Emerging Markets Queries in Finance and Business

A Factor Analysis Approach of International Portfolio Diversification: Does it Pay Off?

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Abstract

One of the most intriguing and debated issues in portfolio theory are the interrelationships between stock markets and the real effects of these to international portfolio diversification. As markets become more integrated the co-movements between markets tend to rise, undermining the benefits of international portfolio diversification. Our paper proposes to study the changes in the linkages between stock markets returns from 12 countries with a factor analysis approach between September 1997 and May, 2012, emphasizing the Eastern European markets. The Principal Component Analysis (PCA) and the Maximum Likelihood (ML) methods are used to study the patterns underlying the stock market relationships.

1. Introduction

The level of interaction or independence between markets has important consequences in terms of predictability, portfolio diversification and asset allocation. The concept of international diversification was introduced by Markowitz in 1952; while Grubel, 1968; Levy and Sarnat, 1970; and Solnik, 1974 establish that international diversification reduces the systematic risk of a portfolio.

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It is important to notice that in the financial literature three main approaches arise in describing the relationships between markets. The first group of studies measures stock market integration by using a single criterion, namely the law of one price. This approach introduced by Tamir,1972 and tries to explain assets price level through the influence of a global market. At the base of this lies the CAPM, which states that a common asset pricing model should be able to explain the different price levels of assets on different markets. This type of integration can be viewed as *integration through prices*. The second view of integration was introduced by Feldstein and Horioka, 1980, and, in order to determine stock market integration the impact of barriers to capital mobility is measured. Formally it can be viewed as *capital-flow integration*, since it is connected to the mobility capital between stock markets. The third approach compares the evolution of stock markets in order to observe their degree of integration. *Risk integration* defines integration from the point of view of mutual risk factors in asset returns, where these features are rather global than national specific.

As we can observe, the approaches for defining the relationships between markets differ, but so do also the methodologies that explore and try to capture the linkages between them. There are mainly four distinctive techniques: the first investigates the relationships between stock markets using the correlation coefficient. Following this approach King and Wadhwani, 1990 find an increase in stock market correlation, as do Calvo and Reinhart, 1996. Baele and Inghelbrecht, 2010 use a dynamic regime-switching model to characterize the fundamental linkages between markets, they find that stock markets become more integrated, but they do not find evidence of contagion. This conclusion of no contagion, only a higher level of dependence between markets is conclusive with the results of Forbes and Rigobon, 2002.

The second type of methodology examines the cointegration vectors between the stock indices for capturing over longer periods of time the changes in the interlinkages between markets. As stated earlier through international portfolio diversification gains can be achieved, if the different markets are not integrated. On the other hand, if integration between markets is indubitable, international diversification may have only a limited potential. Arshanapalli, Doukas and Lang, 1995 find evidence of common stochastic trend between the studied markets, as do Gilmore and McManus, 2001; Syriopoulos, 2006; Narayan, Mishra and Narayan, 2011. Other studies, like Richards, 1995; De Fusco et al, 1996, Kanas, 1998; Ahlgren and Antell, 2002; Ng, 2002; Phylaktis and Ravazzolo, 2005 argue that investors can still benefit from international portfolio diversification.

The third approaches involve the univariate and multivariate general autoregressive conditional heteroscedasticity models for estimating the variance-covariance structure between the markets. Hamao, Masulis and Ng, 1990 use this procedure to examine the relationships between the analyzed markets, and find spillover effects, characterized by different grades of asymmetry from one market to another. The same conclusions of raised correlation between stock markets in periods of high volatility is reached by Longin and Solnik, 1995; Edwards, 1998; Lin, Engle, Ito, 1994; Bae and Karolyi, 1994; Bekaert and Harvey, 1995; Fratzcher, 2002; Choudry, 2004; Billio M., Caporin, M., 2007.

The forth approach uses factor analysis to investigate the relationships between markets. Ripley, 1973 adopting this approach in one of the first papers concludes that in developed countries between stock markets a certain link can be found. Naughton, 1996; and Hui, 2005 using the same approach both conclude that potential for diversification still exists in the Asian countries. Illueca and Lafuente, 2002 together with Fernandez-Izquierdo and Lafuente, 2004 examine the linkages at an international level during the Asian crisis, and conclude that contagion and integration can be identified, with no real portfolio diversification effects. Valadkhani, Chancharat and Harvie, 2008 conclude that geographical proximity and the level of economic development influences the degree of connection between markets. In this case investor can benefit from international portfolio diversification and reduce systematic risk only if the construction of the portfolio respects these guidelines.