



# International capital flows, returns and world financial integration

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## ABSTRACT

International capital flows have increased dramatically since the 1980s, with much of the increase being due to trade in equity and bond markets. Such developments are often attributed to the increased integration of world financial markets. We present a model that allows us to examine how greater integration in world financial markets affects the behavior of international capital flows and financial returns. Our model predicts that international capital flows are large (in absolute value) and very volatile during the early stages of financial integration when international asset trading is concentrated in bonds. As integration progresses and households gain access to world equity markets, the size and volatility of international bond flows decline. This is the natural outcome of greater risk sharing facilitated by increased integration. This pattern is consistent with declining volatility observed during 1975–2007 period in the G-7 countries. We also find that the equilibrium flows in bonds and stocks predicted by the model are larger than their empirical counterparts, and are largely driven by variations in equity risk premia. The model also predicts that volatility of equity and bond returns decline with integration, again consistent with the data for G-7 economies.

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## 1. Introduction

International capital flows have increased dramatically since the 1980s. During the 1990s gross capital flows between industrial countries rose by 300%, while trade flows increased by 63% and real GDP by a comparatively modest 26%. In this paper we document that much of the increase in capital flows is due to trade in equity and debt markets, with the result that the international pattern of asset ownership looks very different today than it did a decade ago. The changes in the holdings of equity and debt have also coincided with significant changes in the volatility of capital flows and asset returns. Among the G-7 countries, the volatilities of equity and debt flows fell throughout the 1975–2007 period. For instance, the volatility of debt inflows and outflows declined, on average, by about 30% between 1975–1995 and 1996–2007. The volatility of equity outflows fell by approximately 40% during the same periods. The volatility of equity and debt returns in the G-7 have also fallen during the same period – by 25% for equity returns and by almost 60% for bond returns. These developments are often linked to the increased integration of world financial markets. Easier access to foreign financial markets, so the story goes, has led to the changing pattern of asset ownership as investors have sought to realize

the benefits from international diversification. From the theoretical perspective, however, it is not clear how flows and returns should respond to greater integration.

In this paper we present a model that allows us to examine how greater integration in world financial markets affects the behavior of international capital flows and asset returns. Our strategy is to start with a relatively standard international business cycle model, extend it to allow for trade in international bonds and equities, calibrate it to match real business cycle moments in the US, and then use it to address three main questions:

- (i.) How is the size and volatility of international capital flows affected by greater financial integration in world debt and equity markets?
- (ii.) What factors drive international portfolio flows, and does their influence change with the degree of integration?
- (iii.) How does the degree of financial integration affect the behavior of equity and bond prices and returns?

To the best of our knowledge, the literature has yet to *jointly* address these questions.

The model we present captures the effects of financial integration in the simplest possible way. We consider a symmetric two-country model with production of traded and nontraded goods. Firms in both the traded and nontraded sectors issue equity on domestic stock markets. We examine the impact of financial integration in this world by

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considering three configurations: financial autarky (FA), partial integration (PI), and full financial integration (FI). Under FA, households only have access to the domestic stock market and so can only hold their wealth in the form of the equity of domestic firms producing traded and nontraded goods. The equilibrium in this economy serves as a benchmark for gauging the effects of financial integration. Under PI, we open a world bond market. Now households can allocate their wealth between domestic equity and international bonds. This configuration roughly corresponds to the state of world financial markets before the mid-1990s where bonds are the main medium for international financial transactions. The third configuration, FI, corresponds to the current state of world financial markets. Under FI, households have access to international bonds, equity issued by domestic firms, and equity issued by foreign firms producing traded goods.

A particular aspect of our model deserves special note. In all three market configurations we consider, international risk-sharing among households is less than perfect. In other words, we only consider international capital flows in equilibria where markets are incomplete. As we move from the FA to PI and then to FI configurations of the model, the degree of risk-sharing increases, but households never have access to a rich enough array of financial assets to make markets complete. We view this as an important feature of the model. There is ample evidence that incomplete risk-sharing persists even with the high degree of financial integration we see today (see Backus and Smith, 1993; Kollmann, 1995 and many others). This observation precludes us from characterizing our FI configuration as an equilibrium with complete markets.

Our analysis is related to three major strands of research. The first strand studies the effects of financial liberalization on capital flows and returns. Examples of theoretical research with this focus include Obstfeld (1994), Bacchetta and Van Wincoop (2000), Martin and Rey (2000), while empirical assessments can be found in Bekaert et al. (2002a, 2002b), Henry (2000), Bekaert and Harvey (1995, 2000), Albuquerque et al. (2005) and many others. Our contribution is primarily to the theoretical branch of this literature and consists of considering a model that allows for a rich menu of risky and riskless assets, including trade in equities. Furthermore, we do so in the environment with incomplete asset markets.

The second strand of research focuses on the joint determination of capital flows and equity returns. Representative papers in this area include Bohn and Tesar (1996), Froot and Teo (2004), Stulz (1999), Froot et al. (2001). Hau and Rey (2004, 2006) extend the analysis of the equity return–capital flow interaction to include the real exchange rate. Our focus is on the role of financial integration for this interaction.

Finally, the third strand of the literature studies the macroeconomic implications of financial integration. Baxter and Crucini (1995), Heathcote and Perri (2002) and Bhamra (2009) compare the equilibrium of models with restricted asset trade against an equilibrium with complete markets. The comparative approach adopted by these papers is closest to the methodology we adopt, but our model does not equate financial integration with complete markets. An alternative view of integration is that it reduces the frictions that inhibit asset trade. Examples of this approach include Buch and Pierdzioch (2005), Sutherland (1996), Senay (1998), Bhamra et al. (2012). In a companion piece, Evans and Hnatkovska (2007), we use the model developed here to study the effects of integration on welfare and the volatility of output and consumption. Our key departure from this literature is the focus on financial variables, such as capital flows and asset returns, and their interaction with the real variables in general equilibrium.

Although the model we develop has a relatively simple structure, several technical problems need to be solved in order to find the equilibrium associated with any of our market configurations. The first of these problems concerns portfolio choice. We interpret increased financial integration as giving households a wider array of assets in which to hold their wealth. How households choose to allocate their wealth among these assets is key to understanding how financial integration affects

international capital flows, so there is no way to side-step portfolio allocation decisions. We model the portfolio problem as part of the intertemporal optimization problem of the households allowing for the fact that returns do not follow i.i.d. processes in equilibrium. The second problem relates to the degree of risk sharing. Since markets are incomplete in all the configurations we study, we cannot find the equilibrium allocations by solving an appropriate planning problem. Instead, the equilibrium allocations must be established by directly checking the market clearing conditions implied by the decisions of households and firms. We use the solution method in Evans and Hnatkovska (2012) to compute equilibrium allocations and prices in this decentralized setting.

Several recent papers have developed and analyzed models with endogenous portfolio choice. The majority of this work (see, for instance Engel and Matsumoto, 2009; Coeurdacier and Gourinchas, 2008; Coeurdacier et al., 2010; Devereux and Sutherland, 2008 and others), focuses on asset positions, while our focus is on capital flows, returns and the role of financial integration. Didier and Lowenkron (2009) analyze capital flows, but in a partial equilibrium setting, where returns are exogenously given. In contrast, ours is a general equilibrium model. Pavlova and Rigobon (2010) work out equilibrium portfolio and capital flows in a general equilibrium setting, but with no production. Furthermore, they do not address the question of how portfolios change with the degree of integration. Bhamra et al. (2012) study the effects of financial integration on equity positions and asset returns, but not on capital flows. Tille and van Wincoop (2010), Devereux and Sutherland (2010a) study capital flows in general equilibrium settings with incomplete asset markets, but do not discuss the implications of financial integration for capital flows and asset returns. Furthermore, these papers examine stylized models of endowment economies in which international assets take the form of equity or bonds. Our framework allows for both bond and equity flows in a richer modeling environment with production and multiple sectors that is frequently used in the study of international business cycles.

We calibrate the model to match the real business cycle moments in the US and ask whether it can replicate the properties of financial variables and their changes over time. This approach ensures that the financial features we study are consistent with well-established characteristics of real international business cycles. Importantly, we do not embellish the financial side of the model in an attempt to exactly replicate the behavior of capital flows and returns so our findings are clearly linked to the degree of financial integration. (Adding financial frictions to fine tune the model's implications is left for future research.)

A comparison of the equilibria associated with our three market configurations provides us with several striking results:

1. We find that bond and equity flows in the PI and FI financial regimes of the model are larger than in the data, but their volatility is in line with the volatility of bond and equity flows found in the data for the G-7 countries.
2. Starting from the PI economy, when households gain access to foreign equity markets (FI economy), we find that the size and volatility of international bond flows decline. While this pattern mimics that found in the data for the G-7 countries, the model underpredicts the size of the decline.
3. In our model, variations in the equity risk premia account for almost all of the international portfolio flows in bonds and equities. Changes in the risk premia arise endogenously as productivity shocks affect the conditional second moments of returns, with the result that households are continually adjusting their portfolios. Although these portfolio adjustments are small, their implications for international capital flows are large relative to GDP.<sup>2</sup>

<sup>2</sup> These results are in line with those of Tille and van Wincoop (2010) who also emphasize the role of endogenous time-variation in expected returns and risk in determining international portfolio flows.

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