International capital flows under dispersed private information ☆

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ABSTRACT

It is well established that private information is critical to our understanding of asset prices. In this paper we argue that it also affects international capital flows and use a simple two-country DSGE model to illustrate its impact. We show that private information (i) increases the volatility of both net and gross capital flows, (ii) leads to a high correlation between capital inflows and outflows, (iii) leads to a disconnect of capital flows from observed macro fundamentals and (iv) implies that capital flows contain information about the future macro fundamentals. We also show that dispersed information affects capital flows both through asset prices and directly, so that the impact on flows is not just the mirror image of the impact on prices.

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1. Introduction

As with all asset trade, international capital flows require some form of heterogeneity. If all investors were identical, higher demand for an asset would only drive up its price, without any flows.[1] The assumption of identical investors is however unrealistic. First, investors live in different countries, so that their non-asset incomes are differently impacted by shocks. Second, investors from different countries hold different portfolios as various frictions lead to a bias towards domestic assets. Models of international capital flows commonly include these basic forms of heterogeneity, but abstract from one of the most important sources of heterogeneity, namely differences across investors in information and expectations. This heterogeneity in information sets is however likely to be important. For instance, Broner et al. (2013) emphasize that differences in expectations between domestic and foreign investors are critical for understanding the strong positive correlation between capital inflows and outflows, i.e. the fact that when U.S. investors are buying more foreign assets, foreign investors tend to buy more U.S. assets.

In this paper we investigate the impact of heterogeneous information on international capital flows. There is extensive evidence of heterogeneous information among agents, with for example a significant cross section dispersion of survey forecasts of asset prices, exchange rates and macroeconomic variables. The large asset market trading volume and the close connection between asset prices and order flow are further evidence of the significant role of dispersed information.[2] A vast literature has documented the many implications of this information heterogeneity

[1] See Forbes and Warnock (2012), who make exactly this point when discussing the importance of heterogeneity for understanding the impact of push and pull factors on international capital flows.

[2] Wang (1994) investigates the impact of dispersed information on trading volume. Evans and Lyons (2002) show that most short-run exchange rate volatility is related to order flow, which aggregates private information. See Hasbrouck (1991) for related evidence for equity prices.

for asset prices, such as market bubbles and crashes, asset price volatility and disconnect from observed fundamentals.[3] However, the implications of dispersed information for international capital flows are not yet well understood.

Albuquerque et al. (2007, 2009) and Brennan and Henry Cao (1997) explicitly consider the impact of heterogeneous information on international capital flows. While this provides some important insights, the analysis is limited to linear partial equilibrium settings. This has several drawbacks. First, these models are not suited to study aggregate international capital flows because there is a riskfree asset in infinite supply in an unspecified location. Capital flows refer only to the assets that are in finite supply, which is affected by shifts between assets in finite supply and infinite supply that play no role when focusing on aggregate capital flows. Second, these models abstract from saving and investment. Net capital flows, which correspond to the current account, i.e. saving minus investment, are then zero by construction. Third, the absence of investment in these models implies that there is no general equilibrium feedback mechanism between portfolio flows, the capital stock and asset returns that depends on the marginal product of capital.

In this paper we investigate the implications of dispersed information for gross and net international capital flows in a general equilibrium setting. This has several advantages. It allows us to consider aggregate flows instead of a subset of them. It also allows us to explicitly take into account important feedback mechanisms. Portfolio shifts across countries affect relative asset prices, which affect expected returns, which in turn impact portfolio flows. Expected returns, asset returns risk and capital flows are all determined jointly in the model. Finally, by adopting a two-country non-linear DSGE model we connect more closely to the existing general equilibrium literature on international capital flows, particularly the recent literature that has introduced endogenous portfolio choice into open economy DSGE settings.[4] The main difference is that this literature abstracts from information heterogeneity. Our contribution thus brings together the literature on dispersed information in partial equilibrium settings with the literature on portfolio choice in open economy DSGE models.

We focus on three implications of heterogeneous information for capital flows that have received significant attention in the asset price literature: the disconnect from observed fundamentals, information content about future fundamentals and volatility.[5] We show that, just like for asset prices, dispersed information leads to a disconnect between capital flows and observed fundamentals and implies that capital flows contain information about future fundamentals.[6] We also show that private information increases the volatility of capital flows. Finally, we show that dispersed information leads to a higher correlation between capital inflows and outflows, an effect that reflects different expectations between Home and Foreign investors.

We consider three versions of the model that only differ in their information structure. In each version agents make saving, investment and portfolio decisions. The model is driven by standard productivity shocks. The first version, which we refer to as the standard model, assumes that agents receive no signals about future productivity innovations. This is a useful starting point as the existing literature on international capital flows relies on models of this type.[7] The second version introduces private signals about next period's productivity innovations,

and we refer to it as the private signal model. The last version only differs in that we replace the private signals about future productivity with publicly observed signals about future productivity, and we refer to it as the public signal model.

We also introduce another feature standard in noisy rational expectations (NRE) asset pricing models, namely non-informational trade (noise). When combined with private information, this noise prevents the asset price from completely revealing the private information. The NRE asset pricing literature has shown that the combination of the information content of asset prices due to private information and even small non-informational trades (e.g. noise trade or liquidity trade) can lead to a very large impact of non-informational trades on asset prices.[8] For example, a higher asset price resulting from noise trade can rationally cause all agents to infer that others have private information about better future fundamentals. This leads all agents to be more optimistic about future fundamentals even if no one has favorable signals about them.

The paper is related to a small literature that introduces NRE asset pricing features into open economy models. These include Albuquerque et al. (2007, 2009), Bacchetta and van Wincoop (2004, 2006), Brennan and Henry Cao (1997), Gehrig (1993) and Veldkamp and van Nieuwerburgh (2009). These papers focus on a variety of issues, ranging from exchange rate puzzles to international portfolio home bias and the relationship between asset returns and portfolio flows. Together they show that information dispersion within and across countries can tell us a lot about a wide range of stylized facts related to international asset prices and portfolio allocation. However, as pointed out above, the linear partial equilibrium nature of such models has serious limitations in analyzing aggregate capital flows.[9]

The paper is organized as follows. Section 2 describes the model. Section 3 presents the general approach of the solution method and Section 4 applies it to our specific model. We discuss the determinants of capital flows in Section 5, stressing the role of private information. Section 6 provides a numerical illustration and Section 7 concludes.

2. The model

We consider a two-country DSGE model that we purposely keep very simple. There is just one numeraire good that is produced in the Home and Foreign countries, with production affected by country-specific productivity shocks. There are two assets, one for each country. We adopt a simple overlapping generations setup to simplify consumption and portfolio decisions. This section first describes the features that are common to the three versions of the model, and then presents the information structure and non-informational trade that differs across them.

2.1. Production, investment and assets

The good is produced using a constant returns to scale technology in labor and capital:

$$Y_{i,t} = A_{i,t} K_{i,t}^{1-\omega} N_{i,t}^{\omega} \quad ; \quad i = H, F \tag{1}$$

where H and F denote the Home and Foreign countries respectively. Y_i is the output in country i, A_i is a country-specific exogenous stochastic