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Spillovers and correlations between US and major European stock markets: the role of the euro

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Abstract

This article investigates the impact of the introduction of the euro on the interactions across the New York, London, Frankfurt and Paris stock markets. After controlling for possible returns and volatility spillovers, we focus on the correlations of shocks using the framework of Dynamic Conditional Correlations (DCC). Daily pseudo-closing prices (recorded at 16:00 London time) are used to avoid conflating correlation and spillover effects. Statistical break tests confirm that the introduction of the euro significantly affects the cross-market correlations. Although dynamic correlations of shocks between all market pairs increase, the correlation in the post-euro period is highest between Frankfurt and Paris, indicating increased integration of these markets. Other findings include the presence of spillover effects from foreign markets for both returns and

volatilities, with asymmetries in volatilities and conditional correlations such that negative shocks have larger effects than positive ones.

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Notes

[1] Milunovich and Thorp (2006) also use pseudo-closing prices.

[2] The 16:00 London time is equal to 16:00 Greenwich Mean Time (GMT) in winter and 15:00 GMT in summer. It corresponds to 11:00 New York time, apart for a short period around the change to daylight saving time in the UK.

[3] The data is extracted from DataStream. Missing observations for holidays in each country are replaced by the price of the previous day, so that the sample for each country contains all days of the week except weekends.

[4] The Deutscher Aktien Index-30 (DAX-30) is a price-weighted index of the 30 most heavily traded stocks in the German market, while the Financial Times Stock Exchange (FTSE)-100 consists of the largest 100 listed UK companies by full market value. CAC-40 is calculated on the basis of 40 largest French stocks based on market capitalization on the Paris Bourse. Finally, Standard & Poor (S&P)-500 is a value weighted index representing approximately 75% of the total US market capitalization.

[5] While returns denominated in a common currency are relevant for international investors, nevertheless such returns reflect both relationships across stock markets and currency movements.

[6] More complicated VAR models were considered in the context of a constant conditional correlation specification, with day-of-the-week dummies or weekly lags, in

order allow for a weekly cycle in returns. The results were, however, essentially unchanged from those of (1).

[7] In principle, we would like to allow the possibility of cross-market persistency effects, which would imply including terms for j ≠ i in (2). However, the addition of these terms resulted in convergence problems in estimation and hence they are excluded from our model.

[8] This condition was checked for all estimated models and found to be satisfied.

[9] The specification of van Dijk et al. (2006) assumes an instantaneous change in the unconditional correlation. The formulation in (5′), on the other hand, implies a smooth change in the unconditional correlations; see van Dijk et al. (2006).

[10] The reported single step estimation results were compared with two-step estimates, where the DCC parameters are estimated conditional on those of the mean and volatility equations. Qualitatively similar results were obtained for all estimated coefficients and their SEs, except that the SEs for all DCC coefficients were smaller using the single step estimation.

[11] In addition to the actual introduction of the euro, various other dates were considered (including the Dublin Declaration in December 1996 and the May 1998 announcement of the countries that would adopt the euro). However, based on the likelihood ratio tests, there is no significance change at these dates. Moreover, the use of a smooth transition in correlations model revealed that the change in correlations occurred around the actual introduction of the euro, rather than at earlier dates. These results are available from the authors upon request.

[12] We also estimated CCC specifications with and without a correlation break in January 1999. The resulting correlations are qualitatively very similar to the corresponding mean DCC values reported in Panel B of Table 1.

[13] At the time this work was undertaken, pseudo-closing prices were available only for 16:00 London time. It is an interesting question for further research whether and how the apparent leadership role changes with the specific time at which returns are measured.

[14] We are grateful to Maria Kasch-Haroutounian for drawing our attention to this point.

[15] The relative importance of the asymmetry (or leverage effect) can be measured by the ratio $|-1 + \gamma_j|/(1 + \gamma_j)$.

[16] It might be noted that the most notable sharp decline in the correlation between Germany and the US in Fig. 1 reflects the impact of the terrorist attacks of 9/11 and our treatment of 'holidays'. In particular, because the New York market was closed subsequent to the attacks, and we replaced these missing values by the last available observation, the decline recorded by other markets is not reflected in New York. A similar decline also occurs for New York with Frankfurt, but is less marked for London and New York.