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Revisiting the consumption-real exchange rate anomaly in a model with non-traded goods

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A B S T R A C T

This paper shows that the assumption used in many two-country business cycle models that all non-traded goods are nondurable consumption goods magnifies the severity of the consumption-real exchange rate anomaly, which is the discrepancy between the high correlation between relative consumption and the real exchange rate predicted by most models and the low correlation observed empirically. This assumption hampers the ability to generate wealth effects necessary for the economies to deviate away from full risk-sharing. Using an alternative setup in which non-traded goods can also be investment goods improves the ability of the model to generate wealth effects, and therefore to overcome the anomaly.

1. Introduction

The sharp contrast between the tendency of models to predict a tight relationship between relative consumption and the real exchange rate, and the lack of supporting empirical evidence, is commonly known in the international business cycle literature as “the consumption-real exchange rate anomaly,” the term used in Chari et al. (2002). In fact, the anomaly exists by construction in models with complete asset markets (see Backus and Smith, 1993; Chari et al., 2002) because full international risk-sharing requires that relative consumption increases only when the real exchange rate depreciates. Researchers have made progress overcoming the anomaly in models with limited risk-sharing. In particular, Corsetti et al. (2004) and Benigno and Thoenissen (2008) show that their models with

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a combination of non-traded goods and incomplete asset markets do not exhibit the anomaly. They find that asset market incompleteness allows traded goods productivity shocks to generate the positive wealth effect, which explains why relative consumption may increase when the real exchange rate appreciates. Benigno and Thoenissen also find that non-traded goods productivity shocks can undermine the result because they generate the negative wealth effect.

In this paper, I show why a shock to the non-traded goods productivity, in contrast to the presence of the non-traded goods sector, contributes to the anomaly and the negative wealth effect. The main culprit is the assumption maintained in both aforementioned papers that all non-traded goods are nondurable consumption goods.[1] This assumption has a strong (un)intended implication: it implies that households cannot engage in the saving–investment and consumption-smoothing behavior because consumption and the supply of non-traded goods must be equal in each period. The inability to smooth consumption via a saving–investment channel has a strong implication for the wealth effect. The key mechanism behind the negative wealth effect is the decline in the value of the non-traded output following a supply shock. If all non-traded goods are nondurable consumption goods, all extra units of the non-traded good must be consumed instantly. Because consumers have a preference for both traded and non-traded goods, they attach a low value to each unit of the non-traded good. The decline in the relative price of non-traded to traded goods more than offsets the increase in the physical units, causing the value of the country's output as a whole to decline relative to that of the other country hence the negative wealth effect. Furthermore, the decline in the relative price of non-traded to traded goods causes the real exchange rate to depreciate. Thus, the anomaly arises as a result.

To reduce the anomaly, the negative wealth effect must be minimized. I consider a two-country business cycle model with incomplete asset markets, and a saving–investment feature for non-traded goods. Specifically, non-traded goods can be investment goods, in addition to being nondurable consumption goods. While the traded investment goods are equipment, non-traded investment goods are structures. Like Greenwood et al. (1997), this paper assumes that these two types of capital are complementary in the production of goods and services. The model with total-factor productivity (TFP) shocks is calibrated to compare quantitative implications of the assumptions regarding non-traded goods. I find that the feature that non-traded goods can be nondurable consumption goods as well as investment goods enables this model to overcome the anomaly better than that of Benigno and Thoenissen (2008). While TFP shocks to the traded sector generate similar positive wealth effects, the shocks to the non-traded sector generate a much smaller negative wealth effect in the model in this paper. The model predicts the correlation between relative consumption and the real exchange rate to be 0.06, which suggests similar to the empirical evidence that these two variables do not have a tight relationship. More importantly, because several empirical estimates of this correlation are slightly negative, this predicted correlation is significantly better than the prediction of 0.32 by a model similar to that of Benigno and Thoenissen. Both models are similar in their abilities to replicate well-known features of international business cycles, including the high volatility of investment relative to GDP and consumption, the counter-cyclicality of net exports, and the positive cross-country correlations of output and consumption.

The new feature also enables the model to partially overcome the difficulty of international business cycle models at explaining the positive cross-country correlation of investment (see, for example, Baxter and Crucini, 1993; Backus et al., 1995). The finding is that the cross-country correlation of investment is inversely related to the elasticity of substitution between equipment and structures. This result is driven by the fact that the low elasticity of substitution makes it inefficient to deviate from the steady state mix of equipment and structures. As a result, productivity shocks no longer cause big reallocations of investment (in equipment) across countries. The new feature in the model does not improve its ability to match the volatility of the real exchange rate observed in the data.

Recent theoretical works have examined the ability of models to generate wealth effects in order to overcome the consumption-real exchange rate anomaly. In Corsetti et al. (2004) the wealth effect

[1] In Corsetti et al. (2004), non-traded goods can be transportation services bringing traded goods to the market besides being nondurable consumption goods. However, this setup does not change the implication that there is essentially no means to smooth non-traded goods consumption.