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## Journal of Monetary Economics

journal homepage: [www.elsevier.com/locate/jme](http://www.elsevier.com/locate/jme)

# Portfolio and welfare consequences of debt market dominance<sup>☆</sup>

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## ARTICLE INFO

## Article history:

Received 15 August 2012

Received in revised form

12 June 2015

Accepted 16 June 2015

Available online 26 June 2015

## Keywords:

International portfolio choice

Global imbalances

Incomplete markets

Bond market

## ABSTRACT

The ability to issue debt that pays in units of the domestic good leads a country to accumulate a large and negative net foreign asset position while maintaining a positive position in equity. This debt market advantage also helps to explain the weak relationship between the real exchange rate and relative consumption. Our stylized model matches the key facts about the U.S. international portfolio, the U.S. real exchange rate, and explains nearly 50% of the observed variation in the valuation effects. We find that taxing bond market transactions increases the volatility of the exchange rate, capital flows and allocations. In contrast, taxing equity positions stabilizes the exchange rate and capital flows while having little impact on the allocation. Lastly, the paper describes a global solution method for portfolio problems under incomplete markets.

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## 1. Introduction

During the past several decades we have witnessed a growing financial integration in the world economy. There has been an increase in both the volume of internationally traded assets and the magnitude of cross-border gross capital flows. According to the dataset compiled by Lane and Milesi-Ferretti (2007), the total gross foreign assets of the U.S. were 16% of GDP in 1970, stayed below 32% until 1984 and increased to 131% of GDP in 2007. Total gross foreign liabilities were 12% of GDP in 1970, stayed below 30% until 1984 and subsequently soared to 148% of GDP in 2007.

The increase of net and gross international capital flows led to global imbalances and, in particular, to a significant deterioration of the U.S. net foreign asset (NFA) position. This weakening of the U.S. NFA position was driven by the accumulation of debt liabilities, while the NFA in equity improved. Gourinchas and Rey (2005) say that “as financial globalization accelerated its pace, the U.S. transformed itself from a world banker into a world venture capitalist, investing greater amounts into high yield assets such as equity and FDI”, while “its liabilities have remained dominated by bank loans, trade credit and debt, i.e. low yield safe assets”. Similar observations were made by Obstfeld and Rogoff (2000) and Mendoza et al. (2009) among others. Obstfeld (2004) states that for the U.S. “the striking change since the early 1980s is the sharp growth in foreign portfolio equity holdings”, while on the liabilities side, “the most dramatic percentage increase has been in the share of U.S. bonds held by foreigners.”

However, the U.S. is in a unique position: it is the only country that can borrow (and lend) almost exclusively in the domestic currency. The share of U.S. debt-like liabilities including government debt, corporate debt and bank loans

<sup>☆</sup> This paper was previously circulated under the title “International Portfolios: An Incomplete Markets General Equilibrium Approach.”

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denominated in U.S. dollars grew from 80.6% in 1990 to 88.3% in 2004, see Lane and Shambaugh (2009). For comparison, during the same period the share of U.K. debt-like liabilities denominated in British pounds averaged at 19.4%. Notably, most of the U.S. debt-like foreign assets were also denominated in the domestic currency amounting to 87.4% in 2004. Therefore, international debt markets have been dominated by assets denominated in the U.S. dollar.<sup>1</sup> The U.S. currency has also dominated the trade in commodity markets, another significant source of short-term debt.<sup>2</sup>

In this paper, we ask if the U.S. dominance in the international debt market can account for the size and composition of the U.S. international portfolio and the dynamics of the real exchange rate. Did the observed debt market structure have any implications for the international adjustment mechanism and what were the welfare implications? To address these questions, we build a model that allows us to match the size and the composition of the U.S. NFA position. The model must feature incomplete financial markets, multiple internationally traded assets and many goods. Incomplete markets are necessary because with complete markets and time-separable preferences portfolios are typically constant and, therefore, capital flows are absent.<sup>3</sup> Multiple (at least three) assets are needed to distinguish debt and equity positions and to model gross equity positions. Multiple goods are necessary to allow endogenous external adjustment via the real exchange rate as emphasized by Lane and Milesi-Ferretti (2001) and Obstfeld (2004). The model and the solution method must also apply to asymmetric economies. In a symmetric world, any imbalances are necessarily transitory unless there are multiple equilibria that naturally pose problems for the quantitative analysis. In order to generate a realistic external portfolio, we introduce two asymmetries into the model.

First, we model the privileged position of the U.S. by assuming that bonds traded in the world financial markets are denominated in the units of its domestic good. With this asymmetry our model predicts that the privileged country accumulates a significant debt while maintaining a sizable net position in equity. In the model, the domestic bond is a good hedge against fluctuation in consumption. But when domestic output increases, the domestic price level declines and consumption becomes more affordable. Yet, the domestic bond does not allow purchasing more consumption as its payoff declines. Hence, the domestic bond is sold. While this result relies on a low, yet reasonable, elasticity of substitution between goods, our numeric simulations show that the effect is very strong, allowing us to match the U.S. net position in debt equal to  $-38.0\%$  of GDP.

Second, we assume that individuals in the U.S. are less risk-averse than elsewhere.<sup>4</sup> This is a reduced form way of modeling the fact, documented in Mendoza et al. (2009), that the U.S. has more developed financial markets than the rest of the world. With more developed financial markets, consumers are better able to insure away idiosyncratic risks and, hence, should be more inclined to invest in risky assets. In turn, Weil (1993) shows that increasing the risk-aversion coefficient or increasing the variance of individual income have the same effect on the equilibrium consumption function.

The small difference in risk aversion that we assume enables us to obtain a realistic portfolio of foreign assets. This asymmetry has little quantitative effect by itself, but it reinforces the bond-market advantage. Namely, a country with lower risk aversion is willing to hold a larger than the rest of the world fraction of wealth in equity. But the insurance service it provides is valued little given the size of observed macroeconomic risks. So, the increased investment in equity is nearly entirely financed by borrowing in the debt market. The effect on the overall NFA position is small. Adding the bond market advantage, above providing independent motives to borrow, lowers the cost of the existing debt and prompts the less-risk-averse country to increase investment in foreign equity. Similarly, a country with the bond market advantage is willing to borrow but this increases its exposure to fluctuations in domestic income. So, it will not invest in equity unless we increase its risk-tolerance.

The main contribution of this paper is to show that the U.S. external balance sheet can be matched using a relatively simple model. This model also matches two important facts in international finance: the home equity bias and the consumption-real exchange rate disconnect. Equity home bias presents a direct restriction on the composition of the NFA that we target. The correlation between the real exchange rate and relative consumption (hence relative pricing kernels) determines which assets a country chooses to hold and which it decides to sell and the size and the stochastic properties of capital flows. Restricted by the above empirical facts, the model explains nearly 50% of the observed exchange rate related valuation effects emphasized by Lane and Milesi-Ferretti (2007).<sup>5</sup>

On the methodological side, we explain how to solve international portfolio choice models by explicitly modeling the financial wealth distribution. We compute a global solution to a two-country two-good general equilibrium incomplete markets model by adapting the projection method developed in Judd et al. (2000) and Kubler and Schmedders (2003). We also show that there exists a wealth-recursive competitive equilibrium, providing a theoretical foundation for the solution methodology. The existence

<sup>1</sup> For a review see Eichengreen and Hausmann (2005). The introduction of the euro led to the increased share of euro-denominated internationally traded debt assets. However, the rise of the euro can be partially accounted for by increased financial flows within the Eurozone, while trade in euro assets with non-euro economies may be limited.

<sup>2</sup> See Goldberg and Tille (2009) for the analysis of the U.S. dollar's role in international trade.

<sup>3</sup> For a proof of this statement see Judd et al. (2000).

<sup>4</sup> An indirect evidence of an elevated risk appetite in the U.S. is provided in Rydqvist et al. (2009): 38.5% of U.S. individuals owned (directly) stocks in 2006. The second highest participation rate of 28.5% is in Canada; the participation in Japan, which is the largest holder of the U.S. debt, is only 18.1. Large European economies have even lower participation rates: 14.1 in the U.K., 12.5 in Germany and 6.9 in France. Moreover, the U.S. has maintained the lead in stock market participation since 1945.

<sup>5</sup> Our model requires additional elements to be consistent with the well-known asset pricing facts. So, we concentrate on the exchange rate channel, largely ignoring the valuation effects stemming from fluctuations in asset prices.

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