asset pricing since the 1970s. Early theoretical researches model the effects of exchange risk on asset returns and consider exchange risk as one risk factor along with the traditional risk factors.[11] On the empirical side, the evidences from testing exchange rate exposure in unconditional asset pricing models are quite mixed and inconclusive. Hamao (1988) and Jorion (1991)

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 [1] Solnik (1997) gives a full review of the literature.

find no evidence that exchange risk is priced on the Japanese and US stock markets. Vassalou (2000) shows that exchange risk, along with foreign inflation risk, can explain part of the cross-sectional variation in equity returns of 10 developed countries. Recent studies using the conditional asset pricing models tend to provide more consistent results. For example, Dumas and Solnik (1995), De Santis and Gerard (1998), Choi et al. (1998), Doukas et al. (1999), Carrieri (2001), Kolari et al. (2008), and Chaieb and Mazzotta (2013), all of them document that exchange risk is priced in the stock markets of major developed countries.

For emerging markets, the markets are more segmented and there exist many restrictions. The answer to the question whether the exchange risk is priced would be totally different from that in developed markets. However, the exchange pricing literature on emerging markets is not extensive. Claessens et al. (1998), among early scholars to address this issue, have found evidence that exchange risk is a significant factor in explaining stock returns in many emerging markets. Tai (1999) studies five Asian–Pacific countries with the US and finds significant time-varying foreign exchange risk premia. He rejects the idea that foreign exchange risk is diversifiable and suggests that investors should be compensated for bearing it. Phylaktis and Ravazzolo (2004) develop a dynamic integration asset pricing model to study a group of Pacific–Basin countries and document that exchange risk premium is substantial and forms a big part of the total risk premium. They find that risk premia vary over time and across markets. Carrieri and Majerbi (2006) conduct tests using market, portfolio and firm level data for nine emerging markets and find a significant unconditional exchange rate premium. Jacobsen and Liu (2008) study the conditional international asset pricing model using China's segmented stock market. They find that the exchange risk is time-varying. More recently, Kodongo and Ojah (2011) investigate the exchange risk pricing and equity market segmentation in Africa. They use the unconditional multi-factor asset pricing model and find evidence that foreign exchange risk is not priced in Africa's equity markets while strong evidence that the markets are partially segmented.

However, so far the models those papers adopted do not belong to the equilibrium models and do not consider investors' consumption and portfolio choice decisions. In this paper, we develop a theoretical model to investigate the exchange risk in emerging markets. The model is setup in an open economy framework. Since the emerging markets are more segmented and faced with many restrictions, especially foreign currency restrictions, we assume that domestic consumers can buy goods from both domestic and foreign markets, but can only invest in the domestic market. The variation in currency valuations would influence the total wealth of the domestic consumers and would finally influence their consumption and portfolio choice decisions. This model takes after the framework of the Lucas (1978) exchange economy, with the consideration that the representative agent has the Epstein and Zin's (1989) recursive utility and can also separate utility between domestic goods and foreign goods.

Our theoretical open economy asset pricing model can be summarized as follows. The real exchange rate will influence the asset prices through what we call the exchange rate multiplier in equilibrium. After satisfying certain conditions for parameters verified in our empirical evidence, the exchange rate multiplier is countercyclical. More precisely, when the economy is booming, the real exchange rate will appreciate, the exchange rate multiplier will decrease, and the total consumption will increase to decrease the marginal utility. When the economy is in recession, the opposite relation holds. Comparing with the models not considering exchange rate fluctuations, the variation in exchange rate will magnify the negative relation between asset return and marginal utility for both scenarios, and thus increase the risks of investors.

We empirically examine our model using Chinese market data. Even though the Chinese economy is the second largest in the world, like many emerging countries, the Chinese investors face strong foreign currency restrictions. They cannot freely invest in the international financial markets and diversify their risks, which is consistent with the setting of our model. Our empirical estimation results show that the open economy model can price the 25 Fama–French portfolios and 14 industry portfolios in Chinese stock market. The unconditional linear factor version of the model demonstrates that the real exchange rate is a pricing factor in explaining asset returns. Moreover, the exchange risk is time-varying and countercyclical which can be used to explain the countercyclical property in asset returns. We also find that exchange risk has a greater effect on small size portfolios, which can explain the trade-off between risk and return reflected in the size premium.