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Trading frictions and consumption-output comovement ☆

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ABSTRACT

The tradable sector has a lower consumption-output comovement than that in the nontradable sector. An artificial autarky generates identical comovements. Once the economy is open, however, the comovement in the nontradable sector becomes too low. The paper demonstrates that the intensity of labor adjustment across sectors is the main reason for the above results. In autarky model, investment adjustment is limited, so is labor and output; with free trade, investment and hence labor adjust to a greater size and output moves oppositive to consumption in the nontradable sector. Therefore, a model with trading frictions can account for the data.

1. Introduction

Nontradable goods have received considerable attention in the open economy macroeconomics literature. The existing literature has concentrated on topics like explaining the terms of trade (Mendoza, 1995), current account dynamics (Edwards, 1989), the home premium puzzle (Baxter et al., 1998; Pesenti and van Wincoop, 2002), the exchange rate (Rogoff, 2002), or purchasing power parity (Backus and Smith, 1993; Sarno and Taylor, 2002).

Less attention has been paid to the statistical properties of the tradable and nontradable sectors within a single country. There are two facts of interest. The first is related to economic fluctuations. For example, the Canadian economy displays a striking difference between the two sectors in terms of volatility. Tradable sector variables like capital, investment, consumption and output are more volatile than their nontradable counterparts. This is especially true for output, where the tradable sector is more than two times as volatile. The nontradable sector accounts for almost half of both *GDP* and total consumption. Understanding the sources of volatility by sector may help in understanding the sources of aggregate fluctuations, the effects of shocks on the aggregate economy, and the likely impact of alternative public policies.

The second question is about consumption-output correlations. This correlation is smaller in the tradable sector than in the nontradable sector. By definition, the tradable sector differs from the nontradable sector in only one aspect, that is, its

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products can move across the border. Are the differences in the consumption-output correlations across the two sectors due to the tradable nature of the tradable sector? Quantitatively, what specific factors lead to this pattern of correlations?

So far in literature, these two questions received little attention except in Povoledo (2007) and Stockman and Tesar (1995). Both papers, however, only mention the fact that the tradable sector is generally more volatile without further investigation.[1] Little attention has been paid to the sector-specific consumption-output correlations. This paper constructs a small open economy model focusing on these correlations.

The benchmark model is a two sector model without any frictions. The model has a representative household who has preferences over leisure and a bundle of traded and non-traded goods. Labor is perfectly mobile across sectors while physical capital is sector-specific. Technology spillover is allowed between the two sectors. This artificial economy generates a higher consumption-output correlation in the tradable sector than in the nontradable sector, a pattern opposite to that seen in the data.

It is of primary interest to confirm that the difference in the consumption-output comovements is indeed because of the international trade. The is done through solving the corresponding autarky model.[2] The autarky model yields similar consumption-output comovements across sectors.

Comparing the free trade and autarky models through impulse responses shows that labor adjusts quite differently in the two models, which results from different investment responses. When a positive productivity shock occurs in the tradable sector, for example, its investment increases. With free trade, foreign borrowing is available and hence the representative household adjusts its investment in accordance with the world real interest rate. Consequently, labor productivity in the tradable sector increases, which in turn causes labor reallocation from the nontradable sector to the tradable sector. Output in the nontradable sector thus decreases. Meanwhile, consumption increases due to the wealth effect. The opposite movement of consumption and output results in the counterfactually low comovement in the nontradable sector.

In autarky, however, foreign borrowing is not possible and the marginal productivity of capital in the tradable sector is not restricted by the world interest rate. Investment can not be increased as much as in the free trade economy, so neither does labor. Accordingly, nontradable output does not decrease much. With technology spillover, the net effect is that output increases, yielding a much closer consumption-output comovement in both sectors.

The underlying reason for labor adjustment difference is due to international openness. An obvious way to enhance the consumption-output correlation in the nontradable sector is to make the economy "less open". This is achieved by imposing international trading frictions in the benchmark model. Trading frictions serve a double purpose here. First they successfully reduce the excessive volatilities in the benchmark model, especially for the trade balance and investment. Second, they serve to increase the consumption-output comovement in the nontradable sector. With trading frictions, the magnitude of the adjustment in the trade balance becomes smaller, which in turn causes a smaller change in investment and finally a smaller adjustment in labor. The smaller drop in labor in response to the same productivity shock leads to a smaller decrease in output in the nontradable sector. As a consequence, the consumption-output correlation in the nontradable sector increases and exceeds that of the tradable sector.

Another way to limit the response of investment and thus labor is to impose capital adjustment costs, which is also widely used in open economy literature. This paper shows that introducing capital adjustment costs does lead to a larger consumption-output correlation in the nontradable sector. This approach, however, fails to generate a consistent order of volatilities across the two sectors and a realistic trade balance volatility.

The main results strongly suggest the existence of trading frictions, and that they may not be overlooked for open economy models. The next section presents the benchmark model; Section 3 calibrates and simulates the benchmark model; Section 4 describes the autarky model and compares with the benchmark model; Section 5 presents the model with capital adjustment costs and the model with trading frictions; Section 6 concludes the paper.

2. Model setup

In the model of this paper, the infinitely lived representative household derives utility from a composite good which consists of tradable C^T, and nontradable goods C^N, and disutility from working either in tradable goods sector, N^T, or nontradable goods sector, N^N.

The agent's preferences are summarized by:

$$E_0\sum_{t=0}^{\infty}\theta_t U\left(C_t^T, C_t^N, N_t^T, N_t^N\right), \tag{1}$$

$$\theta_0 = 1, \tag{2}$$

$$\theta_{t+1} = \beta[U(C_t^T, C_t^N, N_t^T, N_t^N)]\theta_t, \tag{3}$$

[1] Stockman and Tesar (1995) study six OECD countries, and show that consumption, investment, labor and output in the nontradable sector are generally less volatile than those in the tradable sector. The six countries under investigation are Canada, France, Italy, Japan, UK and US.

[2] It may sound strange to still divide tradable sector and nontradable sector in a closed economy. It is necessary and useful, however, especially for comparison, to clarify this issue by maintaining the same division.