

# International Capital Flows

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## Summary

Existing theories of international capital flows are generally based on models where either one risk-free bond is traded or where financial markets are complete. Both frameworks have significant limitations. One-asset models only have something to say about *net* capital flows, not *gross* flows. Moreover, changes in expected returns of assets (e.g. of investing in Europe relative to the U.S.), or risk characteristics of assets, play no role since there is only one risk-free asset. In models where financial markets are complete capital flows are rarely even computed since the real allocation does not depend on the particular asset market structure that implements the asset market completeness. Moreover, there is extensive empirical evidence against complete markets.

The need for better models of capital flows is further reinforced by developments in global finance over the past two decades. We have seen a sharp increase in gross capital flows and positions. External assets and liabilities have roughly tripled among industrialized countries over the past two decades. Much larger external positions have also led to widely discussed valuations effects as asset price and exchange rate changes interact with much larger outstanding assets and liabilities. Finally, global imbalances have significantly increased as well, which has led to an extensive debate about the external adjustment process to such global imbalances, involving changes over time in capital flows, exchange rates, interest rates and asset prices.

In this paper we develop a methodology for solving dynamic stochastic general equilibrium (DSGE) open-economy models with a limited number of assets where financial markets are generally incomplete. We show why standard first- and second-order solution methods no longer work in the presence of DSGE models with portfolio choice, and extend them giving special treatment to the optimality conditions for portfolio choice. We apply the solution method to a particular two-country, two-good, two-asset model and show that it leads to a much richer understanding of both gross and net capital flows. The approach highlights time-varying portfolio shares, resulting from time-varying expected returns and risk characteristics of the assets, as a potential key source of international capital flows.

The model contains two assets, Home and Foreign equity. Capital flows are the result of both portfolio growth and portfolio reallocation. Portfolio growth results from capital flows associated with investing an increase in savings in Home and Foreign assets based on steady state portfolio shares. Portfolio reallocation results from active reallocation of portfolios between Home and Foreign equity. Portfolio reallocation is the result of both (third-order) changes in expected returns on Home relative to Foreign equity and time-variation in second moments (e.g. the variance of the excess return and the covariance between the excess return and the real exchange rate). We show that both sources of portfolio reallocation can have a large impact on capital flows.

Finally, the model is used to consider the external adjustment to global imbalances. In general a country with a net external debt can finance the debt by either running future trade surpluses or by earning higher expected returns on assets than it pays on liabilities. We show though that the expected excess return is zero to a first-order. This means that to a first-order an external debt needs to be financed by future trade surpluses. While to the first-order there are expected (real) exchange rate and asset price changes, as well as expected differences in dividend yields on the two assets, there is no net financing of the external debt by the sum of expected valuation effects (exchange rates and equity prices) and differential dividend yields.