



Home production, labor wedges, and international business cycles[☆]



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ABSTRACT

Non-separabilities due to home production break the link between market consumption and its marginal utility and help explain several stylized facts of the open economy. In an estimated two-country model with complete asset markets in which home production generates a labor wedge that mimics its empirical counterpart, output is more correlated than consumption across countries, labor inputs and labor wedges are positively correlated across countries, and relative market consumption is negatively related to the real exchange rate. Evidence from time use surveys corroborates some of the predictions of the model.

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1. Introduction

Some international macroeconomists have hypothesized that taste shocks and non-separabilities in preferences may help explain the low degree of international risk sharing observed in the data. However, whether such features actually improve our understanding of international business cycles remains an open question, as it has been difficult to interpret, discipline, and test models with non-separable preferences. In this paper, I propose strategies that help discipline the non-separability in preferences induced by home production. The implied restrictions on preferences explain a number of puzzles in open economy macroeconomics.

The model economy is a frictionless international business cycle model in which each country has a market and a home sector. Goods produced in the home sector and goods purchased in the market sector enter in a non-separable way in the utility function. In the home sector, consumers produce home goods with home time and capital, as in Benhabib et al. (1991). Home goods are substitutable to domestic market goods, but they are not tradeable in the market. In the market sector, firms produce specialized market inputs with market time and capital, as in Backus et al. (1994, 1995). The two countries trade specialized market inputs and a complete set of financial securities. International business cycles are driven by productivity shocks in the market and the home sector.

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The first strategy to discipline the non-separability in preferences builds upon a recent literature in the closed economy that organizes aggregate data in terms of time-varying wedges from the first-order conditions of the neoclassical growth model. Of particular interest to macroeconomists is the behavior of the “labor wedge,” which is defined as the gap between the marginal product of labor and the marginal rate of substitution between leisure and market consumption (Parkin, 1988; Hall, 1997; Shimer, 2009; Karabarbounis, 2014). Under this view, successful models of the business cycle – including international business cycle models – must be able to generate volatile and countercyclical labor wedges (Chari et al., 2007).

The proposed strategy is to estimate the non-separability in the utility function from the behavior of the labor wedge as measured in the data. Then, the two-country model is evaluated in terms of its ability to generate business cycles consistent with stylized facts of the international data. The estimates suggest a high elasticity of substitution between market and home goods, moderately persistent but volatile productivity shocks in the home sector, and highly correlated productivity innovations between the home and the market sector. These parameters allow the model to generate a labor wedge which is as volatile and persistent as the labor wedge measured for several countries. In addition, they allow the model to match the negative correlation of the labor wedge with output and the positive correlation of the labor wedge with market productivity observed in the data.

Under the same parameters that restrict moments of the labor wedge in the model to match moments of the labor wedge in the data, the two-country model is consistent with salient features of international business cycles. The “quantity anomaly” is that market output correlates more than market consumption across countries (Backus et al., 1994). The model accounts for the “Backus and Smith (1993) puzzle” which states that the correlation between relative market consumption and the real exchange rate is negative in the data, but positive and high in most theoretical models. In addition, the model generates countercyclical real net exports and a positive comovement of labor inputs and labor wedges across countries. It is important to stress that, contrary to the labor wedge, open economy features of the data are not targeted when estimating the model. Therefore, matching these features through the endogenous response of the labor wedge validates externally the home production theory of the labor wedge.

Two key efficiency conditions allow home production to explain international macro-puzzles through endogenous movements in the labor wedge. The first condition expresses the measured labor wedge as an increasing function of time spent on home production relative to time spent on leisure. Intuitively, households allocate an increasing fraction of their time to produce in the home sector in recessions when market consumption and market work are low. Since the two sectors are substitutes, the increase of the marginal utility of market consumption is smaller than in a model without home production which explains the increase of the labor wedge during recessions. In a model without home production and complete asset markets, productivity shocks induce strong wealth effects that imply a negative comovement of labor and output across countries. By contrast, home production increases the willingness of households to substitute time in response to productivity shocks, which implies that labor and output correlate positively across countries and more than market consumption.

The second condition, the Backus and Smith (1993) condition, sets the real exchange rate proportional to the ratio of marginal utilities of market consumption across countries. Given that home production is substitutable to market consumption, the Backus–Smith condition implies that countries spending relatively more time on home production tend to experience real exchange rate depreciations. Therefore, in states in which domestic market consumption is lower than foreign market consumption, the real exchange rate tends to depreciate because of the increase in relative domestic home production time.

The second strategy uses evidence from time use surveys to test these two efficiency conditions and to corroborate the mechanism induced by home production. The lack of long time series on time use categories other than market work hours is a major challenge in relating non-separabilities in preferences to the labor wedge and to the real exchange rate at business cycle frequencies. This necessitates an alternative approach that substitutes out changes in home production time and changes in leisure time with an estimated function of changes in market work time. To do so, I use the recent findings of Aguiar et al. (2013) who estimate the sensitivity of changes in various time use categories with respect to changes in market work hours in a panel of U.S. states between 2003 and 2010 from the American Time Use Survey (ATUS).

These micro-level estimates can be used to evaluate the model-implied labor wedge in the data at business cycle frequencies. The result is that the labor wedge generated by home production tracks closely the measured labor wedge for a number of countries at business cycle frequencies. Next, I use time use data for various countries and years from the Multinational Time Use Survey (MTUS) to explore the relationship between cross country differences in changes in labor wedges and cross country differences in changes in time use. The evidence shows a positive relationship between labor wedges and time spent on home production. Instead, there is no evidence that a mis-specification of the leisure component of preferences induces the labor wedge. This finding suggests that it is crucial to differentiate between home production time and leisure time in testing for non-separabilities in the utility function.

The role of non-separabilities for real exchange rates is evaluated in terms of the residual between the real exchange rate and the difference of foreign from domestic market consumption scaled by the coefficient of relative risk aversion. As the Backus–Smith puzzle suggests, this “Backus–Smith residual” is volatile at business cycle frequencies. Substituting out changes in home production time and changes in leisure time with the estimated function of changes in market work time allows us to compare the Backus–Smith residual in the data to its model analog. The evidence shows a significant relationship between the residual from the Backus–Smith condition in the data and its analog in the home production model for various country pairs.

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