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# International capital markets and redundant securities

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## Abstract

In this paper we propose a general equilibrium model of a two-country, two-good complete dynamic financial market. We fully characterize the equilibrium, and show that under time-additively separable preferences there exist redundant securities in international capital markets. For example, using the foreign bond and domestic securities, investors are able to replicate foreign equity. However, unlike Zapatero (1995. Equilibrium Asset prices and exchange rates. *Journal of Economic Dynamics and Control* 19, 787–811) and Pavlova and Rigobon (2003. Asset prices and exchange rate. NBER Working Paper # 9834), the perfect correlation between equity markets obtained under the restrictive assumption of logarithmic preferences does not hold under more general specifications of utility, even though the pricing kernels in the two countries are perfectly linked through the exchange rate.

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## 1. Introduction

In this paper, we develop a general equilibrium model of international capital markets. We consider a continuous time, two-country, two-good exchange economy. The intertemporal preferences of the investors are additively separable over time.

We derive the real exchange rate endogenously. We also characterize the uncovered interest rate parity relationship in a dynamic framework. This differs from interest rate parity in a static setting, because the dynamic relationship is augmented by an additional risk premium capturing real exchange rate risk. The pricing kernels in the two countries are linked via the exchange rate, which supports the law of one price and is the no-arbitrage condition in international financial markets. Overall, we fully characterize the equilibrium.

Under time-additively separable constant relative risk aversion (CRRA) preferences for investors, we demonstrate the existence of redundant securities in international capital markets. For example, it is possible to replicate the risky foreign stock using domestic securities and the foreign bond. But unlike [Zapatero \(1995\)](#) and [Pavlova and Rigobon \(2003\)](#), who show that equity markets are perfectly correlated internationally under the assumption of time-additively logarithmic preferences for investors, our work demonstrates that this result does not hold in the general case.

Closely related to our work is the paper by [Cass and Pavlova \(2004\)](#). They study a multiple-good economy with agents having additively separable log-linear preferences. They show that the stock market is completely degenerate, in the sense that all stocks offer the same investment opportunity. Thus, their results obtained with respect to equity redundancy are similar to ours. For more general additively separable utility specifications, however, their conclusion does not hold, particularly the argument that all stocks offer a similar investment opportunity. To replicate one of the securities in their framework, investors have to trade in the goods and securities markets simultaneously. Since their framework is in a domestic context, there is only one risk-free security available to investors. In our model it is possible for investors to replicate one of the assets by trading financial securities only. Indeed, trading the foreign bond is a good proxy for trading the exchange rate risk. For example, by trading domestic equity and the foreign and domestic bonds, agents can replicate foreign equity.

Our paper is related to a number of papers in the international economics and finance literature. [Zapatero \(1995\)](#) and [Pavlova and Rigobon \(2003\)](#) determine the dynamics of equity prices and the real exchange rate in dynamically complete international markets with two countries and two goods. In their settings, agents have time-additive logarithmic preferences, which implies perfect correlation between equity markets. [Serrat \(2001\)](#) studies a two-country exchange economy with heterogeneous agents and non-traded goods, and shows how the presence of non-traded goods helps explain the home bias puzzle. [Brandt et al. \(2006\)](#) specify an exogenous process for the exchange rate and study the relationship between exchange rates and international risk sharing. [Dumas and Uppal \(2001\)](#) and [Basak and Croitoru \(2006\)](#) study economies with imperfect goods markets, and show how the integration of financial markets can attenuate the anomalies introduced by these

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