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International portfolio diversification and multilateral effects of correlations ☆

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ABSTRACT

Not only are investors biased toward home assets, but when they do invest abroad, they appear to favor countries with returns more correlated with home assets. Often attributed to a preference for familiarity, this 'correlation puzzle' further reduces effective diversification. We use a multi-country general equilibrium model of portfolio choice to study how bilateral equity holdings are affected by return correlations among alternative destination and source countries. From the theoretical model, we develop an empirical approach to estimate a gravity equation for equity holdings that incorporates the overall covariance structure in a theoretically rigorous yet tractable manner. Estimation using this approach resolves the correlation puzzle, and finds that international investors do seek the diversification benefits of low cross-country correlations, as theory would predict.

1. Introduction

Home bias in equities is a long-standing puzzle in international finance: investors on average prefer to hold too large a share of their portfolios in domestic assets, given the diversification benefits of

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assets abroad.[1] Further, even when investors diversify abroad, evidence suggests that they prefer countries with a high correlation in returns to their home country.[2] Because a high correlation lowers diversification potential, this behavior compounds investor losses from home bias. Some researchers have explained this second anomaly, termed the 'correlation puzzle,' as a preference for familiarity when investing abroad.[3]

Understanding the correlation puzzle requires a multi-country perspective, both theoretically and empirically.[4] In the context of a multi-country general equilibrium framework, it becomes clear that the optimal share of country *i*'s portfolio in the assets of a foreign country *j* depends not just on the correlation of returns between countries *i* and *j*, but also on the broader set of correlations with other countries. As Okawa and van Wincoop (2012) pointed out, existing empirical frameworks for the estimation of the effect of the bilateral correlation on portfolio shares fail to control for the correlations with all other countries, and hence the existing empirical literature studying correlations lacks a theoretical foundation. Given that correlations are central to modern theories of portfolio choice, there clearly is a need for an empirical approach to deal with them.

This paper uses an N-country general equilibrium model to understand how bilateral asset holdings are affected by the covariances among all potential destination and source countries. We use the model to derive an estimation equation that controls for the overall covariance structure in a theoretically rigorous yet tractable manner. The idea is to apply a second order Taylor approximation, widely used in dealing with the nonlinear Euler equations in portfolio models, to the overall portfolio solution as well. In this second-order approximation, the proliferation of covariances implied by the covariance matrix in the portfolio solution of an N country model collapses down to several key average covariances: the covariance between the source country and the destination country, the average covariance between the source and other potential destination countries, the average covariance between the destination and other potential source countries, and the average covariance among countries other than the source and the destination countries. Each of these groups of covariances has a distinct effect on bilateral equity holdings between a given pair of countries, so that the covariance structure can be summarized in the estimation equation by adding three new average covariance terms.

In the absence of our recommended controls, where the only covariances included are the bilateral covariances between source and destination, estimation tends to reflect the puzzle by predicting a preference for high correlations. But the sign of the coefficient on the bilateral correlation becomes negative when the other covariance terms recommended by our theoretical derivation are included. This suggests that investors do prefer destination countries with low comovement of returns with the home country, as theory would predict. We conclude that adequately controlling for the overall covariance structure is not merely a theoretical nicety, but has practical consequence in terms of helping uncover a statistically significant negative effect of bilateral returns comovement on bilateral equity holdings. Our empirical results are robust after controlling for other familiarity factors from previous literature, such as distance, border, common language, etc, as well as controlling for legal restrictions on capital market openness.

Our theoretical framework is consistent with the model used in Okawa and van Wincoop (2012), but we go beyond the general conclusion that the overall covariance structure matters, to make specific predictions about how different groups of covariances have distinct effects on bilateral holdings, predictions that we can test in our empirical work. More crucially, we answer the challenge raised in

[1] See French and Poterba (1991); Coeurdacier and Rey (2013).

[2] See Aviat and Coeurdacier (2007); Coeurdacier and Guibaud (2011).

[3] See Huberman (2001); Barberis and Thaler (2004).

[4] General equilibrium asset-pricing models have become widespread in international macro-finance research, with the development of higher-order approximation techniques, but these models are generally two-country frameworks. See Devereux and Sutherland (2011) and Tille and van Wincoop (2010) for a discussion of methodology, as well as Engel and Matsumoto (2009), and Evans and Hnatkovska (2012) for applications. The few papers that model more than two countries in general equilibrium tend to assume that the countries are symmetric and have independent returns, such as Baxter et al. (1998), so these cannot study the choice of investors between alternative destination countries. Okawa and van Wincoop (2012), discussed further below, consider an extension with a general covariance structure, but their focus is on the role of financial frictions rather than heterogeneous correlations.