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Correlation dynamics in European equity markets☆

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Abstract

We examine correlation dynamics using daily data from 1993 to 2002 on the five largest Euro-zone stock market indices. We also study, for comparison, the correlations of a sample of individual stocks. We employ both unconditional and conditional estimation methodologies, including estimation of the conditional correlations using the symmetric and asymmetric DCC-MVGARCH model, extended with the inclusion of a deterministic time trend. We confirm the presence of a structural break in market index correlations reported by previous researchers and, using an innovative likelihood-based search, we find that the it occurred at the beginning the process of monetary integration in the Euro-zone. We find mixed evidence of asymmetric correlation reactions to news of the type modelled by conventional asymmetric DCC-MVGARCH specifications.
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1. Introduction

International fund managers usually divide their equity portfolios into a number of regions and countries, and select stocks in each country with a view to outperforming an agreed market index by some percentage. This provides asset diversity within each country together with international diversification across political frontiers. Two interrelated features of this strategy have attracted the recent attention of financial researchers and practitioners. The *first* relates to expected returns. A growing body of empirical evidence on the performance of mutual and pension fund managers has questioned the extent to which they systematically outperform their benchmarks (Blake and Timmerman, 1998; Wermers, 2000; Baks et al., 2001; Coval and Moskowitz, 2001). To the extent that fund managers fail to add value when account is taken of their fees, the more passive strategy of buying and holding the market index for each country might yield an equally effective but more cost-efficient international diversification. The *second* relates to risk. It has been known for some time that equity return correlations do not remain constant over time, tending to decline in bull markets and to rise in bear markets (De Santis and Gerard, 1997; Ang and Bekaert, 1999; Longin and Solnik, 2001). Correlations also tend to rise with the degree of international equity market integration (Erb et al., 1994; Longin and Solnik, 1995), which has gathered pace in Europe since the mid-1990s (Hardouvelis et al., 2000; Fratzschler, 2002). It is of considerable interest, therefore, to investigate the relative strengths of the trends in correlations in European equity markets, because the findings have relevance for the diversification properties of passive and active international investment strategies.

We investigate the correlation trends and dynamics in the equity markets of the European Monetary Union (henceforth, Euro area). In particular, we study the correlation between Euro area national stock market indices over various sample periods. For comparison, we also study the correlation amongst a sample of individual Euro area stocks. We first model correlations in an unconditional setting and we test for the presence of either a stochastic or a deterministic time trend. We then model them in a conditional setting. To this end, we apply the DCC-MV GARCH model of Engle (2001, 2002) and Engle and Sheppard (2001) and we extend it with the inclusion of a deterministic time trend. In so doing, we specify the model to facilitate testing for non-stationarity, structural breaks and asymmetric dynamics in the correlation processes. To identify the date of the structural break, we employ an innovative search that maximise the likelihood of the multivariate conditional correlation model. Finally and more innovatively, to test for residual asymmetry in the distribution of asset returns not captured by our model, we employ the Engle and Ng (1993) diagnostic test in a multivariate setting.

We find significant persistence in all our conditional correlation estimates. We also provide weak evidence that index correlations tend to spike up after joint negative news, but contrary to the recent evidence of Cappiello et al. (2003) and others, this phenomenon is not well captured by a linear specification. We confirm a significant rise in the correlations amongst national stock market indexes that can best be explained by a structural break shortly before the official adoption of the Euro. It follows that portfolio managers investing in the Euro-zone should not overestimate the benefits of pursuing passive international diversification strategies based on holding national stock market indexes.

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