THE IMPACT OF EU INTEGRATION ON THE RISK-RETURN TRADE-OFF OF EUROPEAN DIVERSIFIED PORTFOLIOS

Alexandra HOROBET  
Academy of Economic Studies  
Bucharest/Romania  
alexandra.horobet@gmail.com

Sorin DUMITRESCU  
Academy of Economic Studies  
Bucharest/Romania  
sorin.ase@gmail.com

Dan Gabriel DUMITRESCU  
Academy of Economic Studies  
Bucharest/Romania  
dandumiase@gmail.com

Iulia TINTEA  
Academy of Economic Studies  
Bucharest/Romania  
iuliat2003@yahoo.com

Abstract

The increase in international economic integration in the past decades, fueled by the amplified trade and financial flows around the world changed the size and scope of benefits that international investors may obtain from holding diversified portfolios. Our paper investigates the impact of increased capital market co-movements between emerging and developed markets from European Union, in the following directions: (1) analysis of cross-market correlations and identification of trends in cross-market correlations; (2) analysis of the risk-return performance of European portfolios formed of developed and emerging markets assets. Our approach attempts to investigate whether a diversified portfolio on a European basis, which includes developed and emerging EU markets, offers euro-based investors a better risk and/or return as compared to a purely developed EU markets portfolio. If this were true, then EU emerging markets represent diversification opportunities for euro-based investors.

Keywords: international diversification, capital market integration, correlations, emerging markets, European Union

JEL classification: F36, G11, G15
1. INTRODUCTION

The benefits of international diversification were first brought to the attention of international investors by Solnik (1974). He posited that there is a limit to the risk reduction to be achieved on a single market, because companies are affected by the same macroeconomic factors and the prices of their securities move more or less in tandem. Local diversification can do away with firm-specific risks such as strikes, but it leaves systematic risks untouched. However, it is possible to attain further risk reduction by adding foreign securities to the domestic portfolio: the countries’ economic cycles are not fully synchronised, which implies a correlation coefficient below 1 and ample opportunities for diversification. Although several caveats have to be considered, such as exchange rate risk, the overall risk of an international portfolio is still lower than that of a comparable domestic portfolio. The qualitative benefit of diversification left aside, Solnik (1974) also emphasised the quantitative benefits of investing on an international scale. More markets available mean more assets for investors to choose from and this has been of special interest for investors coming from countries with small stock markets.

The increase in international economic integration in the past decades, fuelled by the amplified trade and financial flows around the world changed the size and scope of benefits that international investors may obtain from holding diversified portfolios. Besides the positive effects of international financial markets’ integrations, such as a better allocation of resources and improved mitigation of risks, negative effects are also present, observable at the level of increased and joint volatility of financial markets around the world. Correlations between markets and assets traded in different national markets are expected to increase in time because the impediments to international investment are being progressively removed and countries are becoming more and more integrated, both from a political and economic point of view. However, their trend over the last 30 to 40 years has been less abrupt than one might expect, because the enhanced competition between national economies has frequently led to specialisation. Furthermore, coefficients would be even lower if measured in real rather than nominal terms. The downside is that they tend to surge in periods of international turbulence, such as financial crises and oil shocks; this phenomenon is known as correlation breakdown.

The classic result offered by Heston and Rouwenhorst (1994) that country factors are more important drivers of volatility and capital markets co-movements than are industry factors seemed to raise a challenge to the asset management industry. Coupled with the widespread opinion that larger capital flows across countries and the global search of arbitrage opportunities by international investors leads to higher correlations of stock returns across economies, this has the potential of changing the anticipated benefits to be obtained from international portfolio diversification. Starting from the well-known paper of Longin and Solnik (1995), the literature in the field failed to provide definitive conclusions on the matter. For example, Lee (2005) finds that conditional correlations between the US, Japan, and the Hong Kong stock markets are positive and increasing, Pascual (2002) finds evidence of increasing integration of the French stock market, but not of the British and German markets, while Rangvid (2000) also identifies a rise in the degree of convergence among European stock markets in the last two decades. On the other hand, Roll (1992) argues that stronger economic integration may lead to lower correlation of asset returns if the integration process is associated with higher sectoral specialization, while Heston and Rouwenhorst (1994) identify the country effects – fiscal, monetary, legal and cultural differences – as bet-
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ter explanatory factors for the co-movement of stock markets. Tavares (2009) analyzes the
impact of economic integration on cross-country comovements of stock returns, in a large
panel of developed and emerging countries, and finds that returns’ correlation is pushed up
by bilateral trade intensity, while the real exchange rate volatility, the asymmetry of output
growth and export dissimilarity between countries tend to decrease it. Bekaert and Hodrick
(2006) use a risk-based factor model and conclude that no evidence of an upward trend in
returns’ correlation across countries is observable, except in the case of European stock
markets. Their findings are accompanied by research – see, for example, Goetzmann et al.
(2003), Heaney et al. (2002) – that shows that cross country correlations in stock returns
change over time and are generally higher in periods of accentuated integration and of high
volatility of returns.

Central and Eastern Europe is a new stock market region among other emerging mar-
kets, as all these markets started to operate at the beginning of 1990s. The attention of
international investors towards this region was attracted by its high returns and low correla-
tions with other developed and emerging markets, but the effective benefits of
diversification received mixed results in the existing literature focusing on empirical evi-
dences. Gilmore and McManus (2002) found that there is no long-term relationship between
major markets in Central Europe, after conducting a co-integration test on stock returns
from these markets, while the Granger causality test they employed showed that no causality
is present between these markets and the US markets, but evidenced causation between
Hungary and Poland. The lack of benefits for portfolio investors from holding assets in these
markets is also documented by Shachmurove (2001), although his findings might be af-
fected by the short period of time chosen. Eger and Kocenda (2007) analyze co-movements
among three stock markets in Central and Eastern Europe (Hungary, Poland and Czech Rep-
ublic) and the interdependence between them and Western European markets (Germany,
France, and United Kingdom), using intraday price data. They find no signs of robust cointe-
gration relationships between stock indices in a bivariate or multivariate framework, but
discover short-term spillover effects both in terms of stock returns and stock price volatility.
Patev et al. (2006) evaluate the degree of market integration between the US stock market
and Central and Eastern European markets, through the use of cointegration, Granger cau-
sality and variance decomposition tests, by studying the long-run and short-run convergence
among stock prices in Hungarian, Polish, Russian, Czech and US markets. They find that
Central and Eastern European markets are segmented, but during the crisis times there is an
increase in the co-movements between markets, which leads to a sharp decrease in the di-
versification benefits for an American investor allocating his funds in the region’s stocks. At
the same time, the intensity of co-movements between markets decreased after the crisis,
which restores the diversification opportunities in Central and Eastern European markets.
Pungulescu (2008) studies the convergence of money markets, bond markets and stock mar-
kets, comparing the East-European New Member States to the EU15 countries, and finds
that stock market integration has started, but is generally weak. The best performers in the
region are Czech Republic, Poland and Hungary, but across the market integration indica-
tors used by the author, the performance of various countries is rather heterogeneous.

The current research continues previous attempts to investigate capital market linkages
between Central and Eastern European countries, including Romania, and between them and
Western countries, developed by Horobet and Lupu (2009) and Horobet and Dumitrescu
(2009, 2009a). Horobet and Lupu (2009) analyzed the stock markets of five emerging coun-
tries from the CEE region – Czech Republic, Hungary, Poland, Romania and Russia – and contrasted them against four major EU markets – Austria, France, Germany and United Kingdom – over the 2003-2007 period, aiming at identifying the speed and significance of information transmission among them, as included in stock market returns. Using different return frequencies, after performing cointegration and Granger causality tests, their results indicate that the markets react rather quickly to the information included in the returns on the other markets, and that this flow of information takes place in both directions, from the developed markets to the emerging ones, and vice versa. At the same time, investors on emerging markets seem to take into account information from the other emerging markets in the region. Nevertheless, the results cannot definitely indicate whether there is a direct transmission of information from one market to another or a common reaction of all markets to some other information relevant to them, either on a European or global level. More recently, Horobet and Dumitrescu (2009, 2009a) explored the increase in correlations between three emerging markets from the European Union – Czech Republic, Hungary and Poland – and three developed markets from the European Union, namely Austria, France and Germany, as well as the link between correlations and stock market volatilities in this sample of countries. They find that there is an observable and statistically significant positive trend in cross-market correlations after the euro introduction in 1999, which may indicate a higher integration of these capital markets. At the same time, they observe that movements in national stock markets are not fully synchronized, but correlations tend to be high in periods of high market volatility. Our paper extends the previous research by analysing of the risk-return performance of European portfolios formed of developed and emerging markets assets and by investigating whether a diversified portfolio on a European basis, which includes developed and emerging EU markets, offers euro-based investors a better risk and/or return as compared to a purely developed EU markets portfolio. The paper is organised as follows: Section 2 describes the data and our methodological approach, Section 3 presents the results, and Section 4 concludes.

2. DATA AND RESEARCH METHODOLOGY

2.1 Data sources and description

We use daily logarithmic return data for stock market indices from six European Union countries – Austria, Czech Republic, France, Germany, Hungary and Poland – over ten years, starting in January 4th, 1999 and ending in December 31st, 2008. Of them, three are developed markets – Austria, France and Germany – and three are emerging markets – Czech Republic, Hungary and Poland. The sample of countries was constructed in such a way as to allow the maximum number of comparative data following the introduction of the euro in 1999. All indices values were collected from Datastream and are Morgan Stanley Capital International (MSCI) indices for these countries. The indices are denominated in euro for the entire sample of countries. A description of the data is presented in Table 1.

<table>
<thead>
<tr>
<th>Table no. 1 Descriptive statistics of stock market returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Std. Dev.</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Jarque-Bera</td>
</tr>
<tr>
<td>Probability</td>
</tr>
</tbody>
</table>

Over 1999-2008, all emerging markets – Czech Republic, Hungary and Poland – offered investors average positive returns, ranging between 0.008% for Hungary and 0.062% for Czech Republic, while all developed markets recorded average negative returns, ranging from -0.009% for Germany and -0.002% for Austria. At the same time, the volatility of all emerging markets, as measured by the standard deviation of daily returns, was higher as compared to the volatility of developed markets: the Hungarian market volatility was the highest (1.973%), while the Austrian market volatility was the lowest (1.411%). These results confirm the previous analyses on returns and volatilities in developed as opposed to emerging markets. The returns were positively skewed for France and Germany and negatively skewed for Austria, Czech Republic, Hungary and Poland. All returns show non-normal leptokurtic distributions, as indicated by the values of kurtosis and Jarque-Bera normality test.

2.2 Methodological approach

We investigate the potential of Central and Eastern European to offer diversification opportunities for euro-based investors on two levels: (1) analysis of cross-market correlations and identification of trends in correlations; (2) analysis of diversified portfolios formed of developed and emerging markets from EU.

The analysis of cross-market correlations aims at observing the evolution of average correlations between pairs of countries and types of countries (developed against developed, emerging against emerging, and developed against emerging), as well as identifying statistically significant trends in correlations from 1999 to 2008. In case of higher market integrations one should observe significant positive trends in cross-market correlations.

We explore the potential of emerging markets from Central and Eastern Europe to represent valuable diversification opportunities for euro-based investors by tracking the monthly performance of three portfolios formed of the six capital markets in our sample between 1999 and 2008. The first one is an equally-weighted portfolio formed of all six markets (Austria, France, Germany, Czech Republic, Hungary and Poland) and we investigate whether such a portfolio offered investors a better risk and/or return compared to other two equally-weighted portfolios, formed only of developed markets, on one hand, and emerging markets, on the other hand. The second portfolio is the minimum variance portfolio, and we are interested in this case by the weights that developed and emerging markets hold in such a portfolio. The third one is the optimal risky portfolio formed of the six markets, with 1-month Euribor considered as the risk-free rate. Again, in the case of this portfolio, apart from its risk-return performance over time, we are interested in the weights allocated for emerging markets. We imposed no restrictions on the weights for the minimum variance portfolio, but we excluded the possibility of negative holdings when obtaining the optimal risky portfolio. This is not an unrealistic assumption, as short selling is highly restricted in emerging capital markets and the three markets included in our analysis are no exception.
3. RESULTS

3.1. Analysis of cross-market correlations

Table 2 shows the correlations of daily returns between 1999 and 2008 for all market pairs. The values of correlation coefficients vary between 0.387 for Germany and Poland and 0.858 for France and Germany. Correlations are higher for developed markets and lower between developed markets and emerging markets, on one hand, and between emerging markets, on the other hand. It is interesting to observe the evolution of correlations in time, as previous research suggests that as markets become more integrated this should be observable through higher correlations between them.

Table 3 presents the average values of cross-market correlations, calculated for pairs of all markets, but also for pairs of the three developed markets (DM to DM), for pairs of the three emerging markets (EM to EM), and for pairs of developed and emerging markets (DM to EM), for each year in the period under analysis and also for the entire 1999-2008 period. As we may observe, the average correlations are higher for developed markets as compared to correlations between emerging markets and correlations between developed and emerging markets, and they all increase between 1999 and 2008. Over the entire period, the average correlations of daily returns increase from 0.558 to 0.817 for pairs of developed markets, from 0.359 to 0.665 for pairs of emerging markets, and from 0.318 to 0.662 for pairs of developed and emerging markets. When we consider the increase in the average correlations from 1999 to 2008, the highest increase – 108.17% – is observable in correlations between emerging markets and developed markets, followed by the increase in correlations between emerging markets – 85.23%. This may suggest a more intense process of market integration involving emerging and developed markets in Europe, fueled by these countries’ accession to the European Union.

Aiming at improving the view over the increases in correlations between markets, we analyzed monthly correlations of daily returns in all markets, also for the entire period. The first observation is that all correlations display high volatility in time, which is higher in the case of emerging countries’ correlations. Second, the correlation between France and Germany is the highest over the entire period, but also the most stable, compared to all other market pairs’ correlations. This finding confirms previous results that indicate more synchronization in market movements for the countries that are part of an economic convergence process. As all stock market correlations fluctuate widely over time, a stable trend is not easy to identify in any of the correlations’ graphs. In order to identify the presence of a trend in the correlation series, we regressed the time series of correlations on a constant and time index using ordinary least squares.
Table 3 Average annual cross-market correlations of daily returns, 1999-2008

<table>
<thead>
<tr>
<th>All markets</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.374</td>
<td>0.364</td>
<td>0.385</td>
<td>0.421</td>
<td>0.307</td>
<td>0.405</td>
<td>0.476</td>
<td>0.588</td>
<td>0.632</td>
<td>0.693</td>
<td>0.495</td>
</tr>
<tr>
<td>DM to DM</td>
<td>0.558</td>
<td>0.446</td>
<td>0.498</td>
<td>0.542</td>
<td>0.401</td>
<td>0.646</td>
<td>0.648</td>
<td>0.746</td>
<td>0.833</td>
<td>0.817</td>
</tr>
<tr>
<td>EM to EM</td>
<td>0.359</td>
<td>0.395</td>
<td>0.490</td>
<td>0.456</td>
<td>0.416</td>
<td>0.369</td>
<td>0.602</td>
<td>0.644</td>
<td>0.568</td>
<td>0.665</td>
</tr>
<tr>
<td>DM to EM</td>
<td>0.318</td>
<td>0.326</td>
<td>0.312</td>
<td>0.369</td>
<td>0.239</td>
<td>0.336</td>
<td>0.377</td>
<td>0.515</td>
<td>0.587</td>
<td>0.662</td>
</tr>
</tbody>
</table>

Table 4 presents the results of the time coefficients resulted from the regressions where the dependent variable is the monthly correlation, as well as their annualized values. Although only thirteen out of fifteen coefficients are statistically significant at the 5% level – we find no significant trend of the correlations between France and Czech Republic, Germany and Czech Republic and Hungary and Czech Republic, all of them are positive, indicating that correlations between the six markets have gone up during the past ten years. The highest value of the trend coefficient is found in the case of Austria–Germany – the correlation between these two markets increased annually by an average of 5.49% (the result is similar to the one identified by using rolling correlations) – and the smallest value is in the case of Germany and Hungary – only an annual average increase of correlation of 1.93%.

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Trend</th>
<th>Trend (annualized)</th>
<th>T-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria/France</td>
<td>0.0041</td>
<td>0.0487</td>
<td>6.3101</td>
</tr>
<tr>
<td>Austria/Germany</td>
<td>0.0046</td>
<td>0.0549</td>
<td>7.0137</td>
</tr>
<tr>
<td>Austria/Czech Rep.</td>
<td>0.0032</td>
<td>0.0387</td>
<td>4.9887</td>
</tr>
<tr>
<td>Austria/Hungary</td>
<td>0.0034</td>
<td>0.0405</td>
<td>5.4104</td>
</tr>
<tr>
<td>Austria/Poland</td>
<td>0.0039</td>
<td>0.0468</td>
<td>6.2212</td>
</tr>
<tr>
<td>France/Germany</td>
<td>0.0018</td>
<td>0.0234</td>
<td>7.3581</td>
</tr>
<tr>
<td>France/Czech Rep.</td>
<td>0.0004</td>
<td>0.0043</td>
<td>0.5949</td>
</tr>
<tr>
<td>France/Hungary</td>
<td>0.0017</td>
<td>0.0203</td>
<td>2.5844</td>
</tr>
<tr>
<td>France/Poland</td>
<td>0.0032</td>
<td>0.0381</td>
<td>6.2938</td>
</tr>
<tr>
<td>Germany/Czech Rep.</td>
<td>0.0004</td>
<td>0.0053</td>
<td>0.7200</td>
</tr>
<tr>
<td>Germany/Hungary</td>
<td>0.0016</td>
<td>0.0193</td>
<td>2.3231</td>
</tr>
<tr>
<td>Germany/Poland</td>
<td>0.0033</td>
<td>0.0400</td>
<td>6.6023</td>
</tr>
<tr>
<td>Czech Rep./Hungary</td>
<td>0.0009</td>
<td>0.0107</td>
<td>1.4204</td>
</tr>
<tr>
<td>Czech Rep./Poland</td>
<td>0.0021</td>
<td>0.0256</td>
<td>3.5063</td>
</tr>
<tr>
<td>Hungary/Poland</td>
<td>0.0031</td>
<td>0.0376</td>
<td>5.5351</td>
</tr>
</tbody>
</table>

3.2. Analysis of EU portfolios

The potential of emerging EU markets to improve the risk and/or return profile of portfolios formed only of developed markets from EU is investigated by the means of three portfolios formed of the six markets included in this study: Austria, France, Germany, Czech Republic, Hungary and Poland. We investigate first the performance in terms of risk and return for the EU diversified portfolio, including all six markets, over 1999-2008 and we contrast it against the performance of other two portfolios: a portfolio including only the three developed markets and a portfolio including only the three emerging markets. All three portfolios are equally-weighted. Figure 1 shows the performance of the EU diversified portfolio (DM&EM) against the other two portfolios (DM and EM, respectively) in terms of...
monthly returns, while Figure 2 shows the monthly volatility of returns of the three portfolios, in terms of standard deviation of returns.

A number of observations are noteworthy for what concerns the performance of the three portfolios. First, both returns and standard deviations are fluctuating in time, for all three portfolios: monthly returns vary from -30.65% to 15.43% for the EM portfolio, from -19.57% to 10.55% for the DM portfolio and from -25.11% to 10.16% for the combined portfolio. Over the entire period, the EM portfolio offered investors the highest cumulative return, including here the drop recorded at the end of 2008: the EM portfolio cumulative return reached its peak in June 2007, when an investors would have had a return of 128.52% on one euro invested in January 1999, but this return was more than half lost due to the high negative returns in 2008. The story is more or less the same for the other two portfolios, which reached the peak of their cumulative returns in May 2007 (DM portfolio) and June 2007, but the values of these returns are smaller as compared to the EM portfolio. Also, by end of 2008 both portfolios’ cumulative returns declined dramatically, to become even negative (-9.93%) in the case of DM portfolio.

Standard deviations vary from one month to the other, ranging between 2.71% and 29.35% for the EM portfolio, between 1.89% and 22.98% for the DM portfolio, and be-
between 2.23% and 24.99% for the DM&EM portfolio. The average values of portfolios’ standard deviations are 6.06% for the EM portfolio, 5.02% for the DM portfolio and 4.93% for the combined portfolio, which indicate that on average the EU diversified portfolio represented a valuable investment opportunity for a euro-based investor.

Second, we conducted a more thorough analysis of the risk-return trade-offs for the three portfolios, whose results are presented in Table 5. The table shows that diversification opportunities provided by the combined portfolio over the DM or EM portfolio in terms of risk and/or return were not pervasive over the entire period of 120 months between January 1999 and December 2008. In the case of returns, the combined portfolio performed better than the DM portfolio in 64 months and than the EM portfolio in 56 months only. The dominance of the EU diversified portfolio over the EM portfolio is obvious for what concerns its volatility – in 107 months out of 120 the standard deviation of the combined portfolio was lower as compared to the standard deviation of the EM portfolio -, but the same conclusion does not hold for the DM portfolio: in its case, a euro-based investors would have obtained a lower standard deviation from holding the combined portfolio in only 63 months out of 120. Still, the combined portfolio offered investors a better risk and return in 37 months compared to the DM portfolio and in 52 months compared to the EM portfolio. These results indicate that the diversification opportunities offered by adding emerging capital markets from EU to a portfolio of developed countries from the same region are not consistent in time and, most likely, depend on the currency risk introduced by holding emerging countries in the overall portfolio.

The second portfolio whose performance we tracked between 1999 and 2008 is the minimum variance portfolio (MVP) for the six markets. In its case, we were interested by its risk-return trade-off and by the weights that developed and emerging markets would hold in such a portfolio. Figure 3 presents the risk and return for the MVP and Figure 4 the relative weights hold by developed and emerging markets in the portfolio. The average return over 1999-2008 was 0.566% and monthly returns varied between -18.34% (in October 2008) and 8.78% (in December 1999), while the average standard deviation was 3.15%.
Developed markets hold higher weights in the MVP over the entire period compared to emerging markets: the average weight for developed markets was 69%, against 30% for emerging countries. The weight for developed markets varied between 0% (May 2002) and 107% (March 2005), while the weight for emerging markets varied between -7% (March 2005) and 78% (September 2007). It is also interesting to observe that weights allocated to emerging markets in the MVP increased in 2007 and 2008 as compared to the previous periods.

The third tracked portfolio is the optimal risky portfolio (ORP) for the six markets. In its case again, we were interested by the risk-return trade-off and by the weights that developed and emerging markets would hold in such a portfolio. Figure 6 presents the risk and return for the ORP and Figure 6 the relative weights hold by developed and emerging markets in the portfolio. The average return over 1999-2008 was 4.41% and monthly returns varied between -21.33% (in October 2008) and 8.78% (in May 1999), while the average
The standard deviation was 5.17%, varying between 1.49% (December 2005) and 34.57% (October 2008).

Developed markets hold slightly lower weights in the ORP over the entire period compared to emerging markets: the average weight for developed markets was 49%, against 51% for emerging countries. In terms of countries, the Czech Republic had an average weight of 28%, followed by Austria (24%), France (14%), Germany and Hungary (12% each) and Poland (11%). These results should not be surprising, as higher returns in emerging markets are the basis for a better return in such a portfolio compared to the minimum variance portfolio: as in the case of MVP the lower standard deviation of developed markets played a significant role in the high weights for developed markets, here the returns provided to euro-based investors by emerging countries had the important saying. These higher average returns are partly explained by the appreciation of these countries’ currencies over a large part of the period under analysis, apart from their local markets’ performance.
4. CONCLUSIONS

Our paper investigated the impact of increased capital market co-movements between emerging and developed markets from European Union, in the following directions: (1) analysis of cross-market correlations and identification of trends in cross-market correlations; (2) analysis of the risk-return performance of European portfolios formed of developed and emerging markets assets. Our main interest was to explore whether a diversified portfolio on a European basis, including developed and emerging EU markets, would offer euro-based investors a better risk and/or return as compared to a purely developed EU markets portfolio. We find that correlations between emerging and developed countries from EU increased between 1999 and 2008, which indicates a higher degree of integration between these countries’ capital markets. Still, emerging markets proved to represent valuable diversification opportunities for investors holding only developed markets’ portfolios, particularly in terms of risk, but such opportunities are not pervasive and the weights that investors allocate for emerging countries in the minimum variance and optimal risky portfolios are highly variable from one month to the other.

References
