



International portfolios, capital accumulation and foreign assets dynamics[☆]

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ABSTRACT

Despite the liberalization of capital flows among OECD countries, equity home bias remains sizable. We depart from the two familiar explanations of equity home bias: transaction costs that impede international diversification, and terms of trade responses to supply shocks that provide risk sharing, so that there is little incentive to hold diversified portfolios. We show that the interaction of the following ingredients generates a realistic equity home bias: capital accumulation and international trade in stocks and bonds. In our model, domestic stocks are used to hedge fluctuations in local wage income. Terms of trade risk is hedged using bonds denominated in local goods and in foreign goods. In contrast to related models, the low level of international diversification does not depend on strongly countercyclical terms of trade. The model also reproduces the cyclical dynamics of foreign asset positions and of international capital flows.

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1. Introduction

Cross-country capital flows have increased greatly, since the liberalization of international capital markets two decades ago (e.g., Lane and Milesi-Ferretti, 2003, 2005, 2006). Equity home bias, while less severe than in earlier decades, remains sizable and is observed in

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all industrialized countries (see French and Poterba (1991) for early evidence and Sercu and Vanpée (2007) for a recent survey). There are broadly two classes of explanations for the persisting equity home bias. The first one centers on transaction costs and informational barriers in cross-border financial transactions and suggests that international risk sharing is insufficient.¹ The second one focuses on the possibility that terms of trade changes in response to supply shocks may provide international insurance against these shocks, so that even a portfolio with home bias delivers efficient international risk sharing (Cole and Obstfeld, 1991; Helpman and Razin, 1978).

Both types of explanations are helpful but are not without problems. Several authors have argued that frictions would have to be large to fully explain the equity home bias (French and Poterba, 1991; Tesar and Werner, 1995; Warnock, 2002). In order to interpret terms of trade changes as providing insurance (rather than a source of risk), the terms of trade would have to improve strongly after a negative supply shock. However, empirically the terms of trade are only weakly correlated with output (e.g., Backus et al., 1994).

¹ See, e.g., Heathcote and Perri (2002, 2004), Martin and Rey (2004), Coeurdacier and Guibaud (2008), Tille and van Wincoop (2007), and Van Nieuwerburgh and Veldkamp (2007) for recent studies on the role of frictions in international financial markets.

Using a two-country general equilibrium model with fully integrated financial markets, this paper shows that the interaction of the following ingredients is key for generating realistic equity home bias, without requiring strongly countercyclical terms of trade: capital accumulation and international trade in stocks and bonds denominated in local and foreign goods.²

By contrast, other recent general equilibrium models of international equity holdings (see [Devereux and Sutherland \(2006a,b\)](#) for references) have mostly assumed *endowment economies*, i.e. economies without production or capital accumulation—[Heathcote and Perri \(2007\)](#) is a notable exception discussed below. In such economies, households trade in international financial markets solely for consumption smoothing and risk sharing purposes so that the equity portfolio is structured to sustain net imports in states of nature where local production is low; this leads to local equity bias if relative Home equity returns rise (compared to Foreign returns) when the Home terms of trade improve and the Home real exchange rate appreciates, in response to a drop in the Home output.³ This condition however is not met in the data: empirically, the correlation between relative equity returns and the real exchange rate is low ([van Wincoop and Warnock, 2006](#)).

We consider a model with capital accumulation because, as discussed by [Obstfeld and Rogoff \(1996\)](#), one of the key functions of international financial markets is to finance physical investment; empirically, productive investment is a key driver of fluctuations in net imports ([Sachs, 1981](#); [Backus et al., 1994](#)). With two stocks and two bonds, and two types of (Home and Foreign) technology shocks, markets are effectively complete, up to a first-order (linear) approximation of the model. In addition to standard TFP (total factor productivity) shocks, the model here assumes shock to investment efficiency (as in [Greenwood et al., 1997, 2000](#); [Fisher, 2002, 2006](#)), because recent empirical research suggests that those shocks are an important source of fluctuations in real activity ([Justiniano and Primiceri, 2006](#); [Justiniano et al., 2007](#)).

The equilibrium portfolio is structured to optimally hedge fluctuations in the real exchange rate and in labor incomes.⁴ Specifically, *bonds* are used for real exchange rate hedging, since the difference between the pay-offs of bonds denominated in Home and Foreign goods is correlated with the real exchange rate. Fluctuations in labor incomes are hedged through the equity portfolio. The key mechanism here is that fluctuations in investment generate a negative comovement between Home capital income (net of investment) and Home labor income (relative to their Foreign counterparts). A Home investment boom lowers Home payments to shareholders (to finance investment) and raises Home output and wage incomes (relative to foreign wages), under the realistic assumption (made here) that there is a local bias in investment spending. Thus, local equity offers a good hedge against movements in local labor incomes associated with investment fluctuations—which explains why equilibrium equity portfolios exhibit home bias. The predicted equity home bias only depends on the degree of home bias in investment spending, and on the labor share. In particular, it is independent of preference parameters.⁵ Importantly, the optimal portfolio does not hinge on the presence of investment efficiency shocks. These shocks help to explain the countercyclical nature of the trade balance and the acyclicity of the terms of trade but our portfolio results would also hold in a model with TFP shocks and a range of other (domestic and foreign) shocks to output and/or investment.

The closest paper to ours is [Heathcote and Perri \(2007\)](#) [HP henceforth] who were the first to investigate the importance of physical investment for equity portfolios. Trade in bonds, and the shocks to investment efficiency assumed here are the main difference between our model and HP. The HP model only generates realistic equity home bias if the terms of trade respond strongly to TFP shocks (or, equivalently, if preferences are “close enough” to log-separability between the two goods, as in a [Cole and Obstfeld \(1991\)](#) economy). Our model does not require strong terms of trade effects of productivity shocks—nevertheless, there is sizable equity home bias. This is important since the empirical evidence concerning the response of the terms of trade to technology shocks is mixed.⁶

Another paper close to ours is [Engel and Matsumoto \(2006\)](#) who analyze international equity portfolio choices in a model with money, sticky prices and trade in bonds, but without capital accumulation. Under price stickiness, the short run level of output is demand determined, so that a positive productivity shock leads to a fall in employment and labor income, but an increase in profits. Ownership of local equity is thus an effective hedge against labor income risk. In our model, local equity has a similar hedging property—but that property is driven by physical investment shocks (without requiring price stickiness).

A key contribution of the paper here is to explore the *quantitative* implications of the model regarding the *dynamics* of external asset positions and international capital flows. [Gourinchas and Rey \(2007\)](#), [Tille \(2005\)](#) and [Lane and Milesi-Ferretti \(2006\)](#) document empirically that fluctuations in the value of domestic and foreign assets induce external capital gains/losses that have a substantial effect on countries' net foreign asset positions (NFA). We show that the present model generates sizable international valuation effects. Here, fluctuations in a country's NFA are driven by asset price changes—NFA is thus predicted to have the time series properties of asset prices; in particular, the first difference of a country's NFA is predicted to be highly volatile and to have low serial correlation. We show that these predictions are consistent with the data. When there is a positive TFP or investment efficiency shock, net imports are predicted to rise on impact (due to a strong short run rise in investment), and to fall thereafter. As NFA equals the present value of current and future net imports, the NFA drops, on impact. Thus, the change in NFA is predicted to be countercyclical, which is likewise consistent with the data. Finally, the model generates sizable asset trades.⁷

We also show that our model has several interesting business cycle features. The investment efficiency shocks assumed here generate net exports and real exchange rate volatility that is larger—and thus closer to the data—than the volatility induced by TFP shocks. In the model here, a positive shock to a country's TFP raises that country's output while worsening its terms of trade; a country-specific shock to investment efficiency likewise raises output, but (on impact) it improves the terms of trade (the shock raises investment spending which is biased towards local inputs; hence it raises the relative price of those inputs). As a result, with the combined two types of shock, the terms of trade (and the real exchange rate) are less cyclical than in standard RBC models that are driven just by TFP shocks (e.g., [Backus et al., 1994](#)). The presence of investment efficiency shocks also generates a cross-country correlation of consumption that is lower,

² [Pavlova and Rigobon \(2007a,b\)](#), [Engel and Matsumoto \(2006\)](#) and [Coeurdacier et al. \(2007\)](#) have previously analyzed equity portfolio choice in general equilibrium models with trade in bonds.

³ See [Uppal \(1993\)](#), [Coeurdacier \(2009\)](#), [Kollmann \(2006b\)](#).

⁴ See [Adler and Dumas \(1983\)](#) for early work that stresses exchange rate hedging as a determinant of portfolio choice. [Baxter and Jermann \(1997\)](#), [Heathcote and Perri \(2007\)](#), [Engel and Matsumoto \(2006\)](#), [Bottazzi et al. \(1996\)](#), and [Julliard \(2002, 2004\)](#), among others, discuss the hedging of labor income risk.

⁵ [Coeurdacier and Gourinchas \(2009\)](#) provide a general discussion of the conditions under which equity portfolios are independent of preference parameters.

⁶ [Corsetti et al. \(2007\)](#) argue that, empirically, a positive technology shocks triggers a terms of trade appreciation; [Acemoglu and Ventura \(2002\)](#) and [Kollmann \(2006c\)](#) provide evidence that higher productivity depreciates the terms-of-trade.

⁷ For other related recent empirical and theoretical analysis of international portfolios and external valuation effects, see e.g. [Lewis \(1999\)](#), [Hau and Rey \(2004\)](#), [Siourounis \(2004\)](#), [Kraay et al. \(2005\)](#), [Devereux and Saito \(2005\)](#), [Ghironi et al. \(2007\)](#), [Obstfeld \(2006\)](#), [Kollmann \(2006a\)](#), and [Matsumoto \(2007\)](#). [Evans and Hnatkovska \(2005, 2007\)](#) and [Hnatkovska \(2005\)](#) also discuss a world with capital accumulation and portfolios; those papers do not analyze the hedging logic that is central to our paper, and have a different empirical focus. [Cantor and Mark \(1988\)](#) provided an early theoretical discussion of the role of equity price changes for current accounts, based on a one-good model with equities trade (their model predicts full portfolio diversification).

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